THE
FIELD NATURALIST.

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THE WOOD CHAT (*Linus Rufus*)

G. F. Moulton del. J. W. Moulton sculp. P. J. Brand.

THE
FIELD NATURALIST:

A REVIEW

OF

ANIMALS, PLANTS, MINERALS, THE STRUCTURE OF THE EARTH,
AND APPEARANCES OF THE SKY.

EDITED

BY JAMES RENNIE, M.A., A.L.S.

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ALPHABET OF BOTANY, &c. &c.

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THE
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JANUARY.

EAGLE-SHOOTING IN THE ALPS.

BY THE EDITOR.

IT is matter of common observation that whenever a hawk makes his appearance in a district, he is soon surrounded by a host of small birds, particularly swallows, which dart at him and tease him, for the purpose, as may be supposed, of distracting his attention, on the pro-

verbial principle that "wealth makes wit waver." But whether this be the true cause or not, it is certain that the cuckoo, which, on the wing, bears considerable resemblance to a hawk, is usually accompanied by a similar retinue of small birds wherever it flies. In the North this is so commonly observed, that the cuckoo is popularly believed to be always attended by the *titling* or pippet (*Anthus pratensis*, BECHSTEIN), which, it is further imagined, has been its step-mother and nurse from the egg: this, indeed, is the bird whose nest the cuckoo most frequently selects to deposit the eggs which she so strangely and unnaturally abandons; though it is more probable that it is not on this account, but because she appears to be a hawk, that the pippet and other small birds persecute her.

I had once an opportunity of witnessing an instance of this hostility towards the cuckoo, while observing the proceedings of some of the bank swallows in their populous colony near Charlton in Kent. I perceived a cuckoo flying quietly along, certainly meditating no harm against the swallows, and not even poaching on their domain by hawking for flies, inasmuch as he prefers a breakfast of caterpillars, which the swallows never touch; but the instant he appeared the tocsin was sounded, and every swallow in the colony darted out of the holes to pounce upon the intruder, whom they beat unmercifully, with bill and wing, till they drove him from their boundaries.

A still more general and determined hostility is manifested towards every species of owl, when any of these night marauders accidentally make their appearance by day, or happen to place themselves so as to be observed by the passing birds. In such cases, the first bird which discovers an owl, begins by peeping about at him, as if he were one of the seven wonders of the world, and ends in sounding the peculiar note of alarm, that appears to be understood as a universal language, by all species of birds, from the wren to the eagle. This alarm note has the effect of a gathering cry upon every bird within hearing, which immediately troops to the muster, and after peeping, as the first observer had done, at the poor owl, hastens to insult him in every tone of defiance, and even to pounce at him, with intent to follow up the preliminary threats by actual attack and buffeting.

The peeping curiosity, staring wonder, or hostile antipathy, manifested by all day-flying birds towards owls, is taken advantage of on the Continent for several purposes, but for none more interesting than that of eagle-shooting. When the goat-herds on the Alps, therefore, find their flocks diminished, and the chamois-hunters find their sport spoiled by the depredations of an eagle, or a lammer-geyer (*Gypaëtus barbatus*, STORR) haunting a particular district, they prepare to lure

him to his destruction by means of an owl. The largest species, such as the eagle-owl (*Bubo maximus*, SIBBALD), is always chosen, when it can be procured, for this purpose, the smaller species being less likely to attract the attention of large birds. The owl is chained by the legs to a post in some conspicuous place, so as to be seen at a distance, and a hut of boughs is erected within gun-shot, to conceal the sportsman while he lies in wait for the arrival of his game.

The thrushes, jays, and magpies, in such cases, are usually the first to descry the owl, and give intimation of his presence to the ravens and hawks; the eagles, if there be any in the district, being in most instances the last to arrive. But when they do come, they are no less eager than the smaller birds, to swoop down from the air to gaze at the strange bird, and to threaten him with voice and wing, for intruding himself into daylight. Then is the moment for the sportsman, who is keenly watching the whole proceedings from his concealment, to level his piece, loaded of course with ball, and to bring down the bird of Jove, from what Shakspeare so happily terms "his pride of place."

Were eagles more numerous in this country than they are ever likely to be, this would form an interesting variety in sporting, for those who delight in the exercise—a delight which originates first from the necessary suspense of uncertainty, and is precisely similar to that which induces a young lady to devour the pages of a romance; and secondly, from human sympathy with animal suffering, and is precisely similar to that which makes boys torment flies, which makes people flock to a bear-beating or an execution, which fills the theatres when a tragedy is to be performed, and which, in a word, is the common and immediate origin of much that is very good, and much that is very bad in human nature.

Lee, Kent, 6th Dec. 1832.

EXPERIMENTS ON THE SLEEPING AND WAKING OF PLANTS.

BY M. DUTROCHET, MEMBER OF THE INSTITUTE, PARIS.*

THE very remarkable influence produced upon the sleeping and waking of plants, by the atmospheric air contained in their air-organs (*organes aërifères*), has been demonstrated to me by a great number

* Translated from the French, by Miss H. G. Lee, Kent.

of experiments upon indigenous vegetables. I shall mention some of these.

It is well known that the leaves of the kidney-bean have evident intervals of sleeping and waking; they have besides a very remarkable nutation. I was desirous of ascertaining by experiments, the effects produced on these phenomena by withdrawing the interior air of the leaves. I took three leaves of the kidney-bean, which I shall call A, B, C. The leaf A was put into water, and kept during a quarter of an hour in vacuo: on restoring it to the air, the air cavities were entirely filled with water. The leaf B remained also a quarter of an hour in vacuo, but without having been immersed. The leaf C remained in its natural state. I put the stalks of these three leaves into vases filled with water, which I exposed to a full strong light. In the evening, the leaf A first exhibited the phenomenon of depressing its leaflets, or of sleep; the leaf B presented this phenomenon later; and the leaf C later still. The next day, the leaf C first presented the phenomenon of straightening its leaflets, or of waking; the leaf B next awoke; and last of all the leaf A. But the cessation of sleep in the two latter was incomplete; their leaflets remained during the whole day in a state of drowsiness, and they made no movement of nutation towards the light. The leaf C, on the contrary, not only straightened its leaflets completely, which constitutes the act of waking, but it inclined the upper side towards the window that admitted the light, which constitutes the act of nutation. On the evening of the second day, the leaf A was again the first to show the phenomenon of sleep; it was followed by the leaf B, and lastly by the leaf C; the latter ceased at the same time to keep the upper side of its leaf-stalks inclined towards the window; the nutation ceased during the night, and the leaflets resumed their natural position. On the third day, the leaf A presented no symptoms of waking, and began to wither; the leaf B revived in a trifling degree, but it continued drooping; the leaf C, perfectly alive, performed its functions as usual. On the fourth day, the leaf A was dead; the leaf B began to fade, and was dead the next day; the leaf C continued to live some time.

These experiments demonstrate to us, that the sleeping and waking of plants, and their nutation, depend on the air which is contained in their air-organs, and is in proportion even to the quantity of that air. The leaf A, the air-organs of which had been deprived of air, and nearly filled with water, slept earlier and awoke later than the leaf B, which having its air-organs deprived of air, had in the meantime remained inaccessible to its return. These two leaves gave no signs of

nutations, like the leaf C, which had preserved all the air naturally contained in the air cavities, and which, for this reason, was also later asleep and earlier awake than the two leaves A and B. Thus the sleep of vegetables is prolonged in proportion as there is less air in the air-organs. This, very probably, is one of the causes which vary the hours of sleeping and waking of plants. We remark also in these experiments, that the waking is more impaired than the sleeping by diminishing the interior air of the plants. When the diminution of the interior air is considerable, the sleep is equally profound as in the natural state, but the waking is incomplete. I have again tried the effect of a vacuum produced by the air-pump on the flowers of vegetables, which exhibit the phenomena of sleeping and waking. I have constantly seen that when a flower, either asleep or awake, is placed in a vacuum, it invariably preserves the state in which it is placed there. It is in vain that a flower placed in such circumstances is exposed to the light, or even to the rays of the sun; it never alters: the darkness of night comes in vain; it has no power to promote sleep in the plant which has been placed in a vacuum during its waking state. It is therefore well established by experience, that the vacuum of the air-pump, by withdrawing the air contained in the air cavities of plants, deprives them entirely of the faculty of moving the floral organs, in order to assume alternately the positions which constitute sleeping and waking. We have seen that this privation of air divests them of the faculty of moving, even when under the influence of anything that stimulates plants possessing this quality, such as the sensitive plant. By taking away the atmospheric air of plants, we suppress their excitability, or the faculty which they possess in various degrees of being affected by outward exciting causes, and of moving in consequence of this influence.

These experiments prove that the interior air is indispensably necessary for exercising the alternate movements which constitute sleeping and waking; and, in general, for the existence of the faculty, more or less apparent in plants, of being affected by the influence of certain exciting causes from without, and of executing the movements caused by this influence. In this point of view, the action of oxygen on the interior of plants appears to be very similar to the action of oxygen on the interior of animals. Among plants, as well as animals, the privation of this interior oxygen destroys vitality, or, in other words, causes *asphyxia* and death.

ON A NEW BRITISH SPECIES OF CUCKOO.

IN A LETTER TO THE EDITOR. BY ROBERT BALL, ESQ., DUBLIN.

SIR,

THE zeal manifested in your numerous publications on subjects of Natural History, induces me to make the present communication, conceiving that any addition to our British birds must prove acceptable to you. In the autumn of 1825, the butler of a neighbouring gentleman brought me to Youghal, in the county of Cork, a bird but a few minutes shot, and still warm and bleeding; not having, at that time, paid much attention to ornithology, I placed it in my collection as a "*rara avis*," though not then suspecting that it was unknown to British naturalists. Some years after I came to reside in this city; having shown it to several of my ornithological friends, I was somewhat surprised at its being unknown to them. On the publication of your edition of Montagu's Dictionary, I searched it in vain for more than one species of cuckoo, to which genus my bird evidently belongs. It thence struck me it was my duty to make it known, and I prepared the accompanying drawing, faithfully though rudely executed*, from the specimen as it now lies in my cabinet; but purposing to make a more finished one, I delayed sending it to you from day to day, until my attention was recalled to it by Mr. Glenon, an intelligent professional moulder of birds. He acquainted me that he had received a bird very like mine, recently shot at Old Connaught, near Bray, a short distance from this city. On comparison of our specimens, mine appears to be the larger and more highly coloured, in which particular it also excels a South American specimen, which Mr. Glenon is possessed of. The tail feathers of the latter, however, have the white somewhat more distinct at the points. The tail consists of ten feathers, the three outermost at each side tipped with white. The drawing conveys more distinctly than words can do the other peculiarities of colouring. The part not displayed in it is of uniform colour with the back of the head, except that the upper sides of the quill feathers have a warm reddish cast. My bird is much smaller than the common cuckoo; the bill rather larger; the feet smaller; the shank longer: the drawing is of the exact size of the original. The fact of a second instance of the bird being killed in this country, will, I conceive, entitle it to a place in

* The drawing sent to me is beautifully done.—EDITOR.

the catalogue of our natives. Should you wish for any further particulars on the subject, or deem this notice worthy of acknowledgment, I shall have much pleasure in hearing from you, and have the honour to be,

Sir, your most obedient servant,

ROBERT BALL.*

Dublin Castle, 20th Oct. 1832.

Cuckoo, reduced by one third from the original drawing.

DESCRIPTION OF THE CUCKOO, FROM THE COLOURED DRAWING.

BY EDWARD BLYTH, ESQ.

TOTAL length, from the tip of the bill to the end of the tail, eleven inches. Bill longer and rather more curved than in the common cuckoo; the upper mandible of a dark horn colour, black at the tip, and yellowish brown at the base; the lower, yellowish brown, tipped with black. The head, back of the neck, and all the upper parts, of a uniform olive brown colour, inclining to red on the upper sides of the quill feathers; the whole under-parts of a pale ashy-brown, darker about the breast, and inclining to buff on the thighs and under tail coverts. Under surface of the wings, pale buff, making a considerable contrast with the colour of the quill feathers, which are underneath of a brownish chesnut tint. The legs and feet of a dark ashy-brown; the shank rather longer in proportion than in the common cuckoo. Tail, wedge-shaped, and about five inches in length; the outer feather but three inches; the second, four inches and a quarter; and the third,

* I shall feel myself obliged and honoured by any farther particulars respecting these birds, or any other subject, from so valuable a correspondent.—EDIT.

nearly five inches long ; of an ash colour, edged and tipped with yellowish white *underneath* ; the colour of the upper surface unknown. Colour of the iris unknown ; and, as in the common species, the third quill feather of the wing is the longest.

Tooting, Surrey, 20th Dec. 1832.

NATURAL HISTORY OF THE ALDERMAN BUTTERFLY (*Ammiralis Atalanta*, RENNIE), FROM THE EGG TO THE ADULT INSECT.

BY MYNHEER J. C. SEPP, OF AMSTERDAM.*

1. Egg natural size ; 2. Egg magnified. 3. The young caterpillar concealed in a folded leaf ; 4. Caterpillar in its second skin ; 5. Caterpillar in its third skin ; 6. Caterpillar in its last skin ; 7. Caterpillar about to change into a chrysalis ; 8. This change farther advanced ; 9. The chrysalis complete.

LIKE all other butterflies, this species originates from an egg, which, however, is very rarely met with, because it is very small and green ; almost indeed of the same colour as the stinging nettle (*Urtica*

* Translated from the Dutch work, *De Wonderen Gods*, by C. Thonan, Esq. London.

dioica), on which it is laid by the mother butterfly, and therefore easily overlooked.

Although I had found, for many years successively, and in considerable numbers, the caterpillars and the butterflies of this species, I was long unsuccessful in procuring any of the eggs; but at last I succeeded, having found one on the 6th of July, at the very moment the mother butterfly had laid it, and it hatched as well as any other of this class. I found others afterwards, which had perhaps been longer deposited, and they likewise hatched, and I reared butterflies from them; so that now I know their whole manner of life, and their several transformations, and am enabled to detail these to the reader from my own observation.

As soon as the infant caterpillar is hatched, it begins to eat directly, and to look out for a place to live in. Providence has given it the faculty of spinning certain threads; and, after selecting a leaf, it draws it together, by means of these, into a roundish hollow form, leaving for the most part an opening into the interior before and behind. The leaf, when thus drawn together, serves as a house or tent for the little creature, and at the same time furnishes it with food; and hence the longer it lives in it the more perforated it becomes. When at length, it has gnawed so much of the leaf as renders it so full of holes that it becomes useless, the caterpillar quits it, and goes to another leaf, proceeding in the same way as it did with the first. Accordingly, when we are desirous of finding these caterpillars, we must search for them on those nettle leaves which are drawn together. I may mention, however, that not more than one caterpillar will be found on a single leaf.

The circumstance of hiding within a folded leaf, is not usual with every spiny caterpillar; and it appears to me, that this species does so, more from a peculiar liking to live solitary than from any fear of danger, inasmuch as they are exposed to no more danger or hardship than other spiny caterpillars, which roam about freely and openly on the leaves. This species, besides, is quite as hardy as the others, with respect to enduring cold and heat; and they are as much persecuted by parasite flies (*Ichneumonidæ*), which lay eggs in their bodies, as are other spiny caterpillars; nor is their dwelling in the folded leaf so securely constructed, as to prevent the intrusion of such unwelcome visitors*, a circumstance always attended with a mortal result.

* I have elsewhere mentioned an instance which fell under my own observation, of a parasite fly thrusting its eggs through a folded leaf into the body of an insect within.—*Insect Architecture*, p. 174. EDITOR.

There must then, I think, be some other reason for these caterpillars hiding themselves in this manner, and I am inclined to believe it can be no other than their desire to be solitary. In accordance with this view, we find the eggs always laid singly and apart; and it is well known to naturalists, that all caterpillars originating from eggs thus deposited are solitary, as those originating from clustered eggs are gregarious. The latter moreover remain in company so long as they are in the caterpillar state, while the former always occur dispersed, and lead a solitary life. In this manner, then, the caterpillars under notice live from the time they are hatched, and even exhibit the same disposition when they prepare for their change into the chrysalis state, as we shall afterwards see.

As to their manner of growth, such caterpillars differ widely from other animals which grow regularly in all their parts as they are supplied with nourishment; but our caterpillars, on the contrary, grow only in their inward parts, whose increase puffs out the skin or outer covering that does not grow, and hence becomes too small, so that at length it must give way. In fact, it actually does so, and this happens more than once during its life; a circumstance which I term the casting of the skin, and which is thus performed. A few days before the skin is cast, the caterpillar remains nearly stationary in the same place, and leaves off eating. About this period, the neck or hind part of the head may be observed to swell, in consequence of which the old skin becomes more stretched, the inner skin is separated from the outer, and in some smooth caterpillars the head may be discerned shining through. The old skin becomes gradually detached, and at length bursts asunder; the head with its new skin appearing through the opening, and successively the fore parts of the body, and the feet. Afterwards by repeated movements, the caterpillar strips off the old skin altogether, and appears in a new dress, which, as far as regards the one under our notice, differs little from the old one in colour and appearance. The head, however, is a little larger, as are the spines and small hairs.

With respect to the latter, it is remarkable that the new spines and hairs appear to have been inserted in the old ones as in sheaths, from which they are drawn out when the skin is cast. I infer from this circumstance, that these spines and hairs are hollow, though in consequence of their minuteness, some of them being barely visible to the naked eye, we cannot well demonstrate this otherwise. Who, I may ask, does not perceive in this wonderful fact, the incomprehensible operations of an all-powerful CREATOR! and where is the man who could imitate these astonishing productions?

Our caterpillar, after casting its skin and resting a little, begins again to eat the leaves of the nettle. I may mention, that all caterpillars do not cast their skins the same number of times; but with respect to the present ones, they cast their skins four times, and as they grow quickly, the castings closely follow each other, at due intervals between. I have traced this in two of these caterpillars, which were hatched from eggs the 12th of July, in the following order. Their first casting of the skins occurred on the 14th, the second on the 17th, the third on the 21st, and the fourth on the 26th. They then continued to eat and grow till the 15th of August, when, having completed their growth, and reached their full age as caterpillars, they left off eating, and prepared for entering upon their second stage of life, namely, that of chrysalis, which has no resemblance to the caterpillar. This change took place on the 17th of August.

It hence appears, that the first stage of life, or the caterpillar state of this insect, only lasts for five complete weeks; but I must remark, that in rearing the caterpillars for the purpose of observing their changes, they must have fresh food every day, and in a warm day twice, otherwise they will not thrive.

The cover of the box where they are kept, ought to have small holes in it for the admission of fresh air; or it may be covered with crape or gauze. It ought not to be too shallow; for if so, the wings of the butterfly, when it comes forth, may be bent or injured.

We have thus seen our insect in its first stages of life; but it is destined to arrive at a higher stage of existence, and is born to be admired, though it does not reach this stage till it has undergone sickness and suffering, with hardly any apparent sign of life. In a short time, however, it awakes from its trance, and appears full of animation, and is richly ornamented.*

ON THE MIGRATION OF BIRDS.

BY PROFESSOR TEMMINCK, OF THE UNIVERSITY OF LEYDEN.

I SHALL here give some observations on the periodical and frequently long journeys performed by several species of erratic birds, and on the points of reunion and departure which they appear to select. The yearlings and the old ones rarely go together in these journeys, which are more or less extended, as the necessity of seeking a fresh

* The History of the Butterfly itself will be given at a future opportunity.

supply of food for other climates, obliges them to quit those places which fail at certain seasons to furnish them with the means of subsistence. I think I have traced the separation of families, and their reunion in bands, of ages more or less equal, to a very natural cause, produced by the difference in the time of moulting in the old and young; and this also appears to be the cause that the bands composed of adults, migrate to a much greater distance, whether in autumn or at their return in spring, than the bands composed of young ones, which do not, in either season, extend their journey so far. The plumage of these birds being still imperfect, and the colours not yet durable, they are generally one or two years old before they are in a state to breed; they then choose those places where adults of their own species do not build their nests, the latter always expelling them from the districts which are to give birth to a new progeny. When the old ones extend their journey to the arctic regions, those of one or two years old are found in the middle countries of Europe; and when the old ones choose the temperate climates, the young ones remain at the south, or at farthest do not pass the seas which separate Europe from the northern parts of Africa; countries in which the greater number of the largest species of our erratic birds, that do not perfect their growth within the first year, choose to reside in winter. It is from these countries, or the numerous islands of the Archipelago, and those of the Mediterranean and the Gulf of Venice, that they set off on their return in the spring; numerous flocks are then seen on all our southern coasts, especially where the sea forms large gulfs, such as the Archipelago, the Adriatic Gulf, and those of Genoa and Lyons. These meetings continue eight, ten, or at most fifteen days; in which time the passage of those countries is completed.

The routes taken by water fowl and birds which frequent marshes, depend very much on the course of rivers, and the beds of the great lakes; the waters furnishing to each species its proper food, they seem to be impelled, by a wonderful instinct, to choose for a rallying point and place of departure, those spots whence the passage from the great sea to the lakes and rivers is shortest and least occupied by land. Thus the bands that assemble in the environs of Genoa and Lyons, repair forthwith to the banks of the Po; following afterwards the passes of the great valleys of the Alps, which descend into Piedmont, they rise above the mountains, where different species of the birds in question are annually killed. From these points they appear to direct their flight towards the great lakes of Switzerland, particularly that of Geneva, which all the water and fen birds of

Europe resort to for a short period, or pass more or less regularly ; from this they seem to continue their journey by the lakes of Morat, Neufchatel, and Bienne, and repair to the Rhine, the course of which they follow, and thus arrive at the Baltic, the great inland, and North Seas. These companies, already less numerous when they arrive in the north, disperse themselves soon afterwards. At this period, the individuals pair and attend to the wants of their new progeny. The route most frequented by all the water-birds, is along the borders of the sea : those which come from the Gulf of Gascony, from Spain, and the coasts of Barbary, appear to follow that only ; several species of waders follow it uniformly ; and the same route is taken by all those birds which are unprovided with powerful means of flight. The divers, the grebes, and other fresh water fowl, which seldom fly when occupied with the cares of pairing and breeding, are, however, endowed with great powers for this action ; their flight is vigorous and long sustained ; they rise even above the high mountains, for it is not rare to find individuals of these species on the lakes of the Alps, where the waders and web-footed species are often killed. It appears that the great flocks which assemble in the Ionian Isles, and the vast marshes between Venice and Trieste, follow in their travels the course of the Tagliamento, to arrive at the lakes in the environs of Villach and Klagenfurt ; they visit the immense marshes which form the lakes Balaton and Neuzidel, where several species remain, while others reascend the Danube, and continue their journey to the Baltic Sea. On the lakes of Hungary, and upon the Danube, several species are found, which also visit the shores of the ocean. It appears to me, that the species most peculiar to the western countries assemble in the Archipelago, and on the borders of the Black Sea ; they reascend the Danube, and following the course of the river, arrive in Hungary and Austria, countries that abound with various species of birds in great numbers. I have not travelled over the whole extent of country crossed by the birds in the latter migration, nor that which takes place from the Gulf of Lyons by the mouths of the Rhone, along that river, and by the Doubs, the way by which their companions reach the Rhine. The banks of this river are peopled in spring and autumn by a great number of birds : we find in the part which forms the boundary of the western countries of Germany, all the species which go by the shores of the ocean and the Baltic Sea.

It is, however, very rarely that we see companies composed of old ones ; these seem to come more frequently by chance, and separately : the yearlings of almost every species pass regularly by these parts of the sea, and they are generally young individuals, or only one or two

years old, such as are killed on the great lakes of Switzerland and Italy. It should be understood that the species which do not continue their periodical journey so far as the North Sea and the Baltic are exceptions; the old ones among the latter never stray to the northern climates, and it would be an extremely rare circumstance to find a young one there.

ON THE WALK OF QUADRUPEDS.

BY J. A. BORELLI, PROFESSOR OF MATHEMATICS, NAPLES.*

DISTINGUISHED philosophers and anatomists, no less than the unlearned, have fallen into gross mistakes upon this subject, in consequence of trusting to theoretical opinion, rather than to the evidence of observed facts.

PROPOSITION.

The step of quadrupeds is not performed by alternately lifting the two feet diagonally opposite, [that is, right and left, or left and right, EDIT.] while the other two remain at rest.

An opinion prevailed that the step of quadrupeds was performed by the moving forwards of two feet together, alternately with the two that

* Translated from the Latin work, "De Motu Animalium," by John Sharp, Esq.

are at rest, as in the walk of a man (*bipedis*) by the movement of one foot constantly succeeding that of the other. Under this erroneous impression, the ancients observed that quadrupeds, while they stand upon the four soles of their feet, form upon the ground a four-sided figure, A B C D. It was thence remarked, that when they are at full speed, the two fore feet, A B, are raised and moved forward together, whilst both the hind feet, C D, are at rest. Immediately after A B falls to the ground, the two hind feet, C D, are raised and moved forwards near to A B; and in this manner quadrupeds, by successively contracting and lengthening themselves, perform running, as is evident in the case of horses and dogs at full speed.

But in going at an easy pace, it is evident that the two fore feet or the two hind feet are not raised together, nor moved forwards at the same time, but alternately; when A is moved, B is at rest; and, on the contrary, when B moves, A is at rest. It is certain that this takes place in the hind feet: but it cannot be so easily distinguished in what order the fore feet move with the hind feet—I mean whether the two left feet, A and D, are moved at the same time, or A with C, on account of the quickness of the motion.

They were of opinion, however, that this could be ascertained by a process of reasoning. If the two left feet, A D, were raised and moved forwards at the same time, then the animal would fall upon the left side. Therefore, the right fore foot, B, with the left hind foot, D, ought rather to rise and move forward at the same time, so that the feet diametrically opposite might move or rest together. Moreover this erroneous opinion prevailed to so great a degree, that, in equestrian statues of marble and of bronze, both ancient and more recent, the two feet diametrically opposed are suspended from the ground.

I am truly surprised that the difficulty and absurdity of such a notion was not perceived. They grant that an animal ought to be steady in motion, lest it might totter or fall, and hence they aver, that the two left feet, A and D, could not be moved together; for then the centre of gravity of the quadruped, and the line perpendicularly drawn from it to the ground, would fall either upon the same right line, B C, where the two right feet are at rest, or beyond it on the line A D, and in that posture the animal would totter or fall.

But when the two feet, B D, diametrically opposite, are raised and moved together, at the same time, the whole weight of the animal ought to rest upon the two feet fixed upon the ground; I mean the line perpendicularly drawn will fall not upon the large space, but upon the line A C. The animal would therefore equally totter; and thence it will have an insecure and unsteady posture at that time.

Secondly. We may consider the figure, which the four feet form after the first motion—namely, when the foot B is transferred to K, and D to S; then the two left feet, A and S, become contiguous, and the right feet, K C, in turn are most removed from each other, so that the four feet form a triangular figure, the longest side of which is K C, and the least altitude A B. This posture therefore is not secure enough, and from it, after the motion of the feet, C and A, to I and V, the animal is restored to the steady quadrangular position, I S V K, like the former A B C D. The firm and tottering postures of this kind regularly following each other, would have been unwisely ordered by Nature, when these disadvantages could have been easily avoided.

But why do we enquire for reasons, when experience contradicts the facts inferred. Observe a horse moving at a slow pace, and you will never see the two feet, A and C, diametrically opposite, to move at the same time, but one foot is always raised from the ground while the other three are at rest. By an attentive observation, you will afterwards perceive that this process is followed in the quick motion of all kinds of quadrupeds.

[In birds, as we shall see in a future page, there are two species of this sort of movement;—one group, like the nightingales and sparrows, carrying both legs forwards at the same time, or hopping; another, like the wagtails and the blue breast (*Motacilla Sucica*), putting one foot before the other.—EDITOR.]

The manner in which the step of Quadrupeds is performed, explained.

The oblong figure of a horse, which may be considered as resting upon its legs as upon pillars fixed upon the ground in A B C D, forms a four-sided rectangle; the line drawn perpendicular from the centre of gravity of the horse would fall upon E near the centre of the rectangle, and thus the posture of the animal would be most secure. Afterwards the step is made by the foot behind, as the left, C, which, by pressing the firm ground with a strong effort backwards, the centre of gravity is moved forward from E to G, and this being performed quickly, the foot B is raised and moved forwards to H, which motion can be made with greater effect, because the centre of gravity falls at first within the triangle A B D; next, it falls within the four-sided figure (*trapezium*) A B F D,—that is, it is supported upon three or four columns. The next three feet, A D F, remain firm, and include the centre of gravity G; the left foot B, being moved forward to H, and by this impulse the centre of gravity is transferred to I—that is, to the centre of the four-sided figure (*rhombus*) A H F D; the steps of the two left feet being concluded, the motion of the right hind foot D begins, and afterwards that of the fore foot A. The step of quadrupeds is always performed in the order just explained.

Although attentive observation may be sufficient to prove these facts, yet it is the duty of the philosopher to enquire into the advantages and necessity of such a process. It is an invariable law of Nature, while she avoids, as much as possible, the disadvantages and

complexities of any system, to perform her work by means sure and certain, and at the same time the easiest and most simple.

The step of animals does not include the motion of the whole body moved forward, with equal rapidity and in the same direction, as in flying, leaping, or creeping, but it is rather the motion arising from the transference of some parts of the body, which are supported by others at rest, and in this manner an animal is moved forward in walking, standing and moving by turns. For this reason, the standing and moving which includes the step of animals, cannot be tottering and unsteady, but firm and secure, and ought to be performed with the least yet sufficient labour of the muscles. But as the attitude of a quadruped in walking must be free from the risk of falling, it is necessary that the body of the animal be supported upon more than two columns—I mean upon three or four, within which the line perpendicular to the centre of gravity may fall. It is very evident that the step of quadrupeds is performed in the manner explained in this proposition.

It is moreover necessary that the support of the animal should be accompanied with the least labour and pain to itself, and this is accomplished by the legs serving as columns, which, on account of their hardness and obtuseness of feeling, easily support the superincumbent weight, without any remarkable uneasiness.

Besides, the motion of the animal body is easily performed, because its whole mass is not raised from the ground at once, one foot only being lifted and moved forward. This is performed by first pressing upon the ground with one of the hind feet, and not by one of the fore feet, for if the former was lengthened while the latter rested upon the ground, the centre of gravity would fall behind; but, on the contrary, by one of the hind feet being lengthened, the fore foot is moved forwards like a gladiator's spear (*ad instar conti*); whence it happens that the whole mass of the animal is moved forward by the bending of three erect columns, not different from the manner in which running upon wheels is performed. Next by raising from the ground the same hind foot, the joints being bent by the muscles, afterwards by the motion of the fore foot of the same side as has been mentioned, these advantages, I say, show the necessity of such an operation.

ON THE DISTINGUISHING CHARACTERISTICS OF ANIMALS.*

BY ARISTOTLE, THE STAGYRITE, FOUNDER OF THE PERIPATETIC
SCHOOL OF PHILOSOPHY.

As to the parts of animals, some are incomposite, namely, such as are divided into similar parts, as flesh into flesh; but others are composite, being such as are divided into dissimilar parts; as the hand is not divided into hands, nor the face into faces. Some things, however, of this kind, are not only called parts, but also members; and these are such parts, as being wholes, contain in themselves other peculiar parts; such as the head, leg and hand, the whole arm, and the chest, (*thorax*). For these parts are themselves wholes, and there are also other parts of them. But all dissimilar parts are composed from similar parts; as, for instance, the hand from flesh, nerves, and bones.

Some animals, however, have all the parts the same with, and some have them different from, each other. But some of the parts are the same in species; as the nose and eyes of one man are specifically the same with the nose and eyes of another man; and flesh with flesh, and bone with bone. This is also the case with the parts of horses, and other animals, which we assert to be specifically the same. For as one whole is to another, so is each of the parts to each. But some animals have parts of the same genus, yet different according to excess and defect; I speak of those whose genus is the same as birds and fishes; for each of these has a difference according to genus, and with reference to genus; and there are many species of fishes and birds.

Nearly, all of the parts in them, however, differ in the contrarieties of passive qualities, such as colour and figure; because some of them are more passive to these, but others less. Further still, they also differ, considered as many and as few, as large and as small, and in short, as to excess and defect. For some of them are crustaceous, and others testaceous; some have a long beak, as cranes; and others a short beak; and some have many, and others a few, feathers. Nevertheless in these also, some of the parts are different from others; for some of them have spurs, and others not; and some have, but others are without a tuft of hair on the forehead. As I have said, however, most parts, and from which the whole bulk is composed, are either the same or differ in contrarieties, according to excess and defect. But some animals neither have parts specifically the same, nor the same according to excess and defect, but according to analogy; just as bone is

* Translated from the Greek work, *Περὶ Ζῴων Ισοπίας*, by T. Taylor, Esq., and corrected and amended by the Editor, from Schneider's edition of the original.

analogous to the spine, a nail to a hook, a hand to a claw, and the scales of a fish to the feathers of a bird; for what a feather is to a bird, that a scale is to a fish. The parts, therefore, which animals severally possess, are, after this manner, different and the same; and the like also takes place in the position of the parts: for many animals have the same parts, but not similarly situated; as for instance, some have the udder on the breast, but others between the legs.*

As to the similar parts, again, some are soft and moist, but others are dry and solid; I mean they are either entirely moist, or are so as long as they remain in their natural condition; as blood, lymph, fat, suet, marrow, the reproductive fluid, bile, milk (in those animals that have it), flesh, and substances similar to these. Again, after another manner, excrementitious matters (are soft parts), such as phlegm, the sediments of the belly, and urine. But the solid and dry parts are such as nerve, skin, vein, hair, bone, cartilage, nail, and horn. For horn is homonymously predicated with respect to genus, when it is predicated of figure and a whole: the parts also, analogous to the before-mentioned, are hard and dry.

But the differences of animals are according to lives and actions, manners and parts, concerning which we shall, in the first place, speak generally, and afterwards discuss the genus of each. The differences, therefore, are according to lives, actions, and manners; but the causes of these differences are, that some animals live in water, and others on land. But the aquatic are of two kinds; for some of them live and obtain their nutriment in moisture, which they alternately receive and reject; and they cannot live when they are deprived of this, which happens to be the case with many fishes. Others live in moisture, and derive their nourishment from it, yet they do not take in water, but air, and generate externally.

But many animals of this kind also walk as well as swim, as the otter, the animal called *latax*, and the crocodile. Some of which are also winged, as the diver and the dabchick; and some likewise are without feet, as the water-snake. But some obtain their nutriment in moisture, and are not able to live out of it, yet neither take in air nor moisture, as the animals called sea-nettles, and oysters. Of aquatic animals, however, some live in the sea, others in rivers, others in lakes, and others in marshes, as the frog, and the *cordylas*. And of sea animals, some pertain to the main ocean, others to shores, and others to rocks.

* These profound and accurate remarks have been twisted by G. St. Hilaire, and the German mystics, into a wildly absurd theory. See *Montagu's Ornith. Dict.* p. xlvi. and "Standing Notice" on our cover.—EDIT.

As to land animals, some take in and again eject air, which is called inspiration and expiration, as man, and all such land animals as have lungs.

Others again do not take in the air, but live and have their food in the earth, as wasps, bees, and insects. Now I denominate those animals insects, which have incisions in their body, either in the upper parts, or in both these, and also in the under parts. Many land animals, as we have said, obtain their nutriment in moisture; but no water animal which takes in the sea water, derives its aliment from the earth.

Some animals, however, first live in moisture, but afterwards change into another form, and live out of moisture, as is the case with maggots in rivers, from which a fly is produced.

Some animals again do not change, while others are changeable; the former live in moisture; but no land animal is of this kind, while many that dwell in moisture live fixed to rocks, as many kinds of shellfish. The sponge also appears to have a certain sense; an indication of which is, that it is with greater difficulty torn off, as they say, unless the motion by which it is wrenched away is performed when it is unaware of danger. But some adhere to rocks, which they occasionally leave, such as is a certain genus called the sea anemone. For some of these feed by night away from the rock. Many also, when they are liberated, are without motion, as oysters, and the spongy creatures called holothuria. But some have a power of swimming, as fishes, the mollusca, and those animals that are covered with a soft shell, such, for instance, as locusts. Some likewise are able to walk, as the genus of crabs; for this animal lives naturally in the water, while it has also the power of walking.

ON THE COLOURS OF THE FEATHERS OF BIRDS.

BY EDWARD BLYTH,

EVERY bird, after the species has been produced, annually undergoes in the autumn a complete change of plumage, which is commonly termed moulting. Some species undergo, or partially undergo, this change twice in the year—in autumn and in the spring; as is the case with a variety of aquatic birds. Others again, as the ptarmigan or white grouse, seem to be in a perpetual moult; that is to say, new feathers may always be observed amongst their plumage. It is probable that, in this case, new feathers are thrown out in an unusually short space of time; thus enabling the bird to meet the sudden changes of temperature, common in the elevated regions in which it is found,—a beautiful provision for an Alpine climate.

Many birds, also, are very different in their winter plumage from what they appear in the summer, and this without any change of feathers in the spring; a circumstance which may be commonly observed in many of our native finches—as the chaffinch, the linnet, the brambling, and others.

This apparent change usually takes place in the following manner: when the new feathers appear, at the annual autumnal moult, they are edged with a kind of fringe of another colour, and usually of a more sombre hue. This fringe is merely a continuation of the barbs of the feather, and is, in many instances, of precisely the same texture, although generally of a rather warmer and more downy nature: but where the two colours meet, that is, at the actual place where this fringe joins the end of the feather, the texture is much finer: so that, if we were to pull one of the little plumelets, or barbs of the feather, it would infallibly break at this place. Now, as the feathers of a bird are arranged one over another, in such a manner as that their terminations only are seen, it of course follows that the bird appears in a very different dress in the winter season from that which it wears in the summer, when all these edgings have fallen off. Accordingly, the head and neck of a male stonechat now appear brown, but, if we were to turn aside the feathers, we should perceive that the edges only are of that colour; in the summer they are of a jet black. I may remark in passing, that the feathers on the back of this bird present the same appearance as those of the head and neck, being black at the base, and edged with brown; but those of the back retain their brown edging throughout the year. The feathers, also, on the neck of a cock chaffinch, at this period of the year, show considerable contrast of colour between the back and its termination, or edging; the former being of a bluish grey, while the latter is of a reddish brown. A beautiful provision of nature is here evinced, by which the feathers of these birds are longer, and, of course, form a warmer covering in winter than in summer.

Fig. 1.

Fig. 2.

Feathers from the breast of the linnet, figured from specimens magnified. Fig. 1. New feathers with their brown fringe. Fig. 2. The older feathers in spring, when the beards have fallen off.

But besides this, the whole plumage of many birds becomes of a brighter hue at the approach of the breeding season ; a fact which is exemplified in a remarkable degree in the forehead and breast of a cock linnet, which, in the winter season, appear of a dingy dark red, but, at the season for pairing, become of a fine bright scarlet. The beautiful roseate tinge, also, which distinguishes the breast of a cock whitethroat in the summer, is no longer observable after the bird has moulted, but seems to be entirely acquired at the commencement of the breeding season.

Hence, it is reasonable to infer with Mr. Selby, " that an invisible circulating fluid pervades every feather, and consequently the plumage may be considered so far an actual part of the living bird, as to be under the influence of such constitutional change as the bird may at any time experience.

" That such circulation takes place is moreover evident, from the striking difference which he observed in the elasticity *,—between the feather upon a bird whilst alive, and upon the same bird a short time after death. In water-birds, this principle of life in the feather (if I may be allowed the expression,) is singularly apparent ; as the plumage that is impervious to water upon the living bird, is almost immediately after death subject to its effect.

" There can be no reason, then, why the feather may not be influenced by the constitutional state of the bird, and as that is in the highest degree of vigour immediately previous to the season of propagation, why may not such vigour be exhibited to the very extreme points of the circulating medium, by a partial variation of colour, or an increased lustre of tone in the former hue of the feathers ?

" It is not fanciful, for it has been established as a maxim in pathology, that the state of health in man may be ascertained by the occasional flaccidity or crispness of the hair ; and have we not repeatedly met with well authenticated instances of great and sudden changes having taken place in its colour, acting only, of course, through the organic structure of the body.

" Changes of colour in the hair of many quadrupeds are seen, and that also at particular seasons ; and (as Dr. Fleming asserts, in the case of the stoat, and some others, that assume a winter's garb,) without any actual shedding of their coat, either upon their first variation, or in regaining their summer's hue."

* Mr. Selby also mentions "*brilliancy of colour*," &c.; but I have never observed this in any remarkable degree.

Thus far Mr. Selby; but it does not appear to me that this excellent naturalist has made sufficient allowance for the effects produced by the action of the air, and by the nature and quality of the food. He seems to think that the change which takes place at the pairing season, is of itself sufficient to produce, not only the high degree of spirit and pugnacious disposition frequently evinced, and the superior song generally called forth at this period of the year, but also to be the sole cause of this superior brightness of plumage. From this, however, I beg leave, with all deference, to dissent, as I can adduce in support of my opinion, a very familiar example. The common linnet, already mentioned as a very striking instance of the great change of colour, which the same individual feathers undergo at a particular season of the year, is well known never to acquire in the cage that bright scarlet plumage of the breast and forehead, which distinguishes the bird in a state of nature. The male whitethroat also, that has passed the winter in confinement, does not assume the fine rosy tint on the breast, that adorns this species in its wild state. But that birds in confinement feel the genial influence of spring, in common with their brethren in the field, is evident, not only from their superior song at this season, and their quarrelsome and jealous spirit, but from their being frequently known to build a nest, and to produce and rear their young in captivity.

It necessarily follows, therefore, that the action of the air, the influence of particular food, and perhaps also, of other unknown agents, assist materially in producing this change of colour.

That certain food may have an influence is probable, from the known effects of particular food upon the plumage of birds in confinement; thus a bull-finch, fed entirely on hemp-seed, will in the course of time become black, not by moulting, but by an actual change of colour in the same feathers; and if this food *only* be given to it for a month or six weeks, previous to its change of plumage in the Autumn, the new feathers will appear of that colour. I have seen a goldfinch also, that has been rendered black by the same food, though in this instance, the yellow part of the wings remained unchanged.

Constant exposure to the fresh air, also, has an effect on the plumage of birds; as the breast of a caged linnet that is kept much out of doors, may be observed to be of a brighter red than that of a bird of the same species, constantly confined in a close room.

From the above facts it would appear, that the great change of colour, which some species undergo at particular seasons, is produced, not so much by any single cause, as by a combination of various and

different circumstances, that altogether occasion a change which cannot be produced without that general concurrence, which does not of course exist to operate upon the plumage of a cage bird; nor at all times upon a bird even in a state of liberty: and we can thus easily account for the curious and often-noticed fact, of many wild linnets passing the summer without ever acquiring the scarlet colour upon the breast. A circumstance which has caused a great deal of speculation and embarrassment among naturalists. It may be remarked, in conclusion, that many birds actually change their plumage twice in the year, of which the male Whidah bird of Africa is a familiar example.

Tooting, Surrey, Dec. 6th, 1832.

ON THE COLOUR OF THE SEA.

BY COLONEL BORY DE ST. VINCENT.*

THOSE who have been accustomed to a life confined in the interior of countries, where only rivulets and shallow rivers flow, where clear fountains rise, or muddy currents roll along, view with admiration the first appearance of the sea, as from the shore they regard the pure and sparkling green complexion of its waters,—a colour which indeed seems peculiar to itself. The wonder is increased, when a portion of its water, passed into a vessel, is observed to retain no trace of that very peculiar colour, and to be perfectly clear. Its transparency is such, that in places undefiled by filth or dirt, the sand may be distinguished at the bottom of its bed at a considerable depth, and stones and shells of the smallest size, which lie there, appear then bright and resplendent. Marine plants, especially the corallines, beam in it with the greatest splendour; and all productions of this nature elegantly shaded, whilst they are sunk beneath the surface of the water; but as soon as they are taken out, this beauty vanishes. Certain *Cystoceira*, called by us *Iridea*, as well as many *Alcyonia*, which, in their fostering element shine in the colours of the rainbow, or in the finest tints of purple and orange, seem there tinged with black, yellow, or simply of a brown or dark violet hue, when cast upon the bank of the shore, lose their attractions by exposure to the atmospheric air. As the light penetrates the abyss of waters, and during a cloudless day, as we enjoy an excursion on its surface, the waves appear coloured in such a manner

* Translated from the French, by the Editor.

around us, that we are sometimes inclined to believe, as we admire the deepness of its green, that we are upon a liquid meadow, or upon a billiard-table carpet, which could be translucent. In proportion as the vessel becomes distant from the shore, and we reach the high latitudes, where the depth increases more and more, the green tint changes into a blue tint, and in the open sea, the water becomes, at fifty or sixty fathoms, of the finest azure colour. The green shade generally announces danger, or an approach to low coasts; for along those which are intersected with peaks or mountains, and near which the sound descends to a great extent, the blue azure is observed to appear, and to become much more lively, as the depth becomes more considerable. But this blue, which is ordinarily regarded as one of the characteristics of the ocean, and which is commonly attributed to the manner in which the rays of the sun become decomposed, as they penetrate into the waters, is not, however, exclusively peculiar to it; every large and deep bed of water has a cast of a similar nature. Deep lakes, which are not salt, especially those among high mountains, are equally affected by the blue azure tint, and this beautiful shade is observed even in the bed of torrents, at the bottom of which, if the water fills a cavity in a rock, the serenity of the heaven produces, in a small degree, the most brilliant effect of colouration.

ANATOMY OF THE SUGAR-LOUSE. (*Lepisma saccharinum*, LINNÆUS)

BY PROFESSOR TREVIRANUS, OF BREMEN.*

THE sugar-louse is ranked along with the wood-louse (*Oniscus*), and water-louse (*Asellus aquaticus*), though it is in many particulars not so like the whale-louse (*Cyamus ceti*, LATREILLE). These insects are similarly filiform, having a structure of numerous small joints, with antennæ, tail bristles, and similar eyes placed together so as to shine, which are composed of minute semicircles and faintly shagreened. Like the *Onisci*, the body is arched above, and composed of numerous small rings. They have only six feet, but in the structure thereof there is not so much resemblance between them and the wood-louse. It must be confessed, however, that the differences are upon the whole no less obvious than these resemblances.

The body of the sugar-louse is longer and smaller than that of the wood-louse, and is everywhere clothed with small scales.

* Translated from the German periodical, *Vermischte Schriften Anatomischen*, by Edward A. Rennie.

(Back and front views of the Sugar-louse magnified.)

The antennæ (*f, f*) are short, cylindrical, tapering from the base to the tip, and beset with bristles at the joints.

The head is covered on the upper part with a round plate, and the back with twelve plates of a square form. The under part of the body, reckoning from the head, has only eleven such plates.

The feet are connected with the three anterior divisions of the body, and consist of five joints, of which the two first are very broad in the middle, and the last very thin and roundish.

On the hinder extremity of the body, are two short, thin, bristles (*palpen, q, q*), beyond which upon each side are two very long ones (*r, r*), and beyond these four others (*m, n*) shorter, while the last ring of the body ends in a single pointed bristle (*schwanzspitze, t*), similar to the rest, all of them having precisely the same structure as the antennæ. The three longest bristles take their origin from the last back-plate, under which is the vent; but the short bristles originate from the last belly-plate (*bauchschuppe*), between the two halves of which are the external organs of reproduction.

Fig. 1.

Fig. 2.

Fig. 3.

The mouth consists of two upper and two under jaws; and of one upper and one under lip. The upper jaws (*kinnbacken*) are roundish and somewhat curved, conical at the base, and furnished at the tip with five teeth (*m, m*, fig. 1). The under jaws (*kinnladen*) are bulged behind (*l*, fig. 2), but taper off to a sharp point at the tip (*k*), with a moveable, pointed, and somewhat curved member (*g*), arising at the base of a long, thread-shaped five-jointed feeler.

The upper lip is triangular, and divided crosswise into four portions, which are moveable on the under part (*a*, fig. 1). The under lip is bluntly triangular, ends on the fore part in four small lobes (*n, x*, fig. 3), and is furnished with two four jointed feelers, the tip joint of which is club-shaped and remarkably thick (*h*, fig. 1, and *a, b, c, d*, fig. 2).

Fig. 1.

Fig. 2.

The digestive canal runs in the form of a narrow tube (*A, B*, fig. 1)

from the mouth downwards, widening out as it descends to the breast into a capacious reservoir, which is held to be the crop (B, C), succeeding to which is a second cavity, smaller, and of a tapering form (C, D). The inner part of this is represented as laid open in figure 2. It is furnished on the inside with six teeth, of which 2 and 6 have the same interior structure as 3 and 5, differing in this from the upper ones 1 and 4. The two teeth 3 and 5 seem manifestly to seize, and the upper teeth to bite and chew the food. It is not a little singular in an animal which stands so low in the scale of organisation, to find such an apparatus for manducation. There are similar stomach-teeth of various structure, in the oriental cockroach (*Blatta orientalis*). This gizzard or toothed stomach (*zahnmagen*) runs into a short, straight, thin intestine (D, E, fig. 1), at the lower end of which four rather long and very slender bile vessels (2) arise at a contraction of the tube.

Ramdohr, in his work on the Digestion of Insects (*Abhandlung*, s. 150), reckons the reservoir which I have called the crop or first stomach as a part of the gullet, and imagines the part called by me the small intestine to be a second stomach, a matter however which must be arbitrary. My own opinion rests on the analogy of the wood-louse and the centipede (*Scolopendra*). In the small tapering stomach, Ramdohr has overlooked the teeth, and has incorrectly termed it a third stomach (*faltenmagen*). Ramdohr is also wrong in representing the sugar-louse to have only two bile vessels.

The thick intestine is narrow at its origin, but becomes wider towards its termination, enlarging very much under the middle long bristle of the tail (E, G, fig. 1). Upon the back of the first and second stomach there is an irregular mass of fat containing real oil.

Fig. 1.

Fig. 2.

Fig. 3.

The external reproductive organs in the female sugar-louse are placed under the middle long bristle of the tail, in form of a plate, or rather of a longish pipe (P, fig. 1), lying between two plates (Z) of a horny structure, running to a point, and having on the sides six small jointed bristles (*q, m, n*). At first sight, this has so much resemblance to the external reproductive organs in the male of the common wood-louse, that we may readily mistake this female for a male, and thus find another similarity between the two species for which there is no grounds. On more close investigation, it is found that the organ in question is cleft, and is in reality an ovipositor (*legestackel*). This terminates above in a short canal, at the upper end of which are two small bladders (T, *d*), and a knotted egg-organ (E, E, fig. 2). The bladders I met with only in the full grown insects; and in such individuals as I found them, the egg-organs were absorbed (*ausgeleert*), and no longer apparent. I was therefore obliged to represent these parts in two separate figures. The bladders are oval, and separated by a contraction into two parts. From each of the two egg-organs there runs a single tube (E, *d*, E) slightly curved, which is furnished on the outer side with five short branches containing eggs (E).

The external reproductive organs in the male are precisely in the same situation as the ovipositor in the female, exactly between the two horn-like plates, which, however, are in the male smaller than in the female, and somewhat different in form. The external part (*ruthe*) is very short and cylindrical, with two lips wherein are two gut-like organs, rather wide, and two longish tubes (*a, b, c*, fig. 3). These two organs are curved and ringed. The two tubes are narrower than the former. These become wider as they ascend, and stand farther apart, afterwards curving downwards, in form of a slender film, which again runs upwards and outwards, ending in several minute branching, longish, bladders.

I have been long in doubt respecting the organ of breathing in the sugar-louse, and have not yet arrived at any certain conclusion. I imagined, at first, that I could distinguish the air tubes (*tracheæ*);

but, on closer investigation, I found that I had mistaken for these certain muscular fibres, and some very slender vessels which have not the usual structure of the windpipe. I could no where find either spiracles or gills; and I was thence led to believe that the sugar-louse breathes through the whole surface of the body (*ganzen oberfläche des körpers*), which is everywhere clothed with shining scales, and these, under a higher magnifying power, appear to be placed on a foot stalk, and marked with longish lines (figs. 1, 2, 4). Now why should not these be the valves of the spiracles? I cannot, however, prove the truth of this conjecture, except from the apparent absence of any other apparatus for breathing. Yet it is proved by the experiment of Sorg (*Disquis. Physiol. circa Respir. Insect. et Verm. p. 109*), that, without some organ of breathing, they could not consume so much oxygen, and appear so sensibly distressed by the presence of hydrogen.

The nervous system of the sugar-louse consists of the brain* (1, fig. 3), and eleven nerve-knots (2-12), of which the three first (2-4) and the last (12), are precisely the size of the brain, while the others (5-11) are very small. The brain differs from the nerve-knots in nothing more than in giving origin to the nerves of the eyes (o, o), which I have been able to see distinctly. With respect to the higher functions of the brain all these animals must rank in a very low scale.

SIR W. JARDINE'S NOTES ON BIRDS.†

THERE can be no question that Sir W. Jardine stands in a high rank among our living British Naturalists, a rank which the Notes before us, as well as those he has given to "White's Selborne," would entitle us to claim for him, independently of what he has done in his splendid work on British Birds. With the exception of one thing also, which we shall not now stop to discuss, he *can* write with an elegance and spirit, very superior to the meagre and uninteresting matter so frequently met with in works on this subject. His Life of Wilson accordingly, is admirable: and we regret much that our plan, and still more our limits, forbid us to touch this portion of the work, even in a sketch.

* See Alphabet of Insects, pp. 75—81.—EDIT.

† American Ornithology; or the Natural History of the Birds of the United States, by Alexander Wilson; with a Continuation, by C. L. Buonaparte, Prince of Musignano. The Illustrative Notes and Life of Wilson, by Sir W. Jardine, Bart., &c. 3 vols. 8vo., Edinburgh and London, 1832.

We must confine ourselves to Sir William's Notes; and here we have a rich fund of accurate remark and interesting detail, such as could only have come from an original observer of nature. The first which attracts our attention is a spirited and accurate sketch of the jays; different, very different indeed, from Wilson's text, but still very excellent in its way. Sir William says:—

"The colours of their plumage are brown, gray, blue, and black, and in some distributed with sober chastity, while in others the deep tint and decided markings rival the richest gems.

Proud of cœrulean stains,
From Heaven's unsullied arch purloined, the jay
Screams hoarse. GISBORNE'S *Walks in a Forest*.

"In geographical distribution, we find those of splendid plumage following the warmer climates, and associating there with our ideas of Eastern magnificence; while the more sober dressed, and, in our opinion, not the least pleasing, range through more temperate and northern regions, or those exalted tracts in tropical countries, where all the productions, in some manner, receive the impress of an Alpine or northern station. This is no where better exemplified than in specimens lately sent to this country from the lofty and extensive plains of the Himalaya, where we have already met with prototypes of the European jay, black and green woodpeckers, greater titmouse, and nutcracker. They inhabit woody districts, in their disposition they are cunning, bold, noisy, active, and restless, but docile and easily tamed, when introduced to the care of man, and are capable of being taught tricks and various sounds. They feed indiscriminately, and according to circumstances, either on animal or vegetable substances; plundering nests of their eggs and young, and even, in the more exposed farm-yards, disappointing the hopes of the mistress in the destruction of a favourite brood. They are also robbers of orchards and gardens of their finest fruits; but, when without the reach of these luxuries, they will be content to satisfy their hunger with nature's own productions, the wild berries, or fruits and seeds of the forest and the field."—Vol. I. p. 5, 6. Note.

This is generalising to some purpose; and is precisely the sort of Natural History with which every reader must be pleased. Sir William's brief sketch of the evening proceedings of the linnet, is also much to our taste. He is speaking of the similarity of the American goldfinch (*Carduelis Americana*, EDWARDS), to our linnets, in their manners, their haunts, their breeding, and their feeding.

"Every one," he says, "who has lived much in the country, must often have remarked the European grey linnets, in the manner above described of the American goldfinch, congregating towards the close of a fine winter's evening, perched on the summit of some bare tree, pluming themselves in the last rays of the sun, chirruping the commencement of their evening song, and then bursting simultaneously into one general chorus; again resuming their single strains, and again joining, as if happy, and rejoicing at the termination of the day's employment. Mr. Audubon has remarked the same trait in their manners, and confirms the resemblance of their notes:

‘ So much does the song of our goldfinch resemble that of the European species, that, whilst in France and England, I have frequently thought, and with pleasure thought, that they were the notes of one of our own birds which I heard.’ ” Vol. I. page 12. Note.

The following remarks on colour will be found to accord pretty nearly with the excellent paper communicated to us by Mr. Blyth, in a preceding page. In remarking on what Wilson tells us of the American goldfinch, changing in autumn from a rich yellow to an olive-green, the black spot of the head taking the same olive tint, Sir William says,

“ These changes take place in the common siskin of this country ; indeed changes, and in many cases similar to those alluded to, are common, according to season, among our Fringillidæ. The common chaffinch loses the pale grey of his forehead, which becomes a deep bluish purple ; the head and back of the brambling, or mountain finch, become a deep glossy black ; and the forehead and breasts of different linnets, from a russet brown, assume a rich and beautiful crimson. They are chiefly produced by the falling off of the ends of the plumelets of each feather, which before concealed the richer tints of its lower parts ; at other times, by the entire change of colour. The tint itself is always much increased in beauty and gloss as the season for its display advances : at its termination the general moult commences, when the feathers are replaced with their new elongated tips of a more sombre hue, which no doubt adds to the heat of the winter clothing, and remain until warmer weather and desires promote their dispersion.” Vol. I. page 15. Note.

The next we shall give is a pretty *bit*, as a painter would call it, of personal observation. Speaking of the nut-hatches of America and Europe, he says,

“ I had lately an opportunity of observing a nest of our own native species, which had been taken young. They became remarkably tame ; and, when released from their cage, would run all over their owner in all directions, up or down his body and limbs, poking their bills into seams and holes, as if in search of food upon some old and rent tree, and uttering, during the time, a plaintive cry. When running up or down, they rest upon the back part of the whole tarsus, and make great use, as a support, of what may be called the real heel, and never use the tail. Their bills are comparatively strong, and the power they possess of using them great ; equal apparently to that of a woodpecker of like size. They breed in hollow trees, and produce a rather numerous brood. The male attends carefully during the time. When roosting they sleep with the head and back downwards, in the manner of several titmice.” Vol. I. page 37. Note.

We really wonder that a naturalist of such general good taste as our author, should continue to use the very inappropriate popular name *mouse* and *mice* for those pretty little birds, the *TITS*. The objectionable term again occurs in another note, recording an interesting habit which must be familiar to every field-observer.

“ It is curious,” says Sir William, “ to remark the similarity, as it were, in the feeling and disposition of some species. In this country, during the winter, when the

different kinds have laid aside those ties which connected them by sexual intercourse, nothing is more common than to see a whole troop of the blue, marsh, cole, and long-tailed titmice, accompanied with a host of golden-crested wrens, and perhaps a solitary creeper, proceed in the manner here mentioned, and regularly follow each other, as if in a laid-out path. An alarm may cause a temporary digression of some of the troop, but these are soon perceived making up their way to the main body. The whole may be found out and traced by their various and constantly reiterated cries." Vol. I. page 43. Note.

Sir William does not often venture upon anatomical physiology; but the following is an interesting scrap:—

"There is," says he, "a curious structure in the covering of the nostrils in most birds; where there is any addition to the horny substance, it is composed either of fine bristles, or hairs, or of narrow feathers closely spread together. In the gold-crests it consists of a single plumelet on each side, the webs diverging widely." Vol. I. p. 128. Note.

Our Author is more at home in describing the habits and manners of birds. Speaking of Wilson's admirable account of the blue bird (*Saxicola sialis*, BUONAPARTE,) he says,

"The very habits of our European *Saxicolæ* are here described; they invariably seek the summit of some elevation, a hillock, a stone, a bush, or some of the taller wild plants, and if occasionally on a tree, the topmost branch is always preferred; there they perch, uttering their monotonous call, which increases in anxiety and frequency as we approach the nest, or the young before they are able to fly; or they alight at intervals, run for some distance, and again remount to a fresh station. When not annoyed they retain the same elevated situations, looking out for food, taking the insects seldom on the wing, but generally by a sudden spring; or leaping down, return immediately with the prey in their bill, where it is retained for a few minutes, while they repeat their uniform note. The young, as soon as they are able to fly, have the same manners with their parents; and at the season when they are first on the wing, some extensive commons have appeared almost entirely in motion with our common species." Vol. I. p. 61. Note.

But though we have got over little more than a hundred pages, our space forbids us to proceed further at present. We shall, however, take an early opportunity of returning to Sir William's highly-interesting notes.

DESCRIPTION OF THE EUROPEAN PLUMED GNATS (*Corethra*, PANZER.)

BY J. W. MEIGEN, OF STOLBERG.*

GENERIC CHARACTERISTICS.—The antennæ stretched forward, thread-shaped, with fourteen joints; in the male with plumed whirls,

* Translated from the German work, *Europäischen Zweiflügeligen Insekten*, by Jacob Dixon, Esq.

in the female hairy. The palpi standing out, bent inwards, four-jointed, the first joint short. The wings incumbent, with the wing-ribs hairy, and the hinder margin with a scaly fringe.

The head smaller than the corselet. The compound eyes crescent-shaped: simple eyes, none. The antennæ stretched forward, thread-shaped, fourteen-jointed; the joints longish, somewhat thick and short at their origin, the two last rather longer, particularly in the male; all the joints in the male, beset throughout with plumed whirls, becoming gradually shorter upwards (fig. 2); in the female they are hairy (fig. 1). The sucker is fleshy; the under lip (*lippe*) cylindrical, with a short neck (*stiel*), and having two round hairy knobs at the extremity (fig. 3, *a, a*); upper-lip (*lefze*) small, horny, presenting three acute angles; palpi (*b, b*) standing out, bent inwards, cylindrical, hairy, four-jointed; the first very short, the others long. The corselet egg-oblong; the back scale (*schildchen*) small. The abdomen slender, cylindrical, clothed with fine hairs, eight-ringed; in the male flattish at the extremity, with two hooks at the vent. The legs slender, tolerably long; in pairs close behind each other, without any interval between. The poisers naked. The wings small, the wing-ribs hairy, with a scaly fringe on the outer border; the scales lancet-shaped, pointed (fig. 4); during repose the wings lie flat on the body. The arrangement of the wing-ribs (*nervenlaufes*) closely resembles that of the common gnat (*Culex*.)

The name of this species is derived from the word *korethron* (*κορεθρον*) which means a "tuft of feathers."

SPECIES.

1. THE FEATHER-HORN PLUMED GNAT (*Corethra plumicornis*, FABRICIUS). The back corselet (*rückenschild*) with white side-stripes. *Thorace vitta laterali*. (fig. 5, the male.)

Fabr. Ent. Syst. iv. 246, 58; Tipula (plumicornis) fusca, thorace linea laterali pedibusque albidis immaculatis.—*Syst. Antl. 42, 22; Chironomus plumicornis.*—*De Geer, Ins. vi. 149, 20; Tipula (crystallina) griseo-cinerea, antennis filiformibus naris plumosis, corpore villosa; thoracis lateribus fascia pallido-grisea.*—*Gmel. Syst. Nat. v. 2826, 108; Tipula Hafniensis.*—*Rèaumur, Ins. v. tab. 6, fig. 4–15.*—*Latreille, Gen. Cr. iv. 247, Corethra lateralis; Panzer, Fauna Germ. cix. 16, Corethra lateralis.*—*Klassif. d. Zweifl. i. Aufl. viii. 1, Corethra lateralis, 34 i. Tipula plumicornis, 37 s. Tipula cristallina.*

Head, feelers, and antennæ, brown; hairs of the antennæ rather yellowish brown. Corselet, dusky grey on the back, with three raised stripes; the inner one, which reaches from the base to the middle, is divided by a long deep line; the two others lie on the side, and go from the middle to the small back scale. A white stripe immediately under

a brown one, encloses the dusky back on both sides. The sides white with a black triangular spot. The abdomen yellowish-brown, sometimes rather brownish-grey, behind the division paler. Legs, pale yellow. Poisers white. Wings unspotted. Found in May on the sea coast. Length, one fourth of an inch.

The maggot lives in water, and is as clear and transparent as crystal. It is nearly cylindrical, though a little tapering from the head backwards, and having a double hook on the head. On the fore part, where the body is rather thickest, two brown kidney-shaped bodies are seen internally, and not far from the vent two similar smaller ones.* The last ring has on the under side an egg-oblong, leaf-like fin, and at the vent two fleshy horns. In adolescence (*nymphæ*) the insect has two horns on the head, and at the vent two egg-oblong fins. After ten or twelve days the full grown gnat comes forth. R $\acute{e}$ aumur found the maggot in July and August; De Geer also found it in the spring, and the full grown gnat at large in May. (See R $\acute{e}$ aumur's work, as above quoted.)

2. THE PALE PLUMED GNAT. (*Corethra pallida*, FABRICIUS.) Whitish, legs spotted with black. *Albida, pedibus nigro-punctatis.* (fig. 6, the female.)

Fabr. Ent. Syst. iv. 245, 56, Tipula (pallida) pilosa pallida, pedibus nigro-punctatis.—Syst. Antl. 42, 19, Chiron. pallidus.—Gmel. Syst. Nat. v. 2826, 107, Tipula pallida.—Panzer, Fauna Germ. cix. 17, Corethra pallida.

Whitish. Hairs of the antennæ, brown. Eyes black. Back-plate (*rückenschild*) with three pale-brown stripes in the same place as in the former species. The thigh and the shank white, with black spots; leg-rings, slightly brownish. Wings, water-coloured, with a slight brownish shade across the middle.—From M. Baumhauer's collection. Length of the male, two lines and a half; of the female, two lines.

3. THE BROWN-PLUMED GNAT (*Corethra culiciformis*, DE GEER.)

Brown; abdomen and legs, grey. *Fusca, abdomine pedibusque griseis.*

De Geer, Ins. vi. 144, 16, Tipula (culiciformis) fusca, antennis filiformibus maris plumosis; abdomine pedibusque griseis; costis alarum hirtis. Tab. 23, fig. 3—12.—Latreille, Gen. Cr. iv. 247.

I cannot add anything to this description, as I have never seen a specimen. De Geer found the maggots, which seem equally common with those of the common gnats, in May, in stagnant waters.

* See Insect Transformations, p. 287, for figures of these.—EDITOR.

They are of a light-brown colour, somewhat long. The corselet very thick, having internally two small, longish, dusky-brown bodies; there is an erect conical tube on the outer margin of the eighth ring, and a rugged tuft of hair under the tail. The adolescent insect (*nymphæ*) is brown, generally curved; large before, having two horns, with two round leaf-like fins at the vent. After eight days' repose, the full-grown gnat comes forth.—DE GEER'S WORK, as above quoted.

ON THE GRANITE NEAR PLYMOUTH, AND THE INFERTILITY OF GRANITE SOIL.

BY JOHN PRIDEAUX, ESQ.*

THE granite of Dartmoor, from Mistor to Heytor, and south of that line, has the following characters; which probably belong to the whole.

It is entirely mountainous, the highest hills being on the borders; where some of them attain an elevation of nearly two thousand feet. The valleys run in various directions; but have a tendency upon the whole to the north and south line. The hills rise often steep, sometimes precipitous; their sides scantily clothed with long grass, except where rushes or moss indicate subjacent bog; and often strewn with loose blocks of granite, from fifty or more tons down to the size of a flag-stone. A crag, called the tor, usually projects at the summit of the hill, having a very striking appearance of stratification; the fissures being sometimes horizontal, more commonly a little inclined. This

* From the Transactions of the Plymouth Institution, kindly sent us by Dr. E. Moore.

stratified character is not less general in the quarries, where, although there are none of those marked divisions indicative of intermissions in the general depositions of the rock, the stone always comes out in beds. The dip is different in different hills, but seems to have a prevailing tendency towards east and south.

Not only the hills are higher on the borders, but in many places the granite seems harder there, and of closer texture. Hey-tor, Sheep's-tor, Collard-tor, and Pen-beacon, will illustrate this, as well as Bol-stack, the granite of which belongs to a more westerly projection. We must except, however, as will presently appear, the hill sides in immediate contact with certain rocks adjoining the moor.

The hardness varies, from such as almost to defy the tool, to that which falls to pieces by the blow of the hammer, or may be even cut with a spade like gravel.

The colour is not much more uniform, being generally pale grey or whitish in the mass, with a shade of red or yellow; but it is found, from almost black with schorl to pure shining white; and some occurs of a rich red, superior in beauty to any Egyptian granite I have seen, particularly where it contains tourmaline.

That it is metalliferous every body knows; tin being the most common product. Copper sometimes occurs; and, in a few instances, manganese has been mentioned; of which, as the miners have reasons for concealing it, I do not know the geological relation to the rock—whether it lies on the surface, or penetrates it in veins. Lead I have not heard of in this formation.

This granite is rich in schorl, and poor in mica; consequently less impregnated with magnesia, and perhaps more subject to the operation of the weather, than is common to that rock: circumstances which may help to explain its comparative fertility in grass. In summer it feeds great numbers of cattle; and in extremely hot and dry weather, when herbage elsewhere is burnt up, assumes the appearance of great verdure; its humid soil and cold atmosphere, which at other times give it a pale and hungry aspect, contributing then to its fertility.

The close crystalline texture of the rock, obliging the condensed fogs and rain to run over its surface, is probably the cause that the valleys are boggy; extending in numerous cases up the hill sides and across the summit. These bogs, dangerous to cattle, are not without their value, being the great depositories of fuel; an important article in those bleak regions, where a fire-side is often agreeable in an evening of July. The peat gradually accumulated there has attained a depth, in many places exceeding twenty feet. The deeper the more it is

prized ; the lower portions, condensed by the superincumbent weight, becoming a much more effective fuel.

Springs commonly break out from these bogs, as though superficial to the stone ; but there are instances of a different kind : on the eastern foot of Ugborough-beacon, is a fine spring pouring out of the rock probably two hogsheads a minute. Such as these may perhaps owe their origin to another condition of the granite, where the crystals of quartz and felspar are incoherent, and the schorl has very much disappeared, forming a sort of gravel many yards in depth. Such a bed of great extent lies on one side of Hessary-tor, near the prison.

In wood this rock appears to be unproductive. A few young plantations of fir do not yet appear to suffer more than might be expected from the climate ; some fine trees are found about the borders of the streams ; and trunks of considerable dimensions have been dug up from the bogs : but it is said by gentlemen possessing estates on the granite, and my observation agrees with it, that trees, after reaching a certain height, rise no farther ; spreading and twisting their branches without proportionate increase of trunk. Wistman's wood, a plot of oaks, supposed to be of a thousand years' standing, the largest less than a man's waist, and within twenty feet high, is an extreme instance.

The outline of the granite, from Tavistock to Hey-tor, southward, may indeed be almost traced by the coppice, which, clothing the declivities of the slates and other rocks that abut against it, disappears suddenly on its gritty soil.

ON PARING AND BURNING GRANITE SOILS, AND OTHERS, WHERE CARBON IS DEFICIENT.

BY THE EDITOR.

THE remarks in the foregoing paper, on the infertility of the soil in granite districts, has suggested to me a probable remedy for this ; and though our Magazine is not intended to embrace the practice of cultivation, it will always be open to papers tracing the causes of success, or the contrary, in field and garden operations.

It is now pretty generally agreed upon, I believe, that carbonic acid gas diffused through water is the principal, though not the only food of plants ; and, consequently, where this is deficient any soil will be barren, such as that where the base is the debris of granite, or other rocks containing little or no carbon. This view is strongly corroborated by

what Mr. Prideaux elsewhere states, when he says, "greenstone appears to form the fertile hill of Rock and Estover estates, well wooded." Again, the "killas is highly fertile, differing singularly from the adjoining granite. In no place is this more remarkable than at Buckland, on the Dart; where the killas runs in a trough between two granite mountains. The vivid green of the turf and the rich wood running up into the acclivities, contrast strikingly with the pale herbage and bald crowns of its overtopping neighbours. It appears amidst the slate in Holne parish, and the different value of the land marks its superior fertility. At Yolland estate, at the foot of Shipley-tor, some fine trees appeared in the midst of the granite; on approaching them, they were found to be growing on a patch of this killas, not a tree spreading out on either side." *

On passing through the Black Forest in Germany, last Autumn, I was particularly struck with the effect of paring and burning the soil in somewhat similar circumstances of barrenness; for though the soil was not granitic in any of the spots which I examined, it was equally deficient in carbonic matter, the underlying rock being a silicious or argillaceous slate. The steep and almost perpendicular declivities were in their apparently natural state, covered with stunted brushwood, chiefly birch and hazel, starved Scotch firs, and tufts of the coarser grasses; and no English farmer, I think, would have dreamed of trying to rear a crop of corn on such a place. The industrious foresters, however, undeterred by what might appear, under the most favourable circumstances, an indifferent prospect,—carefully grub up the brushwood, pare off the scanty sward of grass, and, piling them up in small heaps, burn the whole to ashes. These are scattered over the pared surface, and dug, or rather scratched in, with a sort of pronged hoe, or a narrow spade. In some instances a slight dressing of dung is added, though this is not universal; but after all these operations, the soil seems to be little more than a mass of half-broken and half-powdered slates. I was therefore not a little surprised to observe crops of oats growing there—not very good certainly, but tolerable enough to repay the farmer's trouble.

I am therefore, I think, fairly entitled to infer, that if our granitic and other soils deficient in carbon were thus treated, their fertility would be thereby improved.

Lee, Kent, Dec. 20th.

* Observations like these of Mr. Prideaux' are highly important, and we request our correspondents to transmit us similar facts respecting soils.

NATURAL HISTORY OF THE BIRDS OF AFRICA.

TRANSLATED FROM THE FRENCH OF LE VAILLANT.

EAGLES (*Ætī*, SAVIGNY.)

Nostrils large, and furnished at their orifice with a lobe, membranous, bulging, or plaited, which arises from the upper and back part of the partition. *Upper mandible* very thin and not toothed. *Palate* soft, and either uniform or raised into a simple gristly fold. *Under mandible* abruptly slanting and roundish at the extremity. *Inner toe* with the first joint very short, and not sensibly moveable upon the second.

EAGLE (*Aquila*, BRISSON.)

PRINCIPAL CHARACTERISTICS.—*Bill* large, robust, almost straight at the base, flat on the sides with an angular ridge, and the *cere* smooth or slightly hairy, and somewhat convex. *Nostrils* very large, elliptical, placed across, sloping upwards, the upper edge of each bulged or marked with a plait. *Upper mandible* dilated on the edges, curving only beyond the middle. *Tongue* oblong, thick, fleshy, simply rounded underneath, its horns smooth above, and its point very blunt, thick, and entire. *Under mandible* with the base united and smooth. *Mouth* wide, being cleft almost to the eyes. *Shanks* short, or of moderate length, and entirely clothed with feathers. *Toes* thick, the outer united at the root by a membrane, the middle one somewhat the longest. The inner and the back *claws* much larger and more curved than the middle one; the outer claw small and short.

SECONDARY CHARACTERISTICS.—*Wings* long, extending as far as the tip of the tail. *Quill Feathers*, six to seven, slanting, the outer one short and not longer than the seventh, the others nearly equal, the third and fifth being almost equal to the fourth, which is the longest. *Tail* roundish.

The species which compose this genus feed only on live animals, which they chase and capture on the wing; they will only feed upon carrion or offal when driven thereto by extreme hunger. Their structure and their muscular power is so great that they are able to struggle successfully against violent winds. They soar to a prodigious height, and disappear from observation in the immensity of space. The organ of smell is less developed in them than that of sight. Eagles, for the establishment of their eyry, select the most desolate places, the loftiest trees, or the most rugged rocks. Their moult is simple.—SAVIGNY.

Hujus character est digiti quatuor, membranis destituti; tres scilicet antichi, posticus unus; omnes circiter usque ad exortum discreti: crura ad calcareum usque plumosa. Rostrum breve, primum rectum, dein aduncum; caput plumosum.—BRISSON.

Les Aigles ont un bec très fort, droit à sa base, et courbé seulement vers sa pointe. C'est parmi eux que se trouvent les plus grandes espèces du genre, et les plus puissant de tous les oiseaux de proie.*—BARON CUVIER.

* Eagles being thus, as Baron Cuvier says, "the most powerful of all the birds of prey," nothing, it appears to me, can be more preposterous than to follow the old distinction of *Noble* and *Ignoble* birds, first, I believe, to be met with in the curious work on Falconry, written in the twelfth century by the Emperor Frederick II., Schneider's learned edition of which I have now before me. The falcons and hawks were thus called *noble* because they were employed by noblemen in falconry, and the eagles *ignoble* because they could not be trained to this *noble* sport, the very reason obviously why the terms should have been reversed.—J. R.

Bec presque droit à la base, anguleux en dessus ; cire un peu poilue ; tarses emplumés jusqu' aux doigts, qui sont réticulés ; les doigts extérieurs réunis à la base par une membrane ; ongles aigus ; queue égale (*Aigles Européens*), ou étagée (*Aigles Australiens*) ; ailes aussi longues que la queue ; les première, seconde, et troisième rémiges les plus courtes ; les quatrième et cinquième, les plus longues.—
LESSON.

THE GRIFFARD (*Aquila armigera*, RENNIE.)

Le Griffard, *Le Vaillant*, Ois. d'Afr. i. 1, pl. 1.—*Falco bellicosus*, Latham, Ind. i. 9.
—Martial Eagle, Gen. Syn. Sup. ii. 16 ; Gen. Hist. i. 142.—*Daudin*, ii. 38.—
Falco armiger, Shaw, Zool. vii. 57.—*Baron Cuvier*, Règne Anim. i. 326.—*Lesson*,
Man. i. 83.—*Griffith's Cuvier*, vi. 35.

SPECIFIC CHARACTER.

Brown, feathers pale edged, beneath whitish ; quills black ; tail even, one fourth longer than the wings ; legs pale, feathers to the toes. Size of an eagle.—*GRIFFITH'S CUVIER*.

THE proportions of the several parts of the body furnish naturalists with the best characters which they can employ to distinguish the different species of animals. Forms frequently determine qualities and manners ; while colours very often present us merely with secondary marks of distinction. The latter remark applies particularly to the very

numerous class of birds of prey, which exhibit a different plumage at different periods of age. External forms furnish physical distinctions between the various kinds of animals, and occasion innumerable differences, as well in moral as in physiological character; and hence it becomes as highly important, in the study of nature, to observe these differences, as those which occur in their internal structure.

The African eagle, which I have designated the Griffard, is distinguished, even in this genus of birds, for his strength, courage, and sanguinary weapons. He is nearly equal in size to the Great or Royal Eagle (*Aquila aurea*, BRISSON;) but he has longer and more muscular legs, and stronger talons. By these characters this bird may be recognised in a collection where he may be placed with other eagles, or when on the wing with his legs pendent, while in pursuit of the animals on which he feeds.

Various species of small gazelles (*Antelope*) and hares form his ordinary prey. Pouncing upon the former, he kills them with much ease, and in a manner that shows the great strength with which nature has endowed him. His courage is conspicuous in the hatred he shows towards all other birds of prey, which he pursues the instant he perceives them. If they offer any resistance he attacks them with ferocity, and obliges them to retreat, never suffering one to remain in the district he has chosen for his domain. It often happens that vultures and ravens, in combined flocks, will lie in wait for some favourable opportunity to carry off an animal which the Griffard may have just subdued; but the intrepid and fierce aspect which he assumes, is sufficient to keep at a wary distance a whole legion of these ignoble prowlers.

The Griffard is usually accompanied by his female mate; indeed they seldom separate, and never fly beyond the boundaries of the domain which they have selected for their abode. They construct their eyry, not hollow, like that of other birds, but flat and platform-like, upon the top of the highest trees, or among steep and inaccessible rocks. The Griffard's eyry is so firm and solid, that a man may stand upon it without any apprehension of its giving way; and, in consequence of this solidity, it serves the same pair for a number of years. The base consists of several strong rafters of different lengths, according to the distance between the forked branches on which they are to rest. These rafters are crossed, and everywhere interlaced with flexible boughs which bind them firmly together; this forms the foundation for the edifice. Upon this is laid a great quantity of brushwood, moss, dry leaves, ling, and also leaves of liliaceous plants and flags, if such happen to grow in the neighbourhood. This second layer is covered with another consisting of small bits of dry

wood. The last layer, on which the female lays her eggs, consists entirely of soft materials. The eyry, thus constructed, may be four or five feet in diameter, and two feet in thickness, and is of an irregular form. It lasts, as I have said, for many years, and, it may be, during the whole life of the same pair, if no danger has at any time presented itself to induce them to change their place of habitation.

From the gradual decay of a great mass of bones belonging to different quadrupeds, which I found at the foot of a very large tree on which one of these eyries was built, and from different layers of animal remains on the outer surface of the eyry being intermixed with the bones, it might not have been impossible to have made out its age and to have ascertained how often it had been repaired to meet the necessities of a young family.

When a district does not furnish a suitable tree to the Griffard for the construction of his eyry, he builds it among rocks. As in this case a foundation is not requisite, a bed of moss is placed immediately upon the rock, in which circumstances the eggs are invariably deposited among small wood, and never upon softer materials.

I have observed that this bird prefers an isolated tree for his abode, probably in consequence of his being very suspicious, and of his being desirous to observe what passes around him. On rocks, moreover, his brood is more likely to become the prey of several species of small carnivorous quadrupeds, which, precisely because they are small, are the more formidable to him. It is the same among men; weak and pusillanimous enemies being often the most dangerous.

The female Griffard lays two perfectly white, nearly round eggs, about three inches and a few lines in diameter. While she is sitting, the male attends to all her wants, and provides also for the young when hatched, till they can be left without danger; but afterwards, when they are increased in growth, they require so much food, that the parent birds are both obliged to hunt for them in order to satisfy their insatiable appetites. Their voracity is so great, that some Hottentots told me they had lived for nearly two months on what they took daily from two Griffards, whose eyry was in their neighbourhood; and I think this credible enough, after what I witnessed myself of one of these birds, which I kept for some time alive, and which I caught by my shot having only broken the pinion of the wing. This bird refused to take any of the food which I offered it for three entire days, but I found it impossible afterwards to satisfy its voracity. It became furious at the sight of meat; would swallow pieces entire, of nearly a pound weight; and would never refuse any although its craw was sometimes so full that I was forced to make it disgorge a portion, though it was not long before

it would again devour what had thus been disgorged. All flesh was alike to its taste, even that of other birds of prey; and once it even devoured with evident relish the remains of another Griffard which I had dissected.

While these birds remain perched, they utter shrill and piercing cries, which are heard afar off, mixed every now and then with hoarse, mournful notes. They frequently also utter similar cries when on the wing, and while they are at the same time at so prodigious a height as to be undistinguishable by the eye.

The Griffard for size may be compared to the Great Eagle (*Aquila aurea*, BRISSON;) but it differs from it, as I have already remarked, in the dimensions of the legs and claws, and by the greater roundness of the head, while the beak is not so large, and is more slender at the bend. It is characterised, first, by the feathers of the hind head (*occiput*), which, being a little longer than the others, form behind a sort of pendulous crest; secondly, by the tail being square, that is, all the feathers composing it being of the same length. We shall always make use of this term hereafter, to express this form of tail. Thirdly, by the legs and feet being covered with feathers from the root (*naissance*) of the toes; those of the legs* being short, and not constituting what is commonly understood in falconry by the term *culotte*. Fourthly, the wings being extended to the extremity of the tail, when the bird is in a state of repose. The female is eight feet seven inches across the wings from tip to tip, and the male only seven feet five inches. Fifthly, the craw being prominent and covered with a fine, white, glossy down; the beak, bluish at its origin, being black at the extremity; the toes, very scaly, being of a yellowish colour; the nails approaching to black, and being very much curved, forming nearly perfect semicircles; of these the hinder one is the largest, the middle one the next in size, then the inner ones, the outer ones on each side being the two smallest. The eye, which is very open, is deep sunk, and is covered by the upper part of the orbit, which projects over it for about three lines. The iris is of a fine and very lively hazel brown colour. I have not observed any

* The leg of a bird is that part which is generally called the thigh. The foot, consequently, is that which is usually called the leg. I am sorry that I am obliged to conform to the received usage of anatomists, although several naturalists, particularly, Buffon, have applied indiscriminately the words thigh and leg to the very same part in a bird. This is of itself of very little consequence, but it is of consequence that the reader should understand what is meant.—LE VAILLANT.

Our author in this goes upon an analogical comparison of birds with quadrupeds. At table, the word *leg* is, according to this view, correctly applied in popular conversation. I think the term *shank* (*tarsus*.) the best for what he calls the *foot*.—J. R.

other difference between the male and female, except that the latter is nearly by one-fourth the larger of the two. The colours are the same, except that those of the male are a slight shade deeper on the wings.

The Griffard is met with in the country of the Great Namaquas. The first pair of these birds which I saw were upon the banks of the Great River, in about the 28th degree of latitude. I was more than three leagues from my tent when I shot them; they were not far from each other. I was exceedingly fatigued by bringing them home to my camp, for they weighed together from twenty-five to thirty pounds. Approaching the tropics I met with many of the same species, and as I never saw them during my journeys in Caffraria, I think their range may extend from the twenty-eighth degree of south latitude to the tropics. It may however reach as far as the equator, and may perhaps extend throughout the torrid zone; in a word, over all that part of Africa which is not inhabited by Europeans. It is indeed more than probable, that the species was formerly to be met with at the Cape of Good Hope; but, in proportion as the colonists extended themselves, and the land came to be cultivated, these eagles were obliged to recede further and further. This has been the case with all the larger animals of this country, which, in consequence of requiring a large extent of land to furnish them with subsistence, have been compelled to retire before a still greater devastator than themselves—social man.

A short description of the colours of the Griffard will now be sufficient to prevent it from being confounded with the great eagle, or with any other hitherto described. All the under part of the body, from the throat to the tail, including the legs and shanks, are of a beautiful white. The feathers covering the top of the head, and the back and sides of the neck, are white at the base, and of a greyish-brown towards the point. The feathers about the cheeks and some parts of the neck, are very agreeably speckled with brown and white. The back and tail coverts brownish; all the mantle (*manteau*) is of this last colour, but each feather is bordered with a paler tint; the large wing feathers are black; the middle ones are striped across with dull white and brownish-black; the last feathers have a white border at the point. The tail is striped in the same manner as the middle wing feathers.*

* It is proposed to continue regularly the natural history of the other birds in Le Vaillant's splendid and expensive works, the translation of several volumes being already completed, and part already printed for publication, as formerly announced. I shall add to each bird, as in the above article on the Griffard, the characteristics and synonyms, together with such notes as may appear requisite.—EDIT.

CHAPTER OF VARIETIES.

ON THE YELLOW COLOUR OF ANIMALS AND PLANTS.—It is a curious fact, that animal and vegetable yellows should be so much more permanent than all other colours. The yellow of the petals of flowers is the only colour which is not discharged by the fumes of sulphureous acid. If a lighted match be held under a flower, heart'sease (*Viola tricolor*) for example, the purple tint will instantly disappear, but the yellow will remain unchanged: the yellow of a wall-flower (*Cheiranthus fruticulosus*) will continue the same, though the brown streak will be discharged. I have noticed this in a variety of other flowers. Yellow dyes are also more permanent than most other dyes; and in the above cited instance of the goldfinch, (page 24,) the yellow on the wings continued unchanged, while the rest of the plumage was turned black.—EDWARD BLYTH.

Tooting, Surrey, Dec. 3d, 1832.

ON FLIES WALKING UP GLASS, AGAINST GRAVITY.—Some time ago, Mr. Blackwall, one of our most ingenious and original observers, read a paper to the Linnæan Society, adducing facts discordant with Sir E. Home's opinion that flies walk up glass by means of a vacuum produced in their foot, on the principle of the boys' leather-sucker. I think it highly probable that Mr. Blackwall is not aware of some of his views having been anticipated nearly two hundred years ago. "The common fly," says Dr. Power, "hath six legs, but goes only upon four; the two foremost she makes use of instead of hands, with which you may often see her wipe her mouth and nose, and take up any thing to eat. The other four legs are cloven, and armed with little claws or tallons (like a catamount), by which she layes hold on the rugosities and asperities of all bodies she walks over, even to the supportance of herself, though with her back downwards and perpendicularly inversed to the horizon. To which purpose, also, the wisdom of nature hath endued her with another singular artifice, and that is a fuzzy kinde of substance like little sponges, with which she hath lined the soles of her feet, which substance is also repleated with a whitish viscous liquor, which she can at pleasure squeeze out, and so sodder and beglew herself to the plain she walks on, which otherwise her gravity would hinder (were it not for this contrivance), especially when she walks in those inverted positions."—EXPERIMENTAL PHILOSOPHY, PAGE 5. 4TO. LONDON, 1664.

ON THE TEMPERATURE OF SHALLOWS AT SEA.—The waters which covershoals owe the diminution of their temperature, in a great measure, to their mixture with the lower strata of waters which rise towards the surface on the edge of the banks. The proximity of a sand-bank at sea is indicated by the rapid descent of the surface temperature of the water.—CAPTAIN WILLIAMS.

SPIRAL VESSELS OF PLANTS ANIMATED.—On detaching the spiral vessels from vigorous young shoots of herbaceous plants, they frequently become violently agitated : the motion continues for some seconds, and may be similar to that of the heart in animals under similar circumstances. These vessels abound in the stems of the *Urtica nivea*, of *Centaurea atro-purpurea*, and of the *Malvaceæ*.—DAVID DON.

CAUSE OF VOLCANOES.—It is not long since it was thought that the decomposition, and consequent ignition of pyrites, was sufficient to account for volcanoes, &c., though they are rarely if ever found in lava or other volcanic productions ; and they are still more rarely found at all in masses of any extent. Besides, so long as they remain enveloped in rocks, they are unalterable ; and two or three species, even under the most favourable circumstances, are decomposable with great difficulty ; and only one species—radiated pyrites, is capable of being rapidly decomposed, but not unless it be broken or crumbled into small portions, and not too much or too little moistened.—M. CORDIER.

ATTACK UPON A HARE BY A MAGPIE.—To record the petty conflicts of the inferior animals, may seem trifling to the general observer ; but to the naturalist, who writes the history of a species, no anecdote, however trivial, that serves to illustrate peculiar traits of character, can appear either uninteresting or superfluous. I was informed the other day, by a friend, (a medical man, with whom I am on terms, and on whose veracity I can rely), that he had just witnessed a curious contest between a magpie and a fine full-grown hare ; the bird making frequent and furious pounces at the hare, and pursuing it for a considerable distance, when the animal escaped by making for a thick hedge, at the other side of which it ran off to some distance from the place where it had entered, and without being observed by the bird. I had always considered the magpie to be a remarkably bold bird ; but never conceived him capable of such an exploit as this.—EDWARD BLYTH.

Tooting, November 22d, 1832.

THE CHIFF-CHAFF PROVED TO BE THE *Sylvia Rufa*,

HITHERTO CONFOUNDED WITH *S. Hippolais* OF THE CONTINENT.

BY THE EDITOR.

ARBOUR BIRDS (*Philomela polyglotta*, RENNIE), and nest drawn from specimens.

BRITISH writers, since the time of Pennant and White, have rendered the history of several of our smaller birds a mass of confusion, which even now it will be difficult to clear up, though I feel confident I possess the means of loosening two at least of the knots of the controverted points, as I shall presently show.

When I was residing last summer (1832) at Bonn, on the Rhine, my friend, M. Wichterich, brought me a pair of birds with their young, which, at first sight, judging from colour and size, I took to be pale canaries, till I looked at their bills. I perceived then that it was

a species with which I was unacquainted, and certainly not known as British. I was accordingly not a little surprised when he told me it was the *Sylvia Hippolais* of Bechstein, and astonished when he said it was one of the finest song birds in Europe, very superior to the black-cap and fauvette, and in some respects even to the nightingale. I thence concluded that it was the species whose splendid song had charmed and puzzled me in an orchard at Scheidam, in Holland, and again in the gardens of Prince Maximilian at Neuwied on the Rhine; the rich intonation and multitudinous variety of the notes fully bearing out my friend's opinion. This circumstance alone would go far to prove that the species is not British; for it would be impossible so fine a song bird could be concealed, particularly as it haunts gardens, and is rarely found in woods; the very contrary of the statement of Temminck, whose authority, how high soever it may be in other matters, is, with respect to habits, and field observation, not of the slightest weight: he might have seen the bird, if he had ever looked beyond his cabinet, in most of the gardens about Leyden, where he resides.

I kept the old birds with their young, which they fed in a cage for some time; but to my great regret they fell a sacrifice to the common enemy of cage-birds. About the same time I was delighted to find a nest of the same species in a lilac-tree in my own garden, about half a dozen yards from my parlour window. Three of the young, after leaving this nest, were secured, and the mother was caught to feed them, which she did successfully, and I brought them all and three others home with me to England. The nest was about seven feet high from the garden level, and ten from the base of a low wall, over which the branch, where it was built, leaned. The workmanship of the nest is very superior to that of the black-cap, coming nearer in character to that of the finches. The frame-work is rather thick, made of dry grass stems, sewing thread, fine wood shavings, birch-bark, and small pieces of linen rag. The inside is very neatly lined with roots, hair, a few feathers, and small locks of wool.

The confusion which has arisen about this bird, seems to have originated in the imperfection incident to descriptive language, and the careless enumeration of synonymes. Even Savi (*Ornitologia Toscana*) has utterly mistaken the bird, though he had before him the work of Rauzani, where the mistake of Latham is pointed out. The correct synonymes and description will stand thus:—

THE ARBOUR BIRD (*Philomela polyglotta*, RENNIE.)

Die Bastardnachtigall, *Bechstein*, Staub. Vög. p. 607; *Sylvia Hippolais*, *Bechst. Nat. Gesch. Deutsch.* iii. 179. sp. 10. tab. 24; Gelebaüchiger Sanger, *Meyer*, Tasschenb. Deutsch. i. 246; *Sylvia Hippolais*, *Nilsson*, Orn. Suec.; *Sylvia Polyglotta*, *Vieillot*;

Sylvia Poliglotta, *Ranzani*, Elem. Zool. iii. v. p. 97. *Buffon*, Pl. Enl. 581. fig. 2.; *S. Hippolais*, *Rüppel*, MS. Mus. Frankfort; and *Goldfuss*, MS. Mus. Bonn.

Erroneous Synonymes. *Motacilla Hippolais*, *Gmel.* i. 955. sp. 7.; *Sylvia Hippolais*, *Latham*, Ind. ii. 507; *Lesser Petty Chaps*, *Lath. Syn.* iv. 418.; *Gen. Hist.* vii. 12.; *Shaw's Zool.* x. 746; *Penn. Brit. Zool.* i. No. 249. and i. p. 508; and *Griff. Cuv.* vi. 472; *Herbert*, *White's Selborne*, 8vo. ed. 1832, p. 55, note; *Chiff Chaff*, *Mont. Dict.* and Supp. and 2d edit. p. 83.; *Flem.* Brit. Anim. p. 72.; *Selby*, *Illustr.* p. 189. pl. 47, fig. 1; and I believe all other British Naturalists. *Temminck*, *Cuvier*, and *Savi*, are too vague to be quoted with certainty.

In the full-grown male, the bill is about half an inch long, straight, somewhat blunt, broad and flat at the base. The upper mandible has an exceedingly indistinct notch, and is greenish blue; the under mandible yellowish, with a tinge of red; the angles yellowish; and the opening of the mouth lemon yellow. The tongue is yellow, abrupt at the point, and furnished with three bristles. The iris is dusky brown. The forehead is low, flat, angular, and pointed. The eye-brows and eyelids are yellow, and a yellow line runs from the nostrils to the eyes. The crown of the head, neck, back, and wing coverts, are olive grey, inclining more to green on the rump. The shoulder of the wing (*camptorium*, *ILLIGER*), is yellow; the primary quill-feathers are dusky brown, with a slight fringe of olive grey; the rest of the quill-feathers have a broader fringe of greyish white, which, when the wing is closed, forms a whitish patch. The tail is two inches long, the feathers being of equal length, and very nearly the same colours and fringing as the wing quills. All the under parts of the body are of a fine clear lemon yellow. The legs are five-sixths of an inch high, and of a lead colour; the claws greyish brown. The whole length is five inches and a half; the extent of the wings nine inches.

The female is sometimes, but not always, rather paler than the male. The young have the yellow parts very pale.

The eggs are the size of a linnet's, from four to five in number, of a bright but pale pink, with deep scarlet or crimson spots, rather large, and irregularly scattered over them.

The birds are late in arriving in Germany, seldom before the beginning of May, and depart early in August, almost as soon as the swift. The young do not moult before their departure, and in confinement the moult of both old and young takes place about Christmas. They feed almost exclusively on insects, and will not touch fruit unless compelled by hunger. The call-note is loud and strong, and not unlike that of the green bird (*Fringilla chloris*). *Bechstein* gives it "dak, dak, fidhoy, fidhoy!"

It will appear from this, I think, that we have no reason to suppose this fine bird to be a native of Britain, as we certainly have the following:

Heads of Arbour Bird.

Heads of the Yellow Bird from Mr. Blyth's specimens.

THE CHIFF-CHAFF (*Trochilus rufa*, RENNIE).

Motacilla rufa, Gmel. i. 2. p. 955. No. 63; *Curruca rufa*, Briss. i. 418; *Sylvia rufa*, Latham, Ind. ii. 519. sp. 27; Rufous Warbler, Lath. Syn. iv. 431. Gen. Hist. vii. 40; Bec-fin veloce, Temminck, Man. i. 225; Weiden Zeisig, Bechst. Staub. p. 617. Naturgesch. iii. 29; Weiden Sanger, Naumann, Vög. t. 35. fig. 75; *Sylvia collybita*, Vieillot; *Sylvia veloce*, Ranzani, Elem. iii. v. p. 102; *S. rufa*, Ruppel, MS. Mus. Frankfort; Chiff-Chaff, Bewick, i. 258; Least Willow Wren, Ib. i. 259.; *Sylvia loquax*, Herbert, White's Selb. 8vo. p. 55, note.

This, and the gold-crested wren, are the smallest of our native birds, and hence it is the more surprising that it came to be confounded with the preceding.

The full grown male has the bill a third of an inch in length, very narrow and pointed, of a blackish brown, except at the edges and within, where it is yellow. The iris is dusky brown. From the base of the bill, on each side, there runs a narrow yellowish white streak, and there is another straight streak of a dusky yellow over the eye. The sides of the head are of a very clear brown. The upper part of the head, neck, and back, are greyish brown, with a slight tinge of olive. The wings and tail are greyish brown, with the outer edgings of the plumelets olive grey. The under coverts, and shoulders of the wings, a clear yellow, which is not seen in the least when the wing is closed. The throat is greyish white; the breast, light grey, with a very pale tinge of red, or rather rust brown. The belly is greyish white, with faint yellowish streaks; the under tail coverts yellowish white. The feet are blackish brown, and two thirds of an inch high. The whole length is about four inches and a third, or a trifle more. The tail is one inch and three fourths.

The female and the young males, before the first moult, have the upper parts of a clear olive green, and under parts reddish white.

I have never met with the nest; but it is said to be built on the ground amongst fallen leaves, domed, with a side entrance, and lined with feathers. The eggs are said to be four to seven, white, with reddish black dots most crowded at the larger end.

Temminck must surely be in error, when he says it builds in the old holes of the mole, as he undoubtedly is in saying it chiefly inhabits pine forests. This it may certainly do, on account of the aphides there, but it is also not uncommon in small copses, in Kent; and, last summer, I knew one which haunted a hedge, at Lee, not very near any wood. I have watched this bird by the hour, running up and down the branches hunting for insects, and repeating its simple *chip*, *chop*, or, as Bechstein gives it, *zip*, *zap*. I heard one in Prince Maximilian's garden, at Neuwied, and a great many in the woods and copses on the Rhine. Bechstein says, they come occasionally into gardens.

I had two of these birds brought to me alive, at Bonn, and carried them with me to England, where they were the tamest birds of fifty others in my aviary. Contrary to the statement of most books, my birds were as fond of fruit as the black cap or white throat: elder-berries, grapes, ripe pears, and roasted apples were all welcome. But though they are said to stand the cold well, my little favourites both died through cold, in one night, in November, even when it did not freeze.

My friend, Mr. Blyth, has furnished me with stuffed specimens of a young and an old bird, termed the chiff-chaff, by the London dealers, which I do not know how to dispose of. It is very similar to the wood wren (*Sylvia sibilatrix*, BECHSTEIN), but of a brighter yellow. Unless this bird, however, is well ascertained to utter the same *chip*, *chop*, as *T. rufa*, I must consider it to be either a variety of the wood wren, or an undescribed species. I shall do my best to ascertain its history the ensuing summer. The following figures, which have been carefully drawn from my specimens, of the natural size, will show the differences of these several birds with respect to the bills.

Hay Bird.

Chiff-chaff (*T. Rufa*.)

Wood Wren.

ON THE DISTINCTION BETWEEN INSTINCT AND INTELLIGENCE.

BY J. J. VIREY, M. D. PROFESSOR OF NATURAL HISTORY, PARIS*.

WITH respect to their faculties, animals ought to be arranged in two grand divisions, namely,

I. Animals endowed with both intelligence and with instinct, all of which have spinal joints (*Vertebrata*), and possess a spino-cerebral nervous system, *the seat of intelligence*, and a ganglionic or great sympathetic nervous system, *exclusively the seat of instinct*.

II. Animals endowed with instinct only, which are all destitute of spinal joints (*Invertebrata*), and possess no other nervous system than the ganglionic or great sympathetic; at least among those species in which nerves can be traced.

The nervous system in a beetle. *a, b, c, d, e, f, g, h*, the several nerve-knots or ganglions. *a*, the ganglion of the head not larger than the others.

Internal impulses of life constitute acts of instinct in plants the same as in animals; but these functions of the living machine, forming a particular class of phenomena, the especial object of physiology and anatomy, we shall here occupy ourselves more particularly with instinct, considered in its exterior actions, or with regard to life, as related to surrounding objects. In this view it appears the most extraordinary, because its operations are spontaneous. The animal determines at once, without reflection and without study, as if by divine inspiration; hence its actions are always perfect; it often constructs objects with astonishing industry, which man, with the help of all the sciences, even with the most profound knowledge of geometry, would scarcely execute so well by means of instruments.

We shall, therefore, distinguish two degrees of instinct, first, that of the interior functions, or of the mechanism or organisation; secondly, that of the spontaneous outward impulses, which, like the first, manifest themselves without the intervention of intelligence.

* Translated from the French by Miss H. G——, Lee, Kent.

Almost all the metaphysicians, indeed, who have treated on the instinctive faculties, have erred on this point; having chiefly studied man, whose actions and passions are always in some degree under the influence of reason, they have readily concluded that instinct is a devious branch of intelligence, a species of human thought more or less perfected in brutes. Cabanis often employs the singular term instinctive habits. This error is derived from Condillac, and is very remarkable as to this subject, "Instinct," says the latter, "is the commencement of knowledge, or habit without reflection, or it is nothing."—(*Traité des Animaux*, part ii. chap. v.)—Now, I would ask him, what can be the beginning of knowledge? What will be the habit of those solitary wasps, which, depositing their egg in a hole made by themselves in wood, and putting therein provision for the future maggot, close the hole and die *. The maggot produced in this cell, alone, and excluded from the light, pierces the wall of the prison; emerges into day; then, transformed into a wasp, it seeks a companion, chooses the nectar of such flowers as are necessary for its food, then pierces in its turn a hole in the wood, in which to deposit its egg, carries thither the caterpillars which it only half kills, in order to leave the food still fresh for the maggots hatched from its eggs: in fine, it acts precisely as its parent had done, without having known her, without having acquired any habit or science whatever.

There are besides, animals without heads, the polypus, the muscle, *plant du byssons*, which are equally possessed of instinct; the sea urchin (*Echinus*, LINNÆUS) and others, have no brain, and scarcely can the trace of nerves be observed in them; they are at all times able to walk, whether by the assistance of their spines, or by putting out their membranous feet through the holes of their shell; they seize their prey with these, and are enabled to eat by means of the five teeth in their mouth. At the same time they must know how to direct the water which fills and swells their feet; they should have instinct to attach themselves to the rocks by forming an air-hole of each *tentaculum* or hand, and the art of defending themselves by erecting their spines against the fish that would devour them.

The mover of instinct is only the love of self, or the preservation of the individual and its kind, a sentiment implanted in all organised beings, and, among animals, regulated by pleasure and pain, which inspires in them inclinations, aversions, and affections. Hence the

* See some curious details observed at Lee, in "Insect Architecture," second edit. p. 26.—EDITOR.

individual brings into action the admirable mechanism of the organs with which it is endowed; it associates these different acts; led on continually by the pleasure of following nature, it works spontaneously and always well, without knowing it does well, and without trials or repetition. We shall even see, that, by contradicting this instinctive direction, the animal endeavours to attain its object by all the means at its disposal, but without evincing that it acts from judgment.

The difference indeed between instinct and reason is very marked. Pure instinct works always without deliberation, but maturely driven on by want or desire, by sentiments, passions, and every species of interior excitement, involuntarily. It pursues but one route; it aspires at what is useful and profitable in life, which it always recognises by secret affinity. Among insects there is no apprenticeship, no improvements, no variation in the practice, no superadded invention; but all is wisely disposed beforehand for an act which is necessary, perfect, and natural. A child, or a dull peasant, who instructs himself and studies by the aid of experience, though acting ill at first, afterwards improves. The insect needs none of these imperfect essays; supreme wisdom has rendered it unnecessary, even though it be produced in solitude, often sequestered, or rather separated from its kindred. It costs it neither meditation, nor reflection; observe it at once on its invariable course, conducted by an internal illumination superior to our weak light of reason. If it never improves, never makes any new discovery, like human reason, at least it knows no season of ignorance or degeneration, like our species; and if there are no ages of glory and literary splendour among bees and ants, neither are there ages of darkness, or of barbarity and obscurity. In fine, if the instinctive animal invents nothing, neither does it copy from others; all its actions are original; in no instance are they imitations; the swallow learns not of the mason to build its nest; and although wasps and humble bees form regular cells, they require neither rule nor compass; a more sublime geometrician directs them; a more learned architect raises the edifice of the termites and the ants. On beholding the astonishing fact, that the ant acts according to the rules of reason and industry, (without possessing the one or the other,) we might say that it is aware of the consequence of its actions.

“Haud ignare et non incauta futuri;
Atque inopi metuens formica senectæ*.”

* “The ant, fearing an old age of want, is neither unaware nor improvident with respect to the future.”

Reason, on the contrary, receiving impressions and images from without, or by the external senses, transforms them into ideas in the brain, compares and coolly judges of them, arranges its actions by them, determines voluntarily in consequence, by what appears true, or just, or best, according to occurrences, climates, &c. This is the peculiar faculty of reasoning man; he acts by his free will in several ways.

The ancients in the same way distinguished two faculties or powers of the soul: first, the appetites, the affections, and all the passions belonging to instinct in the unreasoning part of the soul; that is, the dominion of the heart, and all interior movements. But thought, reason, speech, consideration, are the fruit of meditation in the mind or brain. The brutes were not deemed to act by free will, but to be impelled by spontaneous necessity, or the instigation of nature, as if by divine inspiration. So said Cicero, and such was the universal opinion of the ancient philosophers, Plato, Aristotle, and all those who have treated of the soul and the moral faculties. (*Scaliger, Exerc. Subt.* 307, No. 5; *et Stahl, Differentia Rationis et Ratiocinii, etc.*)

But instinct never acts more completely than among those animals which are the least endowed with acquired knowledge. It is clear, that these little creatures, such as insects, each of which scarcely lives more than a few weeks in the world, could not have time, or means to acquire, like a child, any information by education or habit, to accomplish the destinies which nature has designed them. We must therefore attribute to them a mind ready formed and enlightened, and even incapable of acting otherwise. But man, and the larger species of animals who exist longer, and who possess organs and senses more evolved, a remarkable brain, and therefore functions less limited, and which can vary their actions according to circumstances, must participate more or less of liberty, of acquired knowledge, and of understanding. Instinct becomes secondary with the latter in proportion as the intellectual functions are greater and able to replace it. Therefore man, when endowed with reason so highly cultivated as to become sometimes sublime, is almost totally devoid of instinct, particularly in a state of civilisation; his taste and his sense of smelling, for example, being weaned from natural aliments, are no longer able to discern, in the forests of America, a wholesome fruit from the poisonous manchineel, which has a sweet smell; he must take as a guide the rustic savage, whose instinct is less depraved by the arts of the kitchen, by which we disguise all nature. This savage would be again surpassed by the instinct of the ape.

Do we wish this directing and preserving power to become apparent?

Weaken the understanding which restrains or opposes it, and it will immediately revive to take the reins of the organic machine, and prevent it from destroying itself. It also manifests itself particularly in maternal cares. Even when in health, if we would discover the original instinct of a man, it is sufficient to deprive him of the intellectual faculties, or to weaken the latter for a moment, and the internal impressions will predominate spontaneously, as in diseases.

From the same cause we often experience in sleep the announcement or the indication of the state of the body, which is manifestly the voice of instinct. It is certain that our internal impressions being more easily perceived in silence, and in the obscurity of external impressions, they present themselves in many dreams; thus inflammation declares itself by the image of a great fire; the overflowing of the sympathetic or serous fluid, by the idea of inundation or submersion, &c. These observations, which may be traced back to the time of Hippocrates and Aristotle, are again confirmed by a thousand daily examples. (*Aristotle, de Divinat. ex Somnio, et Hippocr. de Insomniis. lib.*)

ON THE ANTENNÆ AND THE HEARING OF INSECTS.

BY M. H. STRAUS-DÜRCCKHEIM, MEMBER OF THE INSTITUTE, PARIS.*

Anatomy of the Antennæ of the Cock-chaffer magnified eight times.

* Translated by the Editor, from the French work "*Animaux Articulés.*"

THE antennæ of the cockchafer (*Melolontha vulgaris*) are inserted before the eyes, and consist of ten joints: the three first (*a-b*) cylindrical, the seven at the tip short, and in form of leaves (*b-c*). They are furnished with numerous muscles, flexors (*c*), pretractors (*h*), elevators (*i*), abductors of the joints (*k-k*), and adductors of the joints (*l-l*). They are supplied with large nerves ($\theta-\theta$), from the ganglionic brain (λ). They are likewise supplied with considerable air tubes (*tracheæ*).

The air-tubes of the antennæ; *a*, *a*, the main branches; *b*, *b*, the antennal branches.

Though it is proved by numerous observations, that insects and other articulated animals (*Articulata*) possess the sense of hearing; yet, except in some *Crustacea*, the organ by which this species of sensation is perceived has not been discovered; probably because it has been fancied that it ought to possess some resemblance to the human ear. But it may be asked, whether it would not be possible for insects to have this sensation communicated to them by means of an organ altogether different from ours? The opinion which I propose to give on this subject may appear rash, but I put it forth only as a simple hypothesis, yet at the same time an hypothesis upon the whole extremely probable.

The antennæ are generally considered to be the organs of touch, properly so called; but this conjecture is founded upon facts imperfectly investigated, if not altogether false. I have made numerous researches on this subject, and I have never been able to satisfy myself that insects examine objects by feeling them with their antennæ. On the contrary, I have rarely observed these animals touch any thing with these organs, and when this did happen, it appeared to be only by accident, and not at all from design. Many insects, besides, have their antennæ so short, that they would be obliged to stand erect upon their heads in order to come at the bodies which they might thus wish to explore, and for this their feet are certainly much better adapted.

Since almost all articulated animals possessing a solid skin (*peau*) have antennæ, which are furnished with nerves of an extraordinary thickness in proportion to their own size, there cannot remain a doubt that they are organs of some sense, and that too a very acute one.

I have said, that insects are proved by observation to be furnished with an organ of hearing. It is, indeed, scarcely probable that creatures such as the tree-hopper (*Cicada*), and the locust (*Locusta*), to which nature has given the faculty of producing a peculiar sound by means of an appropriate organ, should, at the same time, be deprived of the means of hearing such sounds, inasmuch as these can have reference only to their own kindred. It is still farther proved, that these insects share the faculty of hearing, along with all other living beings, by their ceasing to sing the instant they fear they have been discovered.

When observing the various actions of insects, we see them suddenly stretch their antennæ forwards in case of noise, danger, or, in general, when any thing is done to attract their attention; and they keep them thus stretched forward as long as their attention continues, a circumstance which proves that the antennæ serve the purpose of apprising them of what passes at a distance, and consequently must either be organs of hearing or organs of smell. M. Rëaumur, (*Mém. des Insectes*, i. 643,) while he rejects the opinion that the antennæ serve to explore objects, thinks it possible they may be the organs either of some unknown sense or of smell. The latter opinion, however, is supported by no fact either anatomical or physiological; nor is it at all even probable, inasmuch as the antennæ are not soft and lubricated, as observation proves to be necessary for this kind of sensation: it appears to me more plausible to infer that the antennæ serve for the perception of sounds. This opinion is founded partly on the analogy of what occurs in the larger animals, who prick up their ears under similar circumstances in order to hear better; and partly because, on following the progress of *degradation** in the organ of hearing from the first of the vertebrate animals (*Vertebrata*), we arrive again in the last analysis at the antennæ of articulated animals, by a sort of transition occurring in the lobster and craw-fish (*Astacus*), a genus in which this organ occurs in the simplest form, compared with that of superior animals.

[The author here goes into several details illustrative of this last statement, which we shall omit, as of less weight than what follows.]

The solidity of the envelope of antennæ renders these organs well adapted to undergo the same vibrations as the air, in the same manner

* I cannot but deeply regret to see a naturalist of M. Straus-Dürckheim's great ability, thus vitiating his valuable work, as he does throughout, with the cant terms of Lamarck's most absurd theory.—EDIT.

as the strings of an Æolian harp vibrate and emit various sounds according as they are differently struck by the air. In this view, however, we might infer that nature would have made antennæ in the form of rods, consisting of a single piece, in order that they might be more susceptible of vibrations; but it ought to be considered, that these organs would, by such a conformation, have been much exposed to breaking, while, in consequence of their jointed form, they have the advantage of regulating the degree of vibration at pleasure, as may indeed be observed when insects listen with attention; I mean, that the joints of the antennæ perform the same functions as the chain of small bones in the chamber of the human ear, inasmuch as they form a similar chain, and transmit the vibrations of the air to the auditory pulp.

The form of the antennæ appears to be altogether independent of their functions; since their forms are so variously diversified, it would be necessary to admit numerous differences of function according to difference of conformation.

Varieties in the forms of Antennæ.

The principal objection which can be made to my opinion* upon the functions of the antennæ, is that spiders (*Arachnidæ*) being without these organs, ought in consequence to have no sense of hearing, though very conclusive observations prove the contrary. To this I reply, that the organ by which these animals perceive sounds is perhaps different from that of insects, and altogether internal, as is frequently the case in vertebrated animals. Besides, whatever the sense may be that resides in the antennæ, spiders ought to be without it, unless another apparatus be substituted in its stead. Now, as antennæ are found in most articulated animals having a solid skin, and as their nerve is one of the largest in the body, it is not a little evident that

* M. Straus-Dürckheim does not seem to be aware that this opinion was started by Bonsdorf, and adopted by Göze and Christ, as well as by some English writers.—Ed.

the sense with which they are endowed is one of the most essential, while it is not very probable that a whole class (*Arachnidæ*) otherwise very well organised, would be deprived thereof.

[I may mention, that from experiments which I made near Havre de Grace, in the summer of 1829, before the publication of M. Straus-Dürckheim's work, I came to the same conclusion, and followed very nearly the same train of reasoning with him, but with more numerous illustrations, as may be seen in *Insect Miscellanies*, pp. 105—117, all of which was written and printed, though not, I believe, published, before his work.—EDITOR.]

ON THE FOOD OF PLANTS, PARTICULARLY HUMINE, DERIVED FROM MANURES.

BY PROFESSOR DE CANDOLLE OF GENEVA.*

IN order to ascertain the general action of the multitude of manures employed, it will be proper to analyse and compare them according to the different ingredients of which they are composed. Carbon holds the first rank; though it is not only the absolute quantity, but the state in which it is found, that determines its fitness to become the food of plants. The substance most rich in carbon, such, for example, as wood charcoal, is scarcely reckoned among manures, because in this the carbon can only contribute very slowly to the formation of carbonic acid, or humine (*ulmine*), by its combination with the air, and cannot, therefore, form soluble materials to be taken up by the roots. It is only after a very long interval that it undergoes these changes, and then it acts really as a manure, as is proved by the fresher green of the plants on old charcoal stations in the forests.

The refuse (*marc*) of sugar refineries, which contains a great quantity of animal charcoal, mixed, or combined with portions of burnt sugar, forms a manure much valued in the vicinity of these factories.†

All the substances, which contain different proportions of carbon, furnish food for plants; first, because the oxygen of the air unites by simple affinity with a portion of this carbon to form carbonic acid, or because a certain quantity is disengaged by fermentation; in both of which cases, the carbonic acid is dissolved in the water of the soil, and being taken up by the plant, it serves as food. Secondly, these matters are more or less disposed to dissolve in the water itself of

* Translated by the Editor from the French work "*Physiologie Végétale*," a work which every philosophical Botanist ought to possess.

† Payen, *Annales Soc. d' Hort. de Paris*, 1827, p. 171.

vegetation. This effect is chiefly owing to the quantity of humine, or humic (*ulmique*) acid which they contain.

Humine was first observed in a diseased exudation from the elm, whence it received the name of *ulmine*. It is said to have been afterwards found in the bark of the fir, peruvian bark, oak, hornbeam, horse-chestnut, and simarouba, but it is doubtful whether it was found in these in a state of health, or by the effect of the agents employed in the decomposition. M. Braconnot, (*Ann. Chim.*, xii. p. 191,) formed it artificially by heating saw-dust in a crucible, with an equal weight of caustic potass. He afterwards found it ready formed in soot, and has formed it with sulphuric acid, saw-dust, and many other vegetable substances, such as starch, sugar, &c.

M. Polydore Boullay, (*Journ. Pharm.*, 1830,) has found humine in the soil, heath-earth, umber, turf, dung, and in general in the most part of woody or cortical substances in a state of decomposition, such as half charred wood. He also thinks it is formed during the distillation of wood. It is, therefore, doubtful whether humine ought to be reckoned among the immediate constituents of living vegetables, or among those of diseased, or accidental decomposition. M. Raspail, (*Bull. Sc. Chim.* viii. p. 333,) thinks humine is formed by the carbonised *debris* of vegetables, and supposes that it varies according to its mode of production. M. Sprengel, who observed it in soils, gave it the name of humic acid.*

Humine, when pure and dry, is a black substance, has little taste, no smell, and is insoluble in water, a circumstance which has often caused it to be taken for carbon, in the drainings, for example, of dunghills, in which it is abundant. It is very soluble in spirits of wine, concentrated sulphuric acid, potass, soda, ammonia, and by heat in acetic acid. Water throws it down from its solutions. It combines with all the salifiable bases, whence M. P. Boullay gives it the name of the *ulmic acid*; but it has no acid-taste, does not redden vegetable blues, and, like the gallic acid, contains only carbon and water, without excess of oxygen.

A very small quantity of alkali is sufficient to saturate the humic acid; and form a humate (*ulmate*). All the alkaline humates are very soluble in water. It is by its combination with potass, that the humine becomes soluble in the canker of the elm, where it was first discovered; and it is with the union of lime, ammonia, or potass, that the insoluble humine of soils, and of dung, becomes soluble, and

* I prefer Sprengel's name to *ulmic acid*, which is too contracted. See "ALPHABET OF SCIENTIFIC GARDENING."—EDITOR.

contributes to the food of plants. It is rendered soluble by a very minute portion of any alkali, such as the ammonia disengaged from dung, or by the potass, or the lime, which is often added to turf, or other substances little soluble, or, as the farmers say, cold. The substances thus dissolved are taken up by the roots as food. The remarkable analogy, as to composition, between humine, and other nutritive substances, such as gum, fecula, &c., explains and confirms its property of contributing to the food of plants.

[It must appear from the preceding details, that chemists and physiologists need not now be at any loss to account for the existence of the earths and the alkalies in the substance of plants.—EDITOR].

ON DISSECTING AND PREPARING ANIMALS FOR COLLECTIONS.

BY PROFESSOR CARUS, OF DRESDEN*.

THOUGH the art of anatomising the bodies of animals is essentially the same as that practised upon the body of man, and though want of space precludes me from treating the subject minutely, I conceive that a few remarks may not be altogether unacceptable to those who feel desirous of pursuing such studies for themselves.

The first thing that I have to observe is, that all dissections of small and soft objects, such as worms, zoophytes, insects, mollusca, and embryos, where it is desirable to obtain even tolerably accurate results, should be performed *under water*, by which the parts are kept floating and separated from each other, and consequently present themselves more distinctly.

A very simple contrivance for investigations of this kind may be prepared in the following manner:—A mass of tough wax (not too soft) is to be laid upon one, or more, porcelain saucers or capsules of different sizes, which are then to be put in a warm place until the wax melts so as to cover the surface evenly to the depth of a half or a third of an inch. If the object to be examined be laid upon this surface, it may be fixed by needles in any position that is wished, and, when covered with clear water, developed and dissected by means of suitable instruments. Of them the best are very delicate forceps; pointed, well-made, sharp-cutting scissors; and small knives like cataract-needles, some round, others with cutting edges, and fixed in slender wooden handles.* For separating parts I have also employed small horn probes

* Translated from the German by R. T. Gore, Esq. Surgeon, Bath.

† These instruments may be had of Mr. Blackwell, Surgeons' Instrument Maker, Bedford Court, Covent Garden.

and fine brushes; whilst for examining them, a good magnifying glass is frequently indispensable. If it is wished to preserve a preparation thus made, wax, coloured at pleasure as for the purpose of injections, is to be formed into little tablets about one-fourth of an inch thick: one of these is then to be placed upon the saucer or capsule containing the preparation; the latter may then be transferred to it, arranged suitably upon it, fixed there by means of short needles, and both together then placed in alcohol. Nor must I forget to mention, that the examination of very delicate organizations may frequently be conducted with greater facility and accuracy, if the object be previously allowed to remain some time in spirit, and thereby to become harder and contracted. This applies particularly to the dissection of nervous organs, and to the examination of very small embryos, of mollusca, and worms.

There are various modes of destroying worms, insects, mollusca, &c., for the purpose of dissecting, without injuring their organization: mollusca, snails, for instance, as Swammerdam has remarked, are to be allowed to die in water, because by that means their body swells, and all the parts become more distinctly visible; they may be afterwards kept in spirit (though not too long) for dissection. Worms, the larger zoophytes, (for the smaller must be examined while alive,) caterpillars, &c., and also the smaller amphibia, and fishes, are best destroyed by means of spirit. Insects, on the contrary, by being dipped rapidly in boiling water, or in oil of turpentine.

As regards the dissection of larger animals, we may here use with advantage knives of a large size; and, instead of forceps, suitable hooks with handles.

In animals of considerable size we can generally make artificial skeletons only after the bones have been sufficiently cleaned by boiling or maceration. In smaller animals, on the contrary, such as birds, amphibia, and fishes, of which last it is very difficult to make good skeletons, the object will be best accomplished by at once making the bones as clean as possible, without injuring the capsular ligaments, soaking the preparation in water, that is incessantly changed; and lastly, bleaching it for some time in the sun. Lastly, we may mention injections as affording a very essential assistance in zootomical investigations for physiological purposes: in small animals, and in the more minute parts, these must consist of compositions with wax, very fluid and coloured; best of all of mercury. The latter, however, is not suitable for very soft bodies, such as medusæ, &c., in which cases we may employ injections of coloured milk, and similar substances.

HABITS OF THE BEARDED TIT. (*Parus Biarmicus*, LINNÆUS.)

BY EDWARD BLYTH.

The Male Bearded Tit.

It is not a little curious, that this most elegant bird should still be placed by most of our modern naturalists in the genus *Parus*; a circumstance which must have originated in a very shallow kind of observation, as it certainly does not possess any of those peculiarities which are characteristic of that genus. It is by no means easy to ascertain the proper situation of any bird in a system, without actually observing its manners when alive; but the very great difference in the form of the bill, in the colours and markings of its plumage, and in the general appearance of the bird itself, would certainly seem to intimate that this species could never rank among the tits. I am not aware of any foreign species resembling our bird, but it certainly possesses peculiarities which warrant its being placed as a genus by itself.

I have now had this species in confinement a considerable length of time. Great numbers are annually imported about the fall of the

year, from Holland; and they may be purchased in the London markets for a trifle. They are hardy birds, and will thrive upon almost any sort of food: many, however, are very subject to a kind of epilepsy, and will fall from their perch three or four times a day; such as are subject to these fits generally die in the course of a few weeks,* and those which do so perhaps average about half the number of the birds imported. The remainder are usually stout and hardy birds, and very ornamental in the aviary. It would not, however, be advisable to procure more than one pair, as they are often very garrulous and noisy.

Few animals appear so isolated (if I might be allowed the expression) as this bird. It more nearly resembles the shrikes (*Laniæ*) than any other group of birds, but bears no similitude whatever to the tits, with which it has been generally classed. The form of the bill is precisely that of the shrike (*Lanius*) in miniature; in the colours and disposition of its plumage, also, it greatly resembles this genus; and there is the same diversity in the plumage of the sexes, quite at variance with the tits, in which the male and female nearly assimilate in outward appearance. The latter difference, however, I am aware, does not in every instance indicate dissimilarity in the nature of different species: the robin and the redstart, and also the two British species of sparrow (birds possessing great general resemblance) differing remarkably in this respect: but it is nevertheless worthy of notice, as an addition to other differences.

In its voice, also, the Bearded Tit somewhat resembles the flusher, (*L. Collurio*;) but its general call is monotonous, and not very unlike the querulous piping of a young chick, that has strayed from the hen; or it may be written thus, *ptear, ptear*, pronounced with some emphasis. When it is particularly pleased, it utters a note resembling *pitt, pitt*; and it emits almost continually a low kind of chirp, which also bears some similitude to the faint cry of a newly-hatched chick. The male has, however, a considerable variety of notes, many of which, as before stated, resemble those of the flusher, (*L. Collurio*;) but I have never yet heard any that could be construed into *ping, ping*, which has been represented as the common call of the species.

I have never observed any bird so extremely, I might say, strangely fond of society, as this species. A fine male in my possession, that is confined in a large cage with a variety of other small birds, keeps generally on the higher perches, where, if left alone by the others even for a moment, he makes a most pitiful outcry, endeavouring to

* A cock which I possessed had two successive fits, and died in a few days.—Ed.

the utmost of his power to call them up ; and then sometimes, when all his efforts are unavailing, and he can brook solitude no longer, he decends, and struts amongst his companions chuckling with pleasure at being again in their society. He is amazingly and almost unceasingly active, insomuch that it is frequently difficult to obtain even a momentary view of his lovely plumage. His movements also are remarkably light and elegant, and bear a curious resemblance to those of the monkeys in the large cage in the Zoological Gardens ; a resemblance not altogether fanciful, as it has been remarked by several persons. Like the monkeys, he often hangs by one leg from the top of the cage, and looks around him : but perhaps many of these traits are chiefly owing to the large size and convenient form of the cage he inhabits ; and it is as well always to have an eye to such circumstances when describing the manners of birds in captivity, their habits being often affected by the peculiar form of the cage in which they may chance to be confined. Thus, an ox-eye (*Parus major*, RAY,) that is imprisoned in a small cage, will amuse by the curious manner in which he turns himself around the perches ; and the babillard, (*Currucula garrula*, BRISSON,) or nettle-creeper, as it is commonly called in this part of the country, has also a very remarkable manner of throwing back the head when in a small cage ; but in neither instance are these manœuvres observable when the bird is allowed sufficient room to fly about.

The Bearded Tits have a curious habit of scratching each other's polls in the manner of parrots ; and the individual which I have been describing, not having a companion of his own species, has actually contrived to teach one of his fellow-prisoners, a siskin, to do so with him.

This species frequently places one foot upon its food, while it picks it to pieces with its bill ; and this, to a casual observer, might probably be considered as indicative of its resemblance to the tits ; but even in this habit he assimilates more to the shrikes. I have seen the flusher (*L. Collurio*) place its foot upon its food in precisely the same manner while devouring it ; but the tits usually hold their food with both feet in a peculiar way, and break it with reiterated knocks of the bill ; and the large species (*P. Major*) has thus sufficient power even to break a nut. The Bearded Tit, however, has not any notion of hammering at a seed, nor could he succeed in this even were he to attempt it, his beak not being formed for such labour ; but I have frequently seen him sit in patient expectation by the side of a tit that was so employed, and as soon as the seed was broken endeavour to make off with the prize : this trick has so often been successfully practised by

the bird which I possess, that the different species of tits which are confined with him have now become very shy of attempting to break a seed when he happens to be near them.

The shrikes, besides what small animals they can seize, devour a considerable number of the larger beetles and bees; and I am inclined to think that the Bearded Tit principally subsists in its wild state on the various small beetles so abundant in the reedy tracts in which it is found; it will also eat small snails, and it is fond of flies, but is by no means expert in catching them. It will feed also on a variety of small seeds; but Buffon, and after him Goldsmith and others, were most egregiously wrong in calling it a bird of prey,* the weakness of its structure alone being sufficient to convince any person of the contrary.

I would not, however, lay *too* much stress on the resemblance which this bird bears to the shrikes, as it differs from them also in some important particulars. The stomach of the Bearded Tit is extremely strong and muscular, resembling that of a finch or bunting; that of the shrike is membranaceous, and formed like the stomach of a bird of prey, to digest flesh. The stomach of the tits, also, might almost be termed membranaceous, as they have comparatively but little muscular power, their digestion being chiefly effected by the gastric juice. The progressive motion of the shrikes, and of the tits also when on the ground, is by successive hops; that of the Bearded Tit is by a curious and peculiar shuffling walk, somewhat like the strut of the chaffinch, but with the head near the ground. The Bearded Tit is of a very timorous nature, and it is generally a very long time before it becomes sufficiently familiar to feed when a person is looking at it. Some pains have been taken to tame the individual which I possess, and he will now take bread and milk from the hand, but not without the greatest circumspection, and the most extreme readiness to retreat at the least move of the person who offers it. He is immoderately fond of bread and milk, and will take no other food from the hand; but I have observed that it does not agree with him, as he is always ill after having eaten it in any quantity. His extreme timidity is also shewn when disturbed from his roost at night, being alarmed at the slightest noise, and flying about with his long pheasant-like tail expanded wide, which gives it a very beautiful appearance.

* Goldsmith, in describing the butcher-bird, says, that "a still smaller species is found in the marshes near London: this also is a bird of prey, though no bigger than a tom-tit." (*Animated Nature*, Vol. III.)

To judge from the strange situation in which this beautiful species has generally been placed in our systems, it would seem to be but very imperfectly known to most of our naturalists, and I have therefore dilated the more upon its manners and peculiarities, as they appear in confinement. It may probably seem frivolous to some to enter into such minute details, but the most trifling circumstance is often of essential assistance in working out the best arrangement of the productions of nature, and will frequently furnish a clue to the discovery of more important particulars.

The Bearded Tit ought undoubtedly to stand as a genus by itself, and to rank among the *Lanianae*, or birds of the shrike kind; which group it seems more nearly to resemble, than it does the tits, or any other.

I shall conclude by observing, that the bill of the living bird is of a fine delicate yellow, and not of an orange colour, as it has generally been described; but that in the course of an hour or two after death it changes to orange: and that the female has the same singular longish feathers on the sides of the throat as the male bird; but that being of the same colour as the rest of the plumage, it can only be noticed in certain lights.

Tooting, Surrey, Dec. 31, 1832.

[Temminck, Lesson, Selby, and others, say the female wants the moustachios, and a female which I possess in fine feather most certainly wants them, as I have just caught her to ascertain. Mr. Blyth proposes *Laniellus* as a generic name, which I think very appropriate. The species may accordingly be termed *Laniellus Biarmicus*.—
EDITOR.]

M. DE LA BECHE, ON GEOLOGICAL FACTS.*

THEORIES and fanciful systems have been the bane of Geology; and though the investigation of facts has recently been enthusiastically cultivated, this, as appears from some late publications, has tended but little to check the mania for theorizing. The newly-broached theories, however, differ from the older ones, in giving more attention to ascertained facts, and often indeed lead to the discovery of facts which might never have been attended to, if the necessities of the theorists to obtain support for some favourite doctrine, had not excited them to the research.

* A Geological Manual. By H. T. De La Beche, F. R. S. F. G. S. Second edition, corrected and enlarged, 12mo. Treuttel and Wützel, London and Paris.

Such being the existing state of Geology, the unpretending volume of M. De La Beche, can scarcely be too highly valued, inasmuch as he rarely indulges in fancy and theory, and keeps rigidly to facts. Accordingly, when he does mention theories, and it would not be easy to write on Geology without this, he usually introduces a caution; for example, "the student should be careful not to consider such explanations as well-ascertained truths, but merely as hypotheses, which future and extensive observations may or may not, prove to be correct."—p. 177. Again "we have so few data for estimating the value of this theory (Lyell's) that it can only be considered as a possible explanation."—p. 7. In his preface also the author well remarks, that "it is impossible to avoid hazarding certain general conclusions, when the various known facts pass in review before us;" but "essentially it is of little importance, whose or what theory may in the end be found most accurate; so long as we approximate towards the truth, we accomplish all that can be expected; and it is clear that the greater the amount of known facts, the greater the chance of accuracy, not only from the larger mass of information presented to the mind, but also from the frequent checks offered to hasty conclusions."—p. vii.

With so cautious and accurate a guide, then, as M. De La Beche, the student need have no fear of being seduced from the path of truth by brilliant but fallacious theories, so easy to frame but no less easy to demolish by plain facts. It may be interesting to some of our readers to have a specimen or two of our author's manner of treating his subject; and we may select almost at random, every part of the book being carefully executed. We shall therefore take the first that offers, which will prove that the author is an excellent field-observer as well as an investigator of the labours of others.

"Erratic Blocks and Gravel."

"From my own observations, I can fully confirm the remarks of various authors respecting the situation of the Alpine blocks, and their probable derivation from the respective valleys which they, as it were, appear to face. But I have nowhere observed such striking masses of erratic blocks as those which occur in the vicinity of the lakes of Como and Lecco. They are particularly remarkable on the northern face of the Monte San Primo, a lofty mountain ridge presenting one of its sides to the more open and northern part of the lake of Como, where the latter stretches towards the high Alps, thus presenting a bold front to any shock which should come from the north, leaving open passages to the right and left of it, one down the southern part of the lake of Como, the other down that of Lecco. Not only in front, facing the high Alps, but also round the flanks and shoulders of this mountain, and even behind it, where the eddy current would have transported them, blocks of granite, gneiss, mica slate, and others from the central chain, of various sizes, and often accompanied by smaller fragments and gravel, are seen in hundreds, nay thousands, scattered over the dolomite, limestone, and slate of the mountain, and nearly filling up a previously existing valley

which faced the north, the direction whence the rock-charged fluid descended ; proceeding down the side valleys, partly occupied by the lower lake of Como, and the lake of Lecco, we find the evidences of such a current in the presence of blocks occurring, as they should do, where direct obstacles were opposed to its course, or in situations where eddies would be produced behind the shoulders of the mountains. One very remarkable instance of such occurrences is behind or on the southern side of Monte San Maurizio, above the town of Como ; where numerous blocks are accumulated on the steep of the mountain, precisely where a body of water, rushing down the great valley, would produce an eddy at its discharge into the open plains of Italy. The blocks, though no doubt many have descended from their first positions in consequence of the long-continued action of atmospheric agents, occupy an elevated line, as also on other but lower heights in the vicinity, which opposed more direct obstacles to the debacle : seeming to show that the blocks occurred near the surface of the fluid mass, and were whirled by the eddy, at nearly the same level, against the steep sides of this calcareous mountain, as well as thrown against the more direct obstacle of a range of conglomerate hills."—p. 176.

We were strongly tempted to give the author's account of the elevation of mountains, and the various instances of this which M. Elie de Beaumont has arranged in a number of systematic groups ; but this we must defer to some future opportunity ; and in the mean time give our readers an opportunity of estimating M. De La Beche's powers of description, in a short article on

" *Granite.*

" In the earlier days of Geology, granite was considered the fundamental rock on which all others accumulated ; but this opinion, like many others, has now given way before facts ; for, as will be seen in the sequel, we have examples of granite, resting upon stratified and fossiliferous rocks of no very great comparative antiquity. It must, however, be confessed, that granite appears sometimes to alternate in considerable thickness with the inferior stratified rocks, and that the separation of it from gneiss, particularly thick bedded gneiss, is very ambiguous. Granite is a confused crystalline compound of quartz, felspar, mica, and hornblende. It is not essential that all these four minerals should be present ; on the contrary, rocks have been termed granite when only felspar and mica, felspar and quartz, felspar and hornblende, and quartz and hornblende, are the constituent minerals. Such an employment of the term granite must be used with much caution, as, for instance, in the case of the compound of felspar and hornblende, which, in fact, is mineralogical greenstone, and should not be named granite unless it constitutes a very subordinate portion of a mass to which the term may be more properly applied ; and results from the accidental absence of one or two of the above-named minerals for a limited space. The most prevalent compound is one with quartz, felspar, and mica ; when hornblende replaces the mica, it is sometimes called sienite. Other minerals, such as chlorite, talc, steatite, &c., are sometimes arranged with those above enumerated in various ways and proportions ; but such compounds can only be considered as accidental varieties. When the quartz and felspar occur alone, and the crystallization is such that the former appears disseminated in the latter, it is termed *graphic granite*, from the supposed resemblance it bears to antique characters. Granite is occasionally porphyritic, as is the case in Cornwall and Devonshire, large crystals of felspar being disseminated through the mass, showing that

however confused the general crystallization may have been, circumstances were such as to permit the production of distinct crystals of felspar."—p 487.

We may add that M. De La Beche writes with elegance and great perspicuity; and we are not therefore surprised that his book has been translated into French and German, and republished in America. It well deserves, indeed, to become the manual of every Geologist.

ANATOMY AND PHYSIOLOGY OF THE ANTHERS IN THE TREE PRIMROSE (*Oenothera biennis*, LINNÆUS).

BY E. G. BALLARD, ESQ.

THE Tree Primrose, which is common in gardens, and from its blowing in the evening is also called the Evening Primrose, exhibits, in the act of flowering, the following peculiarities:—If carefully watched about seven o'clock in the evening, the advanced flower-buds will be seen to expand gradually, while the calyx swells and at length bursts on both sides, opening from the bottom; and, when fully open, the petals unfold themselves with a sudden spring, which reverts the calyx, and at the same moment the anthers burst lengthways, discharging their pollen upon the stigma. In order, it would appear, to prevent the dispersion and loss of the pollen, it is moistened with a gelatinous fluid, and adheres between the anthers and stigma by means of tenacious films of this fluid. In the course of the night these films dry, and recede in the direction of the stigma, while the pollen is absorbed. In this plant, I may mention; the anthers are ready to burst as soon as the blossom expands.

In consequence of having discovered this curious peculiarity, I proceeded to dissect an advanced flower-bud that would have opened in the evening. I found the anthers already open and full of ripe pollen. The structure of these, with their filaments, I carefully examined, and made the accompanying figures of them while under the microscope.

Fig. 1.

Fig. 2.

I found an anther to consist of two longitudinal cells, A A, Fig. 1, filled with ripe pollen, held in suspension by an exceedingly small quantity of a highly tenacious fluid, strongly resembling that from which the spider spins his web, and which, when the particles of pollen were disturbed, and adhered to my instruments, became drawn out with them into inconceivably fine films. These cells were separated by a vascular and transparent partition B, terminating at each end in the two glands C C, and prominent at the back of the anther, at E, Fig. 2. The liquid they contained was conveyed up the filament D, into the small gland F, and the principal part of it, after supplying the partition, was secreted in the large glands, C C, Fig. 1. This liquid has, however, the peculiar quality of drying as soon as exposed to the air, or rather, perhaps, of evaporating; for the perfectly ripe pollen is, to all appearance, as dry as that of any other plant. It is therefore, it would appear, intended for the purpose of keeping the particles together, but so slightly, that the elasticity and spring with which the petals fly open is sufficient to disperse the pollen on the stigma, and the superfluous particles adhere to the films produced by the fluid, in all directions, between the stigma and the anthers. Whether the anthers are originally continuous round vessels, which burst when the pollen is ripe, either lengthwise or otherwise, or whether they are merely open cells in which the pollen is lodged, I have not been able to discover; but from the peculiar office of the tenacious fluid, and the circumstance of their shrivelling up immediately after the pollen is discharged, I am rather inclined to think the latter is the fact. In dissecting one of the anthers, I separated a membranaceous thread or nerve from its side, which I thought exhibited a kind of involuntary oscillatory motion; but this might only be the effect of the air. Should it however prove otherwise, it is no doubt intended to assist the dispersion of the pollen. This circumstance of the peculiar structure of the anthers, and also the tenacious fluid which holds the pollen, renders it important that the flower should blow in the evening, as the heat of the sun in the day would dry up the fluid, and thus prevent the proper dispersion of the pollen.

It would be worth investigating, whether the same circumstances attend the night-blowing cereus (*Cactus grandiflora*, LINNÆUS.)

Liverpool Road, Islington, 27th Nov., 1832.

ON THE RUMP GLAND IN BIRDS.

BY M. REAUMUR.*

WERE I tempted to explain why the hinder part of the hens, without tails, has not a secretion performed in it like that which is observed in other hens, and in other kinds of birds, in many of which I have found a rump notwithstanding their want of tail; were I tempted, I say, to explain it, I should be aware of the danger I should be in of committing mistakes by the very obligation I think myself under of exposing, as an error, the notion which the naturalists and philosophers have framed to themselves concerning the utility of the unctuous liquor that issues through the one, or the two excretory canals of the rump of birds. All the works of nature being lavishly filled with wondrous characteristics, fit to raise in us a most just admiration, those who, from the best intentions, expose them to our eyes in order to force us to acknowledge the AUTHOR of them, are, on account of the multitude of those wonders, liable to some reproach, when they happen to mention among them some that are not of the utmost certainty. They all have been of opinion, that the feathers of birds, in order to be sheltered against rain, wanted to be done over with a kind of oil, or grease, that might cause the water to run off them without penetrating them, and that this unction wanted to be repeated from time to time: we shall prove in a memoir, that shall treat on nothing but feathers, that they have been wrong to entertain that notion. In consequence of it, they have pretended to make us admire a reservoir of unctuous matter placed on the hinder-part of each bird, out of which he expresses, and takes it with the end of his bill to convey and spread it all over the feathers that want it.

I shall not here undertake to show how little the quantity of liquor, that may be daily supplied by this reservoir, is in proportion to the extent of the surfaces resulting from the assemblage of the numberless feathers with which a hen or a duck are covered; nor how long a time would be necessary to enable the reservoir to supply a quantity of the said liquor; sufficient to besmear the surface of only one of those feathers. In order to explode a notion, that must needs have been

* This paper is introduced from the English translation of the celebrated Réaumur's work on domestic fowls, for the benefit of those who do not read French, and who publish, as their own discoveries, the well-known observations of others. We shall give another similar paper shortly.

pleasing, since it was universally espoused, I need only say, that the feathers of our tailless, or, as I call them, rumpless hens, are as much proof against rain as those of the other hens, and of many other birds that are provided with a rump, in which the secretion of an unctuous liquor is made. It is, however, a real fact, that birds are at times seen pecking their rump: this imposed upon the observers; they thence concluded that they squeezed from their rump an unctuous liquor, which they took upon the end of their bill to stroke it afterwards over their feathers; they did not consider that the extremity of the bill could never fetch out a quantity of that matter, sufficient to make itself greasy. All that might have been concluded from it, is, that some slight pain, or barely an itching, perhaps, caused the bird to squeeze his rump, or the reservoir, or the extraordinary canal of the unctuous matter, to force it out of the place where it caused an obstruction being grown too thick. Our very school-boys know that this obstruction may take place and occasion an illness in birds: when their sparrows look poorly, and are in a drooping condition, they examine the state of the rump; and when they think they perceive any more swelled than they naturally are, they press, and even sometimes tap them, to force their contained fluid out of them. I do not know whether the success of this last operation is very certain, but it would be better, in my opinion, to endeavour to cure the obstruction of the excretory canal, whose orifice is sometimes stopped by the liquor inspissated; and in order to do this, to moisten it, or to introduce into it some small solid body. So long as we shall be ignorant why a secretion is made in our ears of a certain matter, though in a very small quantity, we shall not think ourselves obliged to give an account, why a secretion of a certain matter is in a particular manner effected in a very small quantity on the rump of birds.

OBJECTIONS TO THE RECEIVED THEORY OF RAIN.

BY MR. EDMUND HART, NOTTINGHAM.

It is the received opinion, that rain is caused by the heat of the sun's rays raising the water in a state of vapour, into the higher regions of the atmosphere; and it being there condensed by the cold, it descends again, and thus forms rain.

Objection, 1st. That water requires a heat equal to sixty degrees of Fahrenheit's thermometer, to raise it into the least vapour, according

to the commonly received opinion, (although subsequently I shall prove it gives out its vapour far below the freezing point, on some occasions, and, on the other hand, not at the boiling point,) when experience proves, we have the most rain when it stands below temperate, which is fifty-five degrees; for instance, the snow in frost, and the rain after.

Objection 2d. That when we have the greatest heat, with the largest loss of water, we have the least rain, as witness every dry summer. *Query.* What becomes of it?

Objection 3d. When vapour is condensed into water, which it must be, if exposed to an atmosphere colder than itself, it must immediately descend; as witness the dews, (but more of this by and by); it being then heavier in its specific gravity than the bulk of the surrounding atmosphere. Therefore, were water raised into vapour, by the heat of 300°, it must be immediately condensed by the sudden change of temperature, and descend before it had risen to the height of one hundred yards; much less rise into the highest regions of the atmosphere, and remain there for a length of time, and then form clouds, and so produce rain, as witness the steam arising from the boiler of a steam-engine, or the refrigeratory of a common alembic.

Objection 4th. Experience has proved, that we have the most rain in nights, and in winter, when, of course, it must be the coldest, as then the sun has the least influence.

Objection 5th. There is no vapour arises from the water when the sun has the most influence, (the reason for this will be given hereafter;) for, place a looking-glass over a river, when the sun shines with his meridian force, and it will not so much as dim it; but, when the sun is gone down, the vapour rises so as to be visible. *Query.* Does the water in the pot boil when the fire is out?

Objection 6th. If the old theory were true, there would always be the most rain in the tropics, where the sun is vertical, which is not the fact.

ON THE PREDACIOUS HABITS OF THE SHRIKE, OR FLUSHER, (*Lanius Collurio*.)

BY EDWARD BLYTH.

As there are yet many naturalists who doubt the predacious habits of the shrike (*Lanius Collurio*), the following facts, which have occurred

within the sphere of my own observation, may not, perhaps, be deemed superfluous, or uninteresting.

Twice, during the last summer, birds of this species have been brought to me that had been taken in the nets of bird-catchers, on attempting to seize upon their brace birds : the nets had been spread under a hedge. An instance also occurred of one of these shrikes being seen by a lad, (on whose veracity I can rely,) to carry off a small bird ; which, on a stone being thrown at it, was dropped, and proved to be a young whitethroat, (*Curruca cinerea*, BRISSON,) that had but recently left the nest.

Wishing to ascertain the manner in which the shrike attacks its prey, I opened the door of a cage containing one of these birds, and was about to put a sparrow in it, when, before I could disengage it from my hand, the shrike seized it most instantaneously *in its claws*, striking out in the manner of a falcon. Its death was effected in an instant. The shrike extended his wings and spread his tail over it, in precisely the manner of a hawk, and killed it by picking a hole in the skull. He then flew to a perch, carrying the sparrow in his claws, and fixing one foot upon it, began to devour it ; nor did he desist until he had nearly finished the whole bird, which he held in this manner for upwards of two hours.

I did not observe that the shrike endeavoured to find a nail or stake on which he might fasten his victim, as is the usual habit of birds of this genus ; but I doubt not, that had there been any such convenience, he would not have failed to avail himself of it. The feathers, and other indigestible parts, were afterwards ejected in pellets by the mouth. This shrike was quite a young bird, and had not fed himself above a month.

Mr. Selby remarks, that various small birds have been observed to build their nests and rear their young unmolested, within a very short distance of the shrike's nest ; and I remember once noticing a white-throat's nest within ten paces of that of a pair of these birds. This is certainly a very curious fact ; and Sir W. Jardine mentions an instance, in which a wild duck was discovered sitting within ten yards of the eyry of a peregrine falcon. It would, however, be absurd to infer from the latter, that the peregrine is not a bird of prey ; and accordingly the former cannot be adduced as an argument against the rapacious habits of the shrike.

The flusher appears to subsist principally on the larger insects, (and I have noticed, that, when it can procure this food in great abundance, it eats only the abdomen) ; but if, at any time, it experiences a defi-

ency of insect food, it then probably preys chiefly upon field-mice, and such small birds as it can contrive to seize; and there is no doubt that a very considerable number of young birds are thus destroyed. I once observed six or seven large beetles and humble bees, transfixed by one of these birds on the thorns of a sloebush, each of which had been deprived of its abdomen.

Tooting, Surrey, Dec. 1832.

NATURAL HISTORY OF THE HAMSTER. (*Cricetus vulgaris*,
DUMERIL.)

BY CHRISTIAN QUIX, OF AIX-LA-CHAPELLE*.

Hamsters fighting.

SYNONIMES. *Cricetus*, *Gesn. Quadr.* p. 738; *Ray, Quadr.* p. 281; *Mus cricetus*, *Linn. syst. Nat. by Gmel.* i. 137; *Pallas, Glir.* p. 83; *Schreb.* 4, Pl. 198 A.; *Glis cricetus*, *Erzleb. Mam.* p. 363; *Glis marmota Argontoratensis*, *Briss. Quadr.* p. 166; *Le Hamster*, *Buff. par Sonn.* xxxii. 168, Pl. 13.; *Desmoulins*, *Dict. Classiq. in verb. Hamster*; *Sulzer, Naturg. Tab.* 1, 2; *Hamster nigricans*, *La Cép. Mammal*; *Hamster Rat*, *Penn. Hist. Quad.* ii. 206, Pl. 84; *Shaw's Gen. Zool.* ii. 95. Pl. 137.

* Translated from the German work, "*Naturbeschreibung der Feldmäuse und de Hamsters*," by Christina Rennie.

THE damage which is done by this corn-stealer is not so great in our vicinity as in Thuringia, and some other places in Germany, where it becomes of considerable consequence in household economy to guard against its depredations.

The hamster is of a reddish brown colour, intermixed with a few black, yellow, and white hairs. On the back it is hair-brown. The mouth is margined with white. The throat, feet, and tip of the tail are white. The breast, belly, and the inner part of the ham are glossy black. The ears are close together, and the tail is short. On each side of the back there are two bristly spots. The animal is about ten inches long and one foot high. Its head is thick, short, and blunt, the muzzle short, the upper lip is cleft, showing the four front teeth (*schneidezähne*). On each of the under jaws, in the interior of the mouth, there is a large deep bag or sack, termed a cheek-pouch, wherein the hamster collects provision to carry to its nest. Externally, on both sides of the mouth, are black and white bristles, bristly mustachios, and black bristles over each eye. The body is long and rather thick; the tail short, ringed, and sparingly covered with hair. The legs are short and strong, the fore feet having four toes with a thumb, and the hind feet five toes, furnished with curved claws. The female is rather smaller, and of a paler colour than the male. There are some varieties quite black, others quite white, and others black, with large white spots.

Hamsters are irascible, malicious animals, and when put upon their defence will boldly attack either man or beast, having been known to fly at a horse. They are supposed to live about eight years. They make a nest for their abode two or three feet deep in the ground, and in winter still deeper. It is furnished with at least two entrances, the one for entering, and the other for going out, even in fruitful, clayey, sandy places, in meadows, woods, fields, or fens. The passage outwards is a narrow gallery, running in an oblique direction; but the entrance is straight, cut perpendicularly through the first, by the hamster scraping the earth with its claws, and carrying off the rubbish in its cheek pouches. The entrance is commonly at the distance of about a foot from the outgoing. Through this the hamster puts out his head before he ventures out, in order to see whether there be any danger, and if there is he quickly withdraws into his nest.

Between these two openings several chambers are constructed, one for a storeroom, one for rubbish and offal, and another for sleeping. In some cases, as many as five store-chambers are found. The sexes live apart, the female having a separate chamber close by that of the male.

While she is with young she brings in no provision, and as soon as the young are grown, they separate, and then this chamber often remains untenanted.

The first fall of snow renders the hamsters torpid in their nests, whose entrances they take care to have previously closed, and on the first warm day in March they revive from their hybernation.

They have frequently two broods in the year, and the young of the first brood sometimes breed within the same year. After the pairing season, the male and female separate, and whenever they again meet by accident, they quarrel and show the most spiteful hatred. The female goes with young about six weeks, and has, when young, from three to five at a birth, but when older from six to sixteen. The young are at first blind, and the mother does not seem to treat them so kindly as other animals, for when three weeks old she drives them from her.

No other animal is so destructive to corn-fields as the hamsters; but, besides grain, they eat young birds, meat, fruit, roots, grass, seeds, herbs, and sown seed-corn, and, in autumn, rye. They go out to forage early in the morning and about dusk in the evening, carrying home their plunder to their store-rooms. They stuff grain and other provisions into their cheek pouches with their paws, and when they wish to empty these they press gradually on the outside with their fore-feet. They press their magazine close together, and are said to gnaw off the ends of the grain to prevent its germinating. As a winter treat, they consume a small portion, should they happen to be roused from their hybernation, but this never continues long. Their store-room, however, is of no little importance, and often contains as much as a hundred weight of provisions, such as fruits, peas, beans, tares, barley, oats, wheat, and rye, of which they always take care to choose what is of the best quality. They also eat green seed.

Their teeth are said to be poisonous, and their bite heals with difficulty. Their enemies are the weasel, the marten, pole-cats, foxes, cats, owls, and hawks. They are destroyed in their holes by means of the vapours of sulphur, and also caught in pit-falls constructed with glazed earthenware pots. But the most usual way of extirpating them is by digging them out of their nests. They are thus dug out from March till June, the furs being then in the best condition; and after the harvest they disappear, and are not so readily found. As soon as the hamster-digger gets near the store-room, he closes up all the outlets, and then is the time to strike the animal dead with the

spade. If the burrow is not opened with due caution, the hamster will often escape, or fly at his pursuer; and bite so hard, that he will not quit his hold till he is killed. A hamster when pursued will often dig from three to four ells (Flemish) in a few minutes, and stops up the new run so well as to render it difficult to discover.

NATURAL HISTORY OF THE BIRDS OF AFRICA.

TRANSLATED FROM THE FRENCH OF LE VAILLANT.

TUFTED GOS EAGLE (*Morphnus occipitalis*, CUVIER.)

Le Huppard, *Le Vaill.* Ois d'Afrique, i. p. 8, pl. 2. *Falco occipitalis*, Lath. Ind. Orn. Sup, p. iii. Daud. ii. p. 40. *Falco Senegalensis*, Daud. Shaw's Zool. vii. p. 59. Nisser Tookoor, Black Eagle, Bruce, Travels, Ap. t, p. 159, pl. 32. Occipital Eagle, Lath. Gen. Lyn. Sup. ii. p. 17. *Ib.* Gen. Hist. i. p. 139. Aigle d'Abyssinie, Drapiez, Dict. Class. I. 161. L'Aigle-autour noir huppé d'Afrique, Cuvier, Règne Anim. I. 332. Le Huppard, Lesson, Manuel, I. 90. *Aquila occipitalis*, Spix; *Spizaëtus occipitalis*, Vieillot. Black Tufted Eagle of Africa, Griff.—Cuv. vi. 45.

SPECIFIC CHARACTER.

Grand comme un corbeau, noir, une longue huppe pendant de l'occiput ; les tarses, le bord de l'aile, et des bandes sous la queue blanchâtres.—BARON CUVIER.
 As big as a crow, black, with a long tuft hanging from the occiput ; the tarsi, the edge of the wings, and the band under the tail, are whitish.—GRIFFITH'S CUVIER.

NOTWITHSTANDING the great difference in the size of this species, compared with that of the preceding (*Aquila armigera*), yet it evidently belongs to the same genus. Like the Griffard, the Tufted Gos Eagle is courageous, and, like him, he lives principally by hunting, only seeking offal, when, goaded by hunger, he can find nothing else to feed on and appease his voracity. This is generally the case with all birds of prey, to whatever genus they may belong. I have had so many opportunities of verifying this remark, that, whatever our historian-poets, and all those who have copied from them, may have said, I must always maintain it to be false, that eagles, however they may be pressed by hunger, never prey upon carrion.

Like the Griffard, this eagle is also characterised by a crest, but a much longer one. His legs are likewise covered with fine down, which extends to the root of the toes. His curved beak, and his strongly-arched and sharp talons—although he is not much bigger than our largest buzzards—proclaim him to be a bird of war and destruction. Not being sufficiently strong to seize and strike down such animals as the gazelle, the Tufted Gos Eagle satisfies himself with smaller game, such as hares, ducks, and partridges, which he pursues with great swiftness and dexterity, his long wings, the points of which extend nearly to the extremity of the tail, enabling him to catch such birds, which are very swift, with tolerable facility.

I have named this eagle from the sort of crest which so particularly characterises him. This tuft of feathers takes its rise upon the hind head (*occiput*), is prolonged five or six inches backwards, and descends gracefully, and with a slight curve, towards the back. It is so flexible and light, that the least wind or slightest motion of the body, makes it play. The thousand different forms this tuft assumes, gives to the bird a peculiar air of gracefulness. Our ladies know well how to appreciate the value of such an ornament.

The general colour of the bird is dull brown, lighter upon the neck and breast, and deeper upon the whole mantle and the abdomen. The long feathers (*culottes*) of the legs are mottled, and the down which covers the shank in its entire length, to the origin of the toes, is still more mottled with the same colour. The large quill feathers of

the wings are of a brownish-black, with some white in part of the middle of the external plumelets (*barbes*); all the other wing-feathers are waved with greyish-brown and white, as well as all those of the tail, the extremity of which is entirely blackish-brown. The tail is slightly rounded. The toes are yellowish, and the claws of a shining black; the beak horn-coloured; the iris yellow, more or less deep, according to the age of the bird.

I have only met with this species in the Auteniqua country and in Caffaria.

The Tufted Gos Eagle builds his eyry upon trees, and lines it with feathers or wool. The female lays two eggs, nearly round, and spotted with reddish-brown. She is larger than the male; her colour is lighter, and her crest is not so long; she has also more white on the leg-feathers, and also a number of small white spots about her eyes, and on the top of her head.

The male and female are always sure to be found in the same district, and always together.

The Tufted Gos Eagle has a plaintive cry, but it is very seldom heard except when he is in pursuit of crows, on whom he has no mercy when they approach too near his eyry. But he seems to be most inveterate against the species which I have named *Corbivan* (the Ring-necked Raven—*Corvus torquatus*, SPALOWSKY); for these, better armed and more daring, frequently venture to attack the Gos Eagle, and take his prey from him; when strong in numbers they will even endeavour to beat him from his eyry, that they may devour the eggs or young birds. It sometimes happens that his brood thus becomes the prey of these plunderers; but it is never, till overpowered by numbers, and after a defence which has cost the life of more than one of their enemies, that the unfortunate pair can be forced to abandon their eaglets, frequently still too feeble to defend themselves except by the cries of despair.

The young Tufted Gos Eagles are at first covered with a whitish-grey down, which becomes gradually replaced by brownish feathers bordered with red. I have examined three of the nests, in neither of which did I find more than two young ones, one of which was always a male and the other a female, a circumstance easily known, from the difference of their size. On leaving the nest, the crest is apparent in the male.

CHAPTER OF VARIETIES.

ON THE MATHEMATICAL DANCES OF GNATS.—As an illustration of the beautiful theorem in geometry (*Eucl. i. 32.*) which bears that the “three interior angles of any triangle, are when taken together equal to two right angles,” I have just met with the following, given with so much spirit too by the ingenious author, that perhaps he may include himself among the “many persons” who “have burst into an involuntary flood of tears upon first reading this proposition.”

“The maziest dance,” says our author, “ever performed by three *gnats* of a swarm in a summer’s evening through the air, is yet subject to this strict regulation: the flies can never separate from each other, so that their angular distances, when added together, shall be less or greater at one time than another, but will always be equal to the stated quantity of two right angles, (unless when they happen to be all in the same straight line, on which occasion their angular distances from each other all vanish at once). But what shall we say to the fact (which is, however, but a multiplication of this), that every *trio* of gnats in the swarm, be it ever so large and so lively, every combination of three, in all the evolutions and involutions performed by the whole crowd, keep always at the same collective angular distances from each other; that is to say, the three angles formed by lines joining every three flies in the swarm, when added, not only make up the same quantity at all different times, but those formed by one trio are exactly equal in a sum to those formed by any other! The same is true of all the bodies of the solar system; planets, satellites, and comets. Whatever changes or disturbances they may undergo, there is one relation subsisting between them which no power can alter; every three must, in every position, have the sum of their angular distances what it was in every other position, namely, two right angles (unless when they happen to be in the same right line.)”—*Darley’s Geometrical Companion.*

Gnats, however intricate, involved, or mazy their movements be, cannot (any three of them) place themselves so that lines joining their points of position shall form either more or less than two right angles.

In the annexed figure suppose three gnats to be at the points $a b c$; the lines joining these form a triangle whose three angles are together equal to two right angles. Suppose they have moved to the points $a' b' c'$; the dotted lines joining these form a triangle whose three angles are together equal to two right angles; and in the third position, $a'' b'' c''$, the lines joining these form a triangle having the same properties. In the same manner, were they to continue to move for ever, at no time would they be found in positions which, if joined by lines, would form less or more than two right angles.—JOHN SHARP, *Drummond Crescent*.

APPLE COCCUS.

A. Apple covered with the Insect. B. View of the back of the Insect: magnified.
C. View of the under part: showing the Eggs.

SCALE INSECTS (*Cocci*) ON AN APPLE.—I have been indebted to the kind attention of Mr. Maund, the editor of the justly-appreciated "Botanic Garden," for a specimen of an apple, figured above,

on the rind of which a great number of a species of scale insect, (*Coccus*), are irregularly scattered. It bears a very close resemblance to the scale insect of the elm, (*C. conchyformis*, GMELIN), as described by Réaumur, and also to the one which I have mentioned (*Insect Trans.* p. 92,) as common on the currant bushes at Lee. The one on Mr. Maund's apple is, however, much less gregarious than the currant species, which are always crowded closely together, but more so than Réaumur's species. But as those on the apple are at present in a state of hybernation, (if I may here use this term,) consisting of the dried body of the mother covering and protecting the eggs, as is shown in the figure, there are not sufficient circumstances to establish the difference of the species. I am not, however, acquainted with any species which is thus found on fruit, and I shall carefully watch the hatching of the eggs.—EDITOR.

PROFESSOR CHRISTISON, ON CINNAMON SUET.—We are indebted to Henry Marshall, deputy inspector general of the army hospitals, and author of a valuable work on the "Medical Topography of Ceylon," for a specimen of the singular substance termed cinnamon suet, accompanied by a brief notice, by Professor Christison, of Edinburgh, of his chemical investigation of its properties, which we shall here subjoin.

"I have now finished the the examination of the cinnamon tree suet, and the following is the general result. It contains eight per cent. of a fluid oil, not unlike olive oil, retaining its fluidity at 40 degrees F, and not very solid even at 32 degrees. The remainder is a waxy principle, fusible at 110 degrees, and capable of being sublimed between the temperature of boiling water, and a red heat,—extremely soluble in ether,—moderately soluble in boiling, but nearly insoluble in cold, alcohol; crystallising from its etherial and alcoholic solutions in microscopic, pearly crystals, capable of being saponified, and, in consequence of that process, converted into a fatty acid, fusible at 98, which forms soluble salts with the alkalies, insoluble salts with the earths, and insoluble salts (or plasters), with the metallic oxides.

This principle answers very exactly the description given by John, of one of the waxy principles contained in the wax of the *Myrica cordifolia*, and which he names *Cerin*. My observations on its saponification are new, which proves its not having been particularly studied at the time John published his analysis.

I have also made an examination of the oil of the *Laurus nobilis*, another species of the same genus with the cinnamon; and although its external properties are wholly different from those of the cinnamon tree suet, I find it contains a considerable quantity of cerine likewise, and of a waxy principle, identical with that of the cinnamon tree."—R. CHRISTISON.

INCIDENT OF A DISABLED QUEEN BEE.—The people of my village, many of whom are fond of keeping bees, make use of strange expedients to induce bees to stay in the hives; into which they are first

shaken. One of my hives threw off a swarm, which settled upon the branch of a plum tree; it was hived in the usual way, but, in the evening, went back to the parent hive-tree, when it was again hived; but, in the evening, it again went back. I applied to a woman, who was remarkable for her skill in the management of bees, for advice how to proceed. She told me that one certain method of success was, to rub the inside of the hive with the saliva of a sow! I inquired how that was to be done. She said I must put a few handfuls of oats in the hive and let a sow eat out of it; that, during the operation of munching the grain, I might expect the sow to drop its saliva, which would operate as a charm upon the bees, and cause them to remain in the hive. Not much liking the expedient, I put on a veil, and as the swarm was issuing for the third time, and settling on the same tree, I examined the mouth of the parent hive, and then I beheld the queen with only one wing, making vain attempts to accompany the swarm. I instantly picked her up, put her into the hive, shook the swarm in upon her, and all was well. After the bees remained, they immediately began to work. I knew that the queen (leading off a second swarm, and consequently being a young queen) would be barren, because impregnation takes place in the air, and this queen could not fly. I therefore united the next swarm I got to the colony over which she presided, and was glad to find that, in the single combat which was sure to take place between the rival queens, she of the one wing lost her life, and was thrown out.—R. D.*

BIRD RIDDLES.*—The Author of this pretty book (pretty, were it no more than for the fine frontispiece) has given a number of very ingenious riddles in rhyme, founded on the characteristics of birds, followed by an excellent selection of illustrative anecdotes and details. We select No. 11 as a specimen of the riddles, and the corresponding notes:

“Unceasingly busy, contentious and loud,
Every spring to our native trees we crowd;
We sometimes reside in the midst of the town,
And strange though it may seem, we have built in a crown.”

Page 10.

“ROOKS.—Some years since, a small colony of rooks, probably a detachment from that which had long occupied the trees in St. Dunstan’s

* The other gleanings of this correspondent will be highly acceptable. Two others will be inserted.

† Sketches of Birds, in Enigmatical Verses, for the Amusement of Children. By S. Roper. 12mo. Harvey and Darton, London. 1832.

church-yard, took possession of some lofty elm trees, on the parade in the Tower, which they soon filled with their nests; and the shortness of accommodation there, perhaps led some of them to occupy the crowns, which are fixed on the top of the vanes at each turret of the white tower. The remains of the nests may still be seen filling these singular stations."—Page 48.

RAIN PREDICTED BY MONKEYS.—Some time before rain commences in South America, there is heard through the woods the melancholy howling of monkeys (*Simia Beelzebub*, *S. Seniculus*, &c.) The coming noise of the storm is afterwards heard at a distance. The intensity of the cries of the monkeys may be partly understood from the fact that a single tree is sometimes the abode of sixty or eighty of them.—BARON HUMBOLDT'S *Darstellung*.

FLIGHT OF THE ALBATROSS.—How powerful must be the wing muscles of birds which sustain themselves in the sky for many hours together! The great Albatross, with wings extending fourteen feet or more, is seen in the stormy solitudes of the Southern ocean, accompanying ships for whole days, without ever resting on the waves.—DR. ARNOTT.

HONEY-DEW AND APHIDES NOT FOUND IN BRITAIN.—Speaking of Honey-dew being ejected by Aphides—a fact proved beyond all question, and which may be seen in every wood and hedge in the empire—Mr. Huish says, "I acknowledge that it not only exceeds my belief, but also my comprehension. Its not having been observed in this country may proceed from diversity of climate, which is not congenial to the growth of the insect!!!"—HUISH ON BEES, p. 201.

ON FROST CAUSING PLANTS TO FLOWER.—Plants are often checked in their growth from cold and frosty nights; one striking effect of which is, to force them prematurely into bloom.—PATRICK NEAL.

THE HUNTED HARE.—A hare closely pursued by the hounds was suddenly lost sight of; she had plunged into a deep ditch overgrown with briars; and, after running some distance along its bottom, crept slowly up the bank and stretched herself, breathless and almost dead with terror and fatigue, beneath the legs of a group of school-boys, who had there seated themselves, watching with deep anxiety and interest the fortunes of the chace. As soon as the astonishment excited by this unexpected appearance of poor puss had somewhat subsided, an animated debate arose amongst the youngsters, respecting the disposal of the exhausted creature. The majority, allured by the hope of reward, voted for the prompt surrender of the unfortunate refugee to her mer-

ciless pursuers. One boy, however, actuated perhaps as much by a spirit of opposition as benevolence, declaimed loudly against this meditated act of perfidy,—the violation of sanctuary; and avowed himself resolutely bent, if need were, upon wager of battle in the cause of humanity. The intrepid fellow was, at length, joined by one or two of his more generous associates. After a brief but stormy altercation, the voices of honour and of mercy prevailed: and, although many an anxious and eventful year has since passed over us, we have not yet forgotten the glow of exultation which lighted up the eyes, and expanded the hearts, of the youthful defenders of the persecuted creature; when they heard the voices of dog and man, after a short pause, grow fainter upon the breeze; and saw the poor hare herself, recruited by a few minutes' respite, limp off to rest in safety, or at least to die in peace, beneath the sheltering underwood of an adjacent coppice.—DR. SHIRLEY PALMER, *Birmingham*.

ON THE STOMACHS OF BIRDS.—I have had occasion to open two or three bearded tits, and have observed that the stomach is exceedingly strong and muscular; the stomachs of the tits may almost be called membranaceous; that of the shrike is quite so. I have often been astonished to perceive hard seeds, grains of corn, &c., in the almost membranaceous stomach of the oxeye, which differs so much from the muscular gizzards of the buntings and others which subsist on such food. Amongst other things I have noticed small snails in the stomach of the oxeye. Are you aware that many hard bill birds use the throat or swallow as a pouch, or reservoir for food? A sparrow that I shot a few mornings since had its throat greatly distended with grains of corn.

A kestrel that had long been tame in the garden of one of my neighbours, was lately brought to me, dead; and I was informed that it had for several days refused all nourishment, and that it consequently died from starvation. Poor thing, it died indeed from inanition, and was literally reduced to nothing but skin and bones; but the reason that it refused its food, was that it had swallowed a large piece of knotted rope, which filled and distended the stomach, so that nothing else could possibly enter. The rope, however, was so softened, and its toughness so subdued by the action of the gastric juice, that had the hawk lived a day or two longer, it would probably have passed by the vent, or have been ejected in balls by the mouth.—E. BLYTH, *Tooting, Surrey*.

THE CRICKET AND THE COCKROACH.—It is said by Linnæus, and copied by Donovan and others, that the house cricket (*Acheta domes-*

tica, FABRICIUS) deserts houses infested with the cockroach (*Blatta Germanica*,* LINNÆUS.) Last year a gentleman of this town found that his kitchen was tenanted by a numerous colony of the latter in company with the former. In order to expel them he took down every piece of board from the walls, and even the mantle piece, behind which they had assembled in hoards, and, for any thing he could discover to the contrary, living together in perfect friendship.—L. W. CLARKE, *Secretary to the Entomological Society of Birmingham.*

ON THE SPAWNING OF FISH.—A fish in the egg or spawn, gains its oxygen from the air dissolved in water, and those fishes that spawn in spring and summer in still water, such as the pike, carp, perch, and bream, deposit their eggs upon subaquatic vegetables, the leaves of which, in performing their healthy functions, supply oxygen to the water. The fish that spawn in winter, such as the salmon and trout, seek spots where there is a constant supply of fresh water as near the sources of streams as possible, and in the most rapid currents, where all stagnation is prevented, and where the water is saturated with air for which it has been exposed during its deposition from clouds. It is the instinct leading these fish to find a supply of air for their eggs, which carries them from seas or lakes into the mountain country; which induces them to move against the stream, and to endeavour to overleap weirs, mill-dams, and cataracts.—SIR HUMPHRY DAVY.

THE HON. AND REV. W. HERBERT'S NOTES ON BRITISH BIRDS.†

AMONGST the numerous notes contributed to the octavo edition of White's Selborne, the most remarkable for interest and originality are by the Hon. and Rev. W. Herbert, the brother of the present Earl of Carnarvon. These notes display great enthusiasm, patience in tracing causes, shrewdness, ingenuity, and accuracy, and are at the same time written with all the simplicity and elegance which mark refined taste and superior scholarship. We have no hesitation in saying indeed, that, if the author were so inclined, he might soon attain the highest

* *B. Orientalis* does not appear to be British, as stated by mistake in "Insect Miscellany."—Editor.

† The Natural History and Antiquities of Selborne; by the late Rev. G. White. New edition with notes. 8vo. London. No date [1832.]

reputation as a naturalist. This we might have inferred, independent of the valuable notes before us, from his previous experiments on flowers published in the Horticultural Transactions, particularly those on hybrids and parasites. From the notes to White we shall now select a few specimens to prove that we have not overrated Mr. Herbert's talents. The first we extract, we think very excellent; but though it proves the willow wrens do not eat cherries, it does not prove that they do not eat other fruit, which they certainly do.

"Food of the Willow Wrens.—This sentence has probably been the cause of the murder of numbers of these most innocent little birds, which are in truth peculiarly the gardener's friends. My garden men were in the habit of catching the hens on their nests in the strawberry beds, and killing them, under the impression that they made great ravage among the cherries; yet I can assert that they never taste the fruit, nor can those which are reared from the nest in confinement, be induced to touch it. They check the aphides which are injurious to the fruit trees, and being very pugnacious little birds, I have sometimes seen them take post in a cherry tree and drive away every bird that attempted to enter it, though of greater size and strength. The birds which are mistaken for them are the young of the garden-warbler (*Sylvia hortensis*), with which Mr. White was not acquainted; as it is not mentioned by him and does not appear in his list of summer birds; yet I am confident that they will be found plentifully at Selborne, when the Kentish cherries are ripe. They attacked my cherries in great numbers when I lived in the south of Berkshire, not much more than twenty miles from Selborne. These young birds have a strong tinge of yellow on the sides, which disappears after the moult, and gives them very much the appearance of the yellow wren when seen upon trees, though they are larger and stouter, and in habits very much resemble the black-caps, with whom they are associated in the plunder of cherry-trees. I have never seen the pettychaps in Yorkshire until the cherries are ripe, when they immediately make their appearance and attack the Kentish cherry particularly, being so greedy that I have often taken them with a fishing rod tipped with birdlime while they were pulling at the fruit. The moment they have finished the last Kentish cherries they disappear for the season. If they finish the cherries in the morning, they are gone before noon. I am persuaded that they appear and disappear in the same manner at Selborne, and are probably to be found there only while the cherries are ripe, which accounts for Mr. White's having mistaken them for yellow wrens when he saw them in the fruit trees. They breed in the market gardens about London, and I imagine that, as the cherries ripen, they migrate from garden to garden in pursuit of them. I am told that near London they remain late enough to attack the elder berries, of which the fruit eating warblers are very fond, but in Yorkshire they do not even wait for the later cherries. The number of these visitants depends upon the crop of early cherries. This year the crop having nearly failed, I saw but two of them, which appeared on the 15th of July and were not seen after the 17th. The blackcap remains eating the currants and honey-suckle berries; they are both in confinement very fond of ripe pears, and I believe in the south of England they peck some of them before their departure. Mr. White does not seem to have had any reason for putting the Latin name *Motacilla trochilus* to these distinct birds. There is no cause for believing that Linnæus confounded them, though he only named one of them and overlooked the others. Indeed the wood wren could not be confounded with the yellow wren by any person of the least discrimination.

I could not persuade my gardener that the yellow wrens did not eat the cherries, till he had shot some of the petty chaps in the act of eating them, and compared them with the wrens, when he became satisfied of the error. In order to ascertain beyond doubt, whether the yellow wrens ever eat fruit, I left some which had been reared tame from the nest, and, of course, were more likely to feed upon any new thing than the wild birds, without victuals till they were very hungry, and I then offered them little bits of ripe cherry. They seized them with avidity, but immediately threw them down again, and it was evident they would rather have starved than eat the fruit. I had no doubt of the fact, but I wished to set the question completely at rest; for I have seen them pulling the leaves off the cherry trees so near the fruit, that any person might be deceived, and think they were eating it; and the young of the petty chaps look so like them, that I am not in the least surprised at their having got into bad repute with the gardeners. I had an opportunity of watching, lately, a little family of them, which sat many days in a low standard cherry tree in my garden, not more than a few feet above my head. The old ones took no notice of me at all, but were perpetually feeding close to me. They flitted about the cherry tree, picking the little aphides off the leaves, and bringing them one by one to the young, and sometimes tugging very hard at a leaf to get out a little caterpillar that was twisted up in it, the cherries being ripe at the time. The young sat still for hours together, close to each other, occasionally stretching their legs or wings, or hunching up their hind quarters. This very singular movement is, I think, peculiar to, or at least it is more usual amongst soft-billed birds. It is a sign of health, and is frequent with growing young birds. I do not observe those which feed upon seed use it, though they frequently stretch their leg or wing. The young sedge warblers hunch up their hind quarters to a degree that is singularly ludicrous, and when they do so, they are always thriving. The yellow wrens appear in confinement to have stronger powers of digestion than the wood wrens, though, I believe, they feed naturally upon similar insects. The hens are singularly tame. I had one taken when able to feed itself, what the bird-catchers call a brancher, which soon became so familiar that it would fly upon my finger to feed. The cocks are larger, and rather more shy. Last year I had reared three cocks from the nest, and in July I wished to set one of them at liberty. Having let it out of the cage that stood near a window which was opened, it continued for a long time hopping and flying about the top of the cage, and sitting upon the pots upon the ledge, and on a bar to which the roses were tied across the window. At last it began to travel up the creepers, against the house, and getting upon the roof, it flew over the buildings, and I did not expect to see it again; but, two hours after, it returned exceedingly hungry, and lit upon the upper bar of the middle pane of the lower sash of the same window, and pecked hard for admittance. It was let in and fed heartily from my hand, after which it took its leave. I saw no more of it for two days, when it returned again for a short visit, in very good case, and not appearing at all pressed for food. About a week after, it returned to the very same pane of glass, pecking as before, but I was occupied with a stranger on business, and could not attend to it, and it departed for the season. On the 23rd of July, in the following summer, I was standing at the window, when a fine stout cock of this species lit upon the bar of the same pane, close to my face, and began to peck, as before, for admission. Neither alarmed by my voice, nor by my little boy's jumping up from his seat to look at it, it flew down upon some of the cage pans, which happened to be on the ledge of the window, and began pecking them as if to get food from them. It quickly departed again; but this is so contrary to the habits of the wild bird, that I consider it

quite certain that the bird was my own nursling, which had returned after its trip to Africa, to look at the window where it had been reared in its nest. The visit was a very pleasurable little incident. How many things which Europeans in vain desire to see, had my little wanderer witnessed since last he pecked at my window. Perhaps he had sung his plaintive notes near the grave of Clapperton, or peeped into the seraglio of the king of Timbuctoo, since we had parted. These little birds are exceedingly gentle till they feed themselves perfectly; after which they become exceedingly quarrelsome. I had some in the same cage with young wood wrens, brown wrens, and sedge warblers. One of them, more than a week before it could feed itself, took to feeding two wood wrens which were ten days older than it, and able to feed themselves, though still very willing to be fed by another. It showed exactly the same discrimination that an old bird does in leaning over the one it had last fed, notwithstanding its clamorous entreaties in order to give the food to the other. No importunities of the brown wrens could obtain a morsel from it. There was sagacity even in this, for the brown wren is a much less nearly allied species, and is now referred to a separate genus. Its own fellow nestlings did not importune it for food. It was a cock bird, and three weeks after it beat the cock wood wren so, that it was necessary to separate them. The wood wrens and sedge warblers are not quarrelsome, but squall loud when attacked or alarmed. The little brown wrens, as far as I have seen are not quarrelsome, but perfectly fearless, and very much on the alert to snatch any thing they like out of the mouth of a larger bird, and run under a pan with it to avoid being pursued.

It is remarkable that many birds, which are quite kindly disposed to other birds, will not tolerate the presence of another of their own species. The redstart fights with his brother nestling in the same cage, as soon as he is full grown; he will not tolerate the presence of a stonechat, or whinchat, whose habits are very similar to his own; but he does not attack a nightingale, and behaves decently in a cage full of seed birds. I have seen two yellow wrens, not two months old, fight like bull-dogs, holding tight and pulling the skin, but they rarely attack any but of their own kind. A nightingale which had lived two years in a cage full of birds, in perfect amity with them, and even suffered the brown wrens to jump and rub themselves on its back, instantly attacked, in the most virulent manner, another nightingale which was put into the cage. Two robins will never frequent a hot-house, or a conservatory, in peace, but fight till the weakest is killed, or yields full possession to his antagonist, and they often break the tender young plants in their conflicts. The little thornback fish endures well the heat of a hot-house, which frequently kills a minnow. I have put them into vessels of water, in which I kept aquatic plants, to eat the small insects which devour the roots of nymphææ, in which service they were very useful, but the strongest fish would not endure companions, but persecuted them unto the death. They are very bold and voracious, and when hungry would bite savagely at the point of a pencil, or the tip of the finger, if immersed in the water."—p. 65, note.

The next has been the subject of discussion and controversy, from the time of Aristotle till the present day. The observations of our author, must, we imagine, set the matter at rest.

"*Drumming of Snipes*.—I have observed the drumming of snipes, in bright days, at the beginning of April, and I could very easily discern the manner in which the sound is produced. After rising high and crying *peet, peet, peet*, which is the snipe's usual note, it lets itself drop obliquely through the air, keeping the wings motionless,

but turning, by some muscular contraction, each individual quill sideways, in the same manner that the bars of a Venetian blind are turned to admit more light, and having descended to the customary point, it re-adjusts its feathers and rises again obliquely without sound. They will continue for hours together amusing themselves in this manner upon a mild day, and when they are in this mood, the sportsman has very little chance of getting near them. The cushat has a sportive movement a little similar, in the summer time, in the narrow wooded valleys amongst the hills: it is less observed in flat countries. It descends obliquely without any motion of the wings, and when it has dived to the usual point of descent, flaps its wings with a loud noise, and towers again obliquely to the other side of the valley."—p. 120, note.

The singular natural provision for the cleanliness of nestling birds has been frequently remarked, but it was never before, so far as we are aware, put in so striking a point of view as the following:—

"*Affectionate Cleanliness.*—It is a very curious provision made by nature, that the dung of all nestlings is enclosed in a thin membrane, which enables the old birds to carry it away in their bills, which they do regularly each time they bring food to the nest. The young instinctively, even before they can see, protrude their hind quarters to eject the dung from the nest; but, if the parent did not carry it away, there would be a congeries of dirt under the nest, which would not only be uncleanly, but would attract attention and discover their retreat. As long as young birds are kept to their nest in a basket, or box, the membranous covering continues; if they are let out to perch, it ceases; if they are shut down again in the nest, or basket, it re-appears. The warmth and quiescence of the nest certainly occasion it, and principally the quiescence; but how it should have that effect, I cannot pretend to understand. It is a marvellous provision of ALMIGHTY wisdom."*—page 191, note.

Mr. Herbert's remarks on the stone curlew and the dottrel, shew the immense superiority which a field naturalist possesses over those who merely study in cabinets filled with dried skins. With respect to the stone curlew, (*Edicnemus crepitans*, TEMMINCK,) he says:—

"My observation is, that it is found only on chalk. I used to find it and its two eggs on the bare ground in September, at Highclere, in Hampshire; but only where there was a chalk subsoil. It never strayed to the sand or gravel, and consequently was not upon the heaths; but in the chalky turnip fields. Temminck says, it is found on high sandy uncultivated tracts, and heaths far from water. I have found it only on chalk and ploughed land. I have seen it on the chalk district in Kent. I have never seen it in Yorkshire, nor in the vicinity of the moors, where they should be found if Temminck's account were true. I do not believe that it ever lays an egg upon sand, as he states. The dottrell (*Charadrius morinellus*), also is peculiar to dry chalk districts, and feeds chiefly upon small, green beetles; but Temminck most erroneously states that it lives in desert miry places, (*lieux deserts et fangeux*). He should have said dry sheep walks. It is probable that the insects to which these species are

* "See a paper on the cleanliness of animals, by J. Rennie, in the Roy. Inst. Journ. Oct. 1830."

partial, reside only in the chalk districts; but they may possibly thrive on a different subsoil in the south of Europe, though I am very little disposed to believe it."—p. 79, Note.

We shall conclude with an excellent example of observation, well worthy of being placed as a companion to our first extract :—

“Gold-crested Wren.—The golden-crested wren, and the common brown wren, are both very impatient of cold. In confinement, the least frost is immediately fatal to them. In a wild state they keep themselves warm by constant active motion in the day, and at night they secrete themselves in places where the frost cannot reach them; but I apprehend that numbers do perish in severe winters. I once caught half a dozen golden wrens at the beginning of winter, and they lived extremely well upon egg and meat, being exceedingly tame. At roosting-time, there was always a whimsical conflict amongst them for the inside places, as being the warmest, which ended of course by the weakest going to the wall. The scene began with a low whistling call amongst them to roost, and the two birds on the extreme right and left flew on the backs of those in the centre, and squeezed themselves into the middle. A fresh couple from the flanks immediately renewed the attack upon the centre, and the conflict continued till the light began to fail them. A severe frost in February killed all but one of them in one night, though in a furnished drawing-room. The survivor was preserved in a little cage, by burying it every night under the sofa cushions, but having been one sharp morning taken from under them before the room was sufficiently warmed by the fire, though perfectly well when removed, it was dead in ten minutes. The nightingale is not much more tender of cold than a canary bird. The golden-crowned wren very much frequents spruce fir-trees and cedars, and hangs its nest under their branches: it is also fond of the neighbourhood of furze bushes, under which it probably finds warm refuge from the cold. The brown wren is very apt, in frosty weather, to roost in cow-houses, where the cattle keep it warm *.”—p. 132, Note.

We have confined our review of Mr. Herbert's Notes to birds, as these are the most copious portion of his contributions, and well entitled to the attention of naturalists, from his having so minutely studied the living birds instead of the usual practice of studying only museum specimens, or, what is even worse, the prints taken from museum specimens. Mr. Herbert, however, has not confined his observations of nature exclusively to birds, and we could, if we had here room, give equally interesting and original remarks from his notes on quadrupeds, on plants, and on meteorology. Were he so inclined, we have no doubt that he could furnish from his portfolio a whole volume of similar notes.

See a paper on the Contrivances of Animals to secure Warmth. By J. Rennie, Roy. Inst. Journal, May, 1831.”

ON CABINET GROUPS OF STUFFED ANIMALS, PICTURING
THE EFFECTS OF THEIR PASSIONS.

BY M. BOITARD.

' Specimen of a cabinet picture of a Lion and Tiger fighting.*

WE denominate groups, those kinds of pictures in a cabinet of stuffed animals usually representing some action, but more frequently possessing no interest besides the brilliant plumage of the animals of which they are composed. A falcon tearing a turtle-dove or a squirrel to pieces, or two doves billing on a rose-bush; a partridge covering her numerous brood with her wings to conceal them from the fangs of a weasel, or the piercing eye of a bird of prey; a nightingale opposing her impotent anger to a serpent which slides its head into her nest to seize and devour one of her young—such we call pictures representing an action: and compositions of this kind are very interesting, when they are arranged with taste, and the artist has the talent to give each individual the attitude and expression most proper to describe the supposed emotion, as anger, fright, ferocity, or love.

* Taken from a beautiful model in wax, by Mr. D. Morrison.

Animals have passions like man; fewer, indeed, as to number, but of much greater energy. In my work, entitled "*Le Cabinet d'Histoire Naturelle*," I have given a sketch of the effect which fear or anger imparts to the attitude of birds, and I shall quote from it, as examples, three well-known species—the magpie, the blackbird, and the wren. The few words I shall say of them will be sufficient to direct the cabinet naturalist in making his observations.

The magpie, when in a state of repose, has the feathers on the upper part of the body lying almost flat on the skin, and those of the belly slightly bristled, as if hanging down, the neck contracted, while the tail is parallel to the body, sometimes slightly bent downwards, and the wings are placed close to the sides. In this attitude it always perches.

The blackbird, when in repose and perched, has the feathers slightly ruffled, the neck entirely buried in the breast, the tail slightly raised, and the wings somewhat drooping. The wren has the feathers flat, the tail parallel. It constantly perches.

The body of the magpie, when in action, is placed horizontally; the neck is lengthened, the head turned aside, the feathers quite flat, and the tail much raised; the feet are placed under the middle of the body, the wings are drooping, in which circumstances it may be perched or not.

In action, also, the feathers of the blackbird are ruffled, the neck somewhat lengthened, the head straight and also a little raised, the beak directed forward, the tail much raised, the feet bent as if unable to support the weight of the body, and the wings are very much depressed. It does not always perch in such circumstances.

The feathers of the wren, when in action, are flat, the tail raised vertically, the neck moderately stretched, the head depressed, that is to say, the back is directed downward; while the wings are drooping, the feet extended, and the body placed parallel to the horizon.

When birds experience the sentiment of fear, their neck is much lengthened, their feathers extremely flat, the beak, the body, and the tail in the same line, and rather advanced; the upper part of the wings much raised from the body, and the extremities approaching very near to the tail. If from fear they pass to anger, the whole body inclines still more forward; the beak opens, the pupils of the eyes incline towards each other, which gives the animal the appearance of squinting. The feathers of the neck are erect, those under the body exactly corresponding; the tail is raised and arched, the legs bent, and the wings averted from the body, or half opened by raising them

over the back. If the cabinet naturalist cannot arrest all these shades of distinction, and a thousand others, which are still more fugitive—if, in order to stuff them, he is reduced to the necessity of copying engravings which are often faulty, his birds will never have that air of grace and animation, and that appearance of life, which at once surprises and delights us.

Specimen of a cabinet picture of a kestrel (*Falco tinnunculus*) devouring a bird.

The taste of the artist can alone guide him in choosing subjects with which to compose a group; but there are, nevertheless, certain materials which are commonly used, and those I shall enumerate. The branches on which the birds are generally placed may be sought for by the skirts of woods, and are usually the branches of plum trees, which have been cropped by cattle, and are covered with mosses and white and yellow lichens, branches of old pear trees, and the like.

The branch being chosen, it is placed on the stand, the lower end being inserted in a hole made to receive it, and secured with glue to keep it in the proper position. Extremely fine steel wire is used to tie on artificial leaves and flowers, which may be had of persons who manufacture such articles.

At the turners may be procured those little shavings which they detach from their horn ware; these, when died green or yellow, may be disposed with great advantage to resemble mosses or lichens, especially if they are somewhat notched; longer pieces of the same will

represent slender grasses. To fix them on the branches and the stand a coat of strong glue, gum, or paste is used, and the same sprinkled over them. To imitate a stone or rock, we generally use grey paste-board soaked in water with a little paste, and left to dry after giving the picturesque form which taste dictates; it is cemented with glue, and sprinkled with very fine sand of an appropriate colour. In a word, we employ sand and also dried coffee grounds in the same way to imitate the ground.

Specimen of a cabinet picture of the common eagle (*Haliaetus albicilla*, SAVIGNY) having just captured a hare.

NATURAL HISTORY OF THE CONDOR.

BY BARON HUMBOLDT.*

AMONG birds of prey, as among insects, the female is generally larger than the male. In the condor, however, this difference is not very perceptible, though the size varies somewhat in individuals of

* Translated from "Observations Zoologiques," by Jacob Dixon, Esq.

either sex. Living in solitary places, having no other enemy than man, who busies himself very little in its destruction, it is probable that the condor attains a very advanced age. The bird does not, however, appear to multiply much; I have not, at any time, seen more than five or six at once; but it seems to be a more numerous species than the king of the vultures (*Vultur Papa*), which, I think, is the least numerous of all the American birds of prey.

I have been assured that the condor does not build a nest. It lays its eggs upon the bare rock, without even surrounding them with straw, nor with the hairy leaves of the *Espeletia frailexon*, the only plant which grows near the perpetual snows, and which has a resemblance to our shepherd's club (*Verbascum thapsus*). I have been assured that the eggs are quite white, and three or four inches long. It is also said that the female remains with the young ones for the space of a whole year. When the condor descends to the plains, he prefers to rest upon the earth. He does not build upon the branches of trees, as the zamura or gallinazo (*Vultur aura*) does. The condor, also, has very straight claws. I make this observation, in corroboration of a passage in Aristotle, in which that profound naturalist says that those birds of prey which have curved claws, do not like to place themselves upon rocks.*

The manners of the condors are the same as those of the lammergeyer of the Alps. If he does not surpass the latter in size, he seems at least to be superior in strength and boldness. A couple of condors will attack not only the stag of the Andes, the puma, the vicuna, or the guanaco, but even the cow: they pursue it so long, wounding it with their talons or beaks, that the animal, breathless and exhausted, bellowing, hangs out its tongue. The condor then seizes it by the tongue, of which it is very fond, and tears out its eyes; while stretched upon the earth it slowly expires. In the province of Quito, the mischief which the condors do to cattle, particularly to the flocks of sheep and oxen, is very considerable. I have been told that in the savannas of Antisani, 2101 toises above the level of the sea, bulls are frequently found wounded in the back by condors who have not been able to bear them off. This recalls to my mind the missions of the Upper Oroonoko, where the large bats do so much damage by wounding the oxen, that it forms one of the principal objections to the establishment of farms in that country.

* Aristotelis Historia Animalium, ix. 22, ed. Casaub. p. 575.

The condor, when-gorged, remains phlegmatically perched upon the top of a rock. I have found him, in this situation, maintaining an air of dull and sinister gravity. Like the carrion vulture (*Vultur aura*), one may drive him along without his giving himself the trouble to fly off; but when tormented by hunger, he takes wing and rises to a prodigious height, floating in the sky and embracing at a glance the vast expanse of country which is to furnish him with his prey. It is particularly on days when the atmosphere has been very serene, that I have observed the condor, and also the gallinazo (*Vultur aura*) at extraordinary heights. One might suppose that the great transparency of the air invited them to review a great space of country, which in more cloudy weather the piercing sight of these aerial hunters could not grasp.

In Peru, at Quito, and in the province of Popayan, the people have a method of taking the condor alive with nooses. Other travellers, I believe, have already described this extraordinary sport, which is engaged in principally to amuse European strangers. An ox or a horse is killed, and, in a short time, the stench of the dead animal attracts the condors, whose sense of smelling is extremely acute. A great number of them are seen to appear in places where one could have scarcely thought that any could be. The bird eats with inconceivable voracity. He always begins with the eyes and tongue, which seem to be his favourite morsels; he then proceeds to the vent in order to get easily at the intestines. When the condors have gorged themselves, they are too heavy to fly off; the Indians then pursue them with nooses, and catch them with ease. We are told that the bird makes great efforts to rise into the air: in this he succeeds, if, exhausted by the pursuit, he happen to vomit abundantly. In these efforts, I have no doubt, the condor alternately stretches and retracts his neck, and brings his claws near his beak. This manœuvre, certainly accidental, has led the country-people to say, that the condor, in order to save itself by provoking vomiting, puts one of its toes into its mouth. I do not think the talon of the condor would tickle very gently the parts which it touched. The Spaniards call this sport *correr huitres*, and, after their bull-fights, it forms one of the chief amusements of the people. One may imagine to what cruelty these unfortunate condors are consigned when thus taken alive by the Indians: an insect would not suffer more in the hands of an entomologist.

I was told, at Riobamba, that, to make the catching of the condors easier, poisonous plants were sometimes put into the belly of the animal exposed to them. The condors then seem inebriated. This is

in imitation of fishing with the *Jacquinia armillaris* or the *piscidia*. The Spaniards call this method of fishing, *embarbascar*.

The condor, taken alive, is at first melancholy and timid; but he soon becomes very mischievous. I kept a female for eight days in my house at Quito; but it was dangerous to approach her, for fear had rendered her quite savage.

The condor is more tenacious of life than any other bird of prey. At Riobamba, while at the house of our friend Don Xavier Montufar, corregidor of the province, we were present at the attempts made by some Indians to kill a condor. They commenced by strangling him with a noose; they hung him on a tree; they pulled him forcibly by the legs for several minutes: the noose was scarcely taken off, when the condor walked as if nothing had been done to him. Three pistol-balls were then fired at him at less than four paces distance. By these he was wounded in the neck, breast, and abdomen; still he continued on his feet. A fifth ball struck against the thigh bone (*femur*), and fell again to the earth. The corregidor, Don Juan Bernardo Léon, to whose kindness I own many interesting remarks on the animals of Quito, was present on the occasion. The condor did not die till half an hour after he had received so many wounds. M. Bonpland kept the ball, thus repelled by the shock against the thigh-bone, for a long time.

This observation, however extraordinary it may seem, has, however, already been made before. The astronomer Ulloa relates that in the cold region of Peru, the condor's skin is often so closely covered with feathers, that eight or ten balls have been known to strike against the body of the bird without one of them having been able to pierce it.*

The condor which we examined was covered with an immense number of brown lice (*pediculi*), I am sorry I was so remiss as not to have described them; they are of another species than the vulture louse (*Pediculus vulturis*), described by Fabricius,† which, however, may also be found on the Indian vultures.

The condor prefers dead carcasses to living animals, though he subsists on both; it also seems that he pursues small birds less than he does quadrupeds.

* La pluma de condor forma un entretejido tan bien preparado, que no lo penetra la bala del fusil; ni el animal, se inmuta al recibir el golpe. En la parte alta del Peru hasucedido tirat le 8 à 10 tiros seguidos, oiendo dar las balas sobre el y caer estas al suelo de rechazo sin haberle hecho dano alguno.—(ULLOA, *Noticias Americanas*, p. 158, s. 18.)

† Fabricius, *Mantissa Insectorum*, ii. 369, No. 12.

EXPERIMENTS ON THE ABSORPTION AND CIRCULATING
FLUIDS OF PLANTS.

BY H. F. LINK, PROFESSOR OF BOTANY, BERLIN.

TREVIRANUS is of opinion, that the sap of plants flows between the cells, meaning the interstices between these, an opinion adopted by M. Kieser, and also as it would appear by M. De Candolle. It is true, indeed, that the sap may be supposed in this manner to diffuse itself freely in every part of the plant; but then the bark and pith, from the looseness of their cellular texture, ought to afford more facilities for the flow of the juices than the wood, and this does not accord with the following observations.

It has been customary to tinge the water introduced into plants, for the purpose of experiment, with ink, tincture of litmus, of Brazil wood, and the like. The ink is well known to contain the gallate and tannate of iron suspended in water by means of gum; and it is very possible that other vegetable colouring matters may be similarly suspended in water without being dissolved. The outer rind (*epidermis*) of plants, and vegetable membrane in general, is capable of filtering coloured liquids, and preventing the colouring matters from entering into the vessels. From this we may account for experiments in which coloured fluids do not enter into the vessels, or at least do not appear when these are cut. In order to avoid such inconvenience, it is requisite to effect a precipitation in the vessels themselves, and to produce a precipitate of a well marked colour, such as may not be confounded with the colours naturally produced in a plant.

I took therefore several healthy plants in pots, such as are commonly found in green houses,—a *Rhagodia*, a *Bigonia*, a *Stilydium*, and a *Hermannia*. I put the pots containing these plants in vases filled with a solution of the cyanuret of potass and iron, made with one part of cyanuret and thirty-two parts of water, in which I allowed them to remain for an entire week. The plants watered in this way continued quite healthy. I then removed the vases, and substituted others filled with a solution of sulphate of the oxyde of iron in thirty-two parts of water, taking previous care to wipe the pots dry. I left them in these vases for twenty-four hours, when I cut the plants, and, on examining the interior parts with the micro-

* Translated from the French by the Editor.

scope, I perceived that their vessels (*trachées*) alone were tinged with blue, amongst the cells which were not coloured in the slightest degree. It was the entire tube which was equally coloured, though the spiral vessels were differently turned, and more or less evolved.

In the tubercles of plants, there are vessels (*trachées*) which are not united in packets: such vessels in *Bignonia discolor*, were equally tinged blue with the others.

A, A, the portions of the vessels of *Bignonia discolor* uncoloured; B the vessel coloured by the precipitate.

I have repeated these experiments with many plants and always with the same results. There are, however, some very tender plants, such as *Impatiens balsamina*, *Pelargonium*, &c. which readily flag when watered with a solution of the cyanuret of potass and iron, consequently, the experiment must not with these be continued too long, for after they begin to flag they will not take up the solution

Spiral, ringed, and beaded vessels of Plants.

of the sulphate of iron, and the vessels will not be coloured. I have very frequently observed that all the vessels are not tinged; that in the same packet there are blue ones, amongst others which have remained white; and that in general the narrow vessels became more readily coloured than the others. The vessels which are

termed beaded (*en chapelet*) are also as readily coloured as the true vessels.

It sometimes happens that the colour is not blue, but deep green, although the solution of the sulphate of iron has been exposed to the air for a sufficiently long time; but this green colour can be very well ascertained to be foreign to the vessels. I have often seen the colour penetrate even the vessels of the leaves; but I have not hitherto seen it pass into the flowers. It often happens also that the vessels of the stem have been tinged blue, while those of the roots are not at all tinged, perhaps because the solution of the cyanuret had all passed into the stem. M. De Candolle, says, in his "*Organographie*," that there are no vessels (*trachées*) in the roots: I have found them in the roots of all vascular plants. The preceding experiment furnishes an easy method of distinctly indicating the vessels (*vaisseaux*) which conduct the sap in the several parts of a plant.

Some years ago I made experiments upon the resorption of plants, which I published in a German journal. I took plants in garden pots, and bent down branches of them so as to terminate in a glass filled with solution of arsenious acid, without separation from the stem, or wounding them in any manner. The plants were *Linaria alpina*, *Cliffortia obcordata*, *Hemimeris coccinea*, *Mezembrianthemum glomeratum*, and *Xenopoma obovatum*. After some time, they all flagged, first the branches soaked in the solution, and then the rest of the plant. I remarked that the plants which were watered, resisted the effects of the poison longer than those which were not watered; and that succulent plants, nourished by the juice of their own leaves, could vegetate a long time without absorbing poison sufficient to kill them. Absorption then goes on through the leaves and branches, if the roots fail in affording the necessary supply of water. If some leaves, or the point of the branch to be soaked, be cut, the poison immediately enters the absorbing vessels (*vaisseaux*) and the plant soon dies.

I was anxious to ascertain whether this absorption is made by the common vessels (*trachées*), and not by other vessels (*vaisseaux*) appropriated for this purpose. With this view, as in the preceding experiments, I soaked branches in a solution of the cyanuret of potass and iron; I then washed the branches with pure water, and substituted for the cyanuret or solution of sulphate of iron. These experiments were not uniformly successful, for it frequently happened that the interior parts of the plants were not coloured;

but I found in some experiments, particularly in those made upon *Vinca herbacea*, that it was the vessels (*trachées*) alone which took a blue colour. The resorption then appears to be made by the same vessels as the absorption of fluids.

It is the entire tube which conducts the sap and not the spiral tube, as Hedwig alleges, (see B, in the figure above,) though his opinion is partly true, for the spiral tube is in reality a vessel; as I have often seen it coloured interiorly. I have represented this

in a slice from the root of the date (*Phœnix dactylifera*), cut lengthwise, and seen by an excellent microscope by Fraunhofer of Munich. At *b* are seen the modified vessels (*trachées*) having the rest of the spiral tube coloured as in the entire tube at *a*. At *c* there is a straight vessel (*vaisseau*) coloured in the same manner. At *d* there is not the least colour, which proves that the colour observed is not an optical illusion.

There is then no real difference among the vessels of plants, whether they be termed tracheæ pseudo-tracheæ, porous tubes, or annular vessels. All these are organs which conduct the sap and distribute it throughout the plant. They can be all coloured blue, as I have above explained; and the changes are wholly produced by the changes of the spiral tube. The turns of this tube become mutually detached, the rounds become more slender, and intervals (*lacunæ*) termed pseudo-tracheæ are formed, which are never seen in young plants. There are no porous tubes, such as are de-

scribed by the authors, nor are there pores either in the vessels or the cells. Frequently what are alleged to be pores are nothing more than the remains of a spiral tube, or of small bulgings thereof remaining permanent when the spiral character has disappeared.

a, a, a, Remains of the doublings of the spiral vessels in the Balsam plant, in form of pores.

The annular vessels again, first described by Bernhardt, and confounded by M. De Candolle with the pseudo-tracheæ, are altogether different; being produced by the rounds of a spiral tube becoming at first detached and again united to form a ring, it being not unusual to find one part of a vessel or spiral tube changed into the annular form, while another part remains unchanged. The beaded vessels are only vessels turned, or folded with narrowings at the foldings. Coloured fluids readily pass these narrowings.

ON STORMS PREDICTED FROM THE APPEARANCE OF THE AURORA BOREALIS.

BY CAPTAIN WINN.

I HAVE often wished, that somebody would carefully collate a sufficient number of meteorological journals, with intent to observe, and class the several appearances in the atmosphere, before great changes in the weather, particularly before great storms. I am persuaded, from my own observation, that in general sufficient indications of impending tempests precede them a considerable time, did we but carefully note them. The phenomenon which I am going to mention is one of those indications, which not only portend an approaching tempest, but serves to ascertain from what quarter it will come; a circumstance that may render it of essential service to seamen. I believe the observation is new, that the Aurora Bore-

alis is constantly succeeded by hard southerly, or south-west winds, attended with hazy weather and small rain. I think I am warranted from experience to say constantly, for, in twenty-three instances that have occurred since I first made the observation, it has invariably obtained. I beg leave, however, to recommend it to notice, as a matter, which when confirmed by further observations, and generally known, may be of more consequence than at first appears. To shew that it may, give me leave to recite the circumstance which first occasioned my taking notice of it. Sailing down the English channel a few days before the autumnal equinox, we had a remarkably bright and vivid Aurora the whole night. In shore, the wind was fluctuating, between N.N.W. and N.W., and farther out W.N.W. Desirous of benefiting by the land wind, and also of taking advantage of an earlier ebb tide, I dispensed with the good old marine adage, never to approach too near a weather shore, lest it should prove a lee shore; and, by short tacks, clung close along the English coast. Next day the wind veered to the S.W., and soon after to the S.S.W., and sometimes to the S. We were then in that dangerous bay between Portland and the Start point, and carried a pressing sail, with hopes of reaching Torbay before dark; but night fell upon us with thick haze and small rain, insomuch, that we could not have seen the land the distance of a ship's length. The gale was now increased to a storm; in this dilemma nothing remained but to endeavour to keep off the shore till the wind should change. Luckily the vessel was a stout one, and well rigged.

Reflecting some time after on the circumstance of this storm, and the phenomena that preceded it, I determined to pay particular attention to future Auroræ, and the weather that should succeed them; and, as I have above observed, in twenty-three instances have found them uniform, except in degree: the gale generally commencing between twenty-four and thirty hours after the appearance of the Aurora. More time and observation will probably discover, whether the strength of the succeeding gale is proportionate to the splendour and vivacity of the Aurora, and the distance of time between them. I suspect that the more brilliant and active the first is, the sooner will the latter occur, and will be more violent, but of shorter duration than when the light is languid and dull. Perhaps, too, the colour of the Aurora may be some guide in forming a judgment of the coming gale. That which preceded the storm I have mentioned was exceedingly splendid. The tempest succeeded it in less than

twenty-four hours, was violent, but of short (about eight hours) continuance. In June last, a little without soundings, we had, for two nights following, faint, inactive Auroræ; the consequent gale was not hard, but lasted nearly three days: the first day attended with haze and small rain; the second with haze only; and the last day clear.

The benefit which this observation on the Aurora Borealis, when further confirmed and known, may be of to seamen is obvious, in navigating near coasts, which extend east and west, particularly in the British Channel. They may, when warned by the Aurora Borealis, get into port, and evade the impending storm; or, by stretching over to the southward, facilitate their passage by that very storm, which might have otherwise destroyed them; for no winds are so dangerous in the channel as southerly and south-west. In a word, since I have made this observation I have got out of the channel, when other men, as alert and in faster sailing ships, but unapprised of this circumstance, have not only been driven back, but with difficulty escaped shipwreck. Perhaps the observation, that southerly gales constantly succeed this phenomenon, may help to account for the nature of the Aurora Borealis.

Spithead, August 12.

ON THE HABITS OF THE OX-EYE.

BY THE EDITOR.

My friend, Mr. Blyth, who is a keen observer of Nature, and who is not, as is so very usual with naturalists, inclined to adopt all that is met with in books, sent me in the same cage a sky lark, a wood lark, and a chaffinch, together with an ox-eye, (*Parus major*, RAY) which had been confined about a week. In a note which accompanied the birds, he says, "you need not be fearful of turning the ox-eye loose into your aviary, notwithstanding the bad name which has been given to the species. I have an ox-eye, which I last week turned into a large cage containing six or seven small birds; he did not shew the least symptoms of animosity, but, on the contrary, suffered himself to be severely buffeted by that quarrelsome little bird, the babillard, (*Curruca garrula*, BRISSON), insomuch that I was at length compelled to place the latter in another cage. The ox-eye continues to live in terms of the greatest good fellowship with his companions,

and I have never observed him to evince the least disposition to annoy the rest."

Upon the faith of this, I turned my ox-eye loose at night into my aviary, where there are more than thirty birds, chiefly summer birds of passage; but I had some doubts of his good behaviour, when Colonel Montagu expressly says, "it will sometimes attack a bird its inferior in size, or one in a sickly state, fracturing its skull by repeated strokes of its pointed bill."* M. Bechstein also says, "if they have not plenty of food which they like, they will attack other birds, and pierce their skull to feast on the brain. When they have once tasted this food, there is no security for the birds in an aviary, whatever may be their size. I had myself an ox-eye which attacked a quail, and killed it in this way."†

Notwithstanding these authorities, I trusted to the fear which all strange birds usually have of the others when turned loose in the aviary, for keeping the ox-eye quiet, and I resolved to watch his motions next morning. I was, however, too late; for in less than an hour after day light, when my daughter went into the aviary to give the birds water, she found a poor fauvette (*Sylvia hortensis*) already killed, and the ox-eye standing by with his beak and breast covered with blood. But it would appear that the fauvette had not died without retaliating, for the ox-eye was himself *in articulo mortis*, as a medical man would say, and died in a few minutes, though this might be from exhaustion in making the attack. Perhaps some of the other birds, particularly a very cross-grained pugnacious nightingale, which I purchased in Rotterdam in June last, might have come to the assistance of the fauvette, and revenged its death on the ox-eye.

My intelligent friend, however, has a precedent of high authority, as I have just discovered, for the peaceable disposition of his bird as I have for the ferocity of mine. "I have learned from experience," says M. Montbeillard, "that the ox-eye kept in the cage sometimes cleaves the skull of the young birds that are presented to it, and feeds greedily on the brain. M. Hebert ascertained nearly the same fact by an experiment which he made: he put a redbreast in the same cage with eight or ten ox-eyes, about nine in the morning; and against mid-day the skull of the red-breast was bared, and the brain entirely eaten. On the other hand, I have seen many

* Ornith. Dict. 2nd edit. p. 550.

† Naturgeschichte der Stubenthier, 3rd edit. p. 553-4.

ox-eyes, and other tits, which had been caught by means of the call, that lived above a year in the same volery, without any act of hostility; and at this very moment, there is an ox-eye which has lived six months on good terms with goldfinches and siskins, though one of the siskins was sick during that period, and, in its feeble state, incapable of resistance, offered an easy prey to voracity."*

In the other authors whom I have consulted, namely, Gesner, Turner, Aldrovand, Jonston, Klein, Linnæus, Brisson, Daudin, Pennant, Bewick, Latham, Temminck, Cuvier, Lesson, Drapiez, and Fleming, there is no allusion whatever to the circumstance: Selby copies Montagu's statement.

The following paper will show that some ox-eyes are even cannibals, attacking and devouring their own species; as is extensively exemplified among fish, such as the pike, and among insects, such as the grass-hoppers and earwigs, which make no ceremony of devouring their own kindred. Spiders are said to be, if possible, still more barbarous.

Lee, Kent, Dec. 3, 1832.

ON THE DIVERSITY OF DISPOSITION IN ANIMALS OF THE SAME SPECIES.

BY EDWARD BLYTH.

THE very great difference of temper and disposition between different animals of the same species, seem never to have been sufficiently taken into consideration by naturalists, who have often described the character of a whole species, judging from the peculiar disposition of a single individual.

I have an oxeeye, (*Parus major*,) that has now lived for several months in the same cage with a number of other small birds, (finches, tits, and warblers,) and that still continues to live with them in the most perfect harmony; never showing the least indication of hostility, nor of that carnivorous disposition which this species occasionally evinces: this was an adult bird when caught. Another oxeeye was lately brought to me, which not wanting, I gave to a young gentleman in my neighbourhood who keeps a few birds in confinement: it was put into a cage, and a day or two after another of the same species was caught, and placed with it in the evening after the

* Hist. Nat. Des Oiseaux, Ant. La Grosse Mesange ou Charboniere.

former had retired to roost. The next morning, what was the astonishment of my friend, to find the bird, which I had given him, regaling itself on the brains of its companion, which it had killed, holding the head of the dead bird in its claws, and picking it in the same manner that they usually pick a hempseed. It afterwards stripped off the feathers in the usual manner of a bird of prey, and in the course of the day *devoured the whole*, excepting, of course, the bones, the bill, and the feet. A redpole (*Linaria minor*) was held to it, and it showed the same eagerness to seize it, that a regular bird of prey would have done. This oxeye died the following night, probably from the effects of the contest which it must have had with the other: it appeared when first caught a remarkably savage bird, biting most desperately, and even hanging by its bill to the hand of the man who brought it, when it was not held, but might have flown off if it would.

I have now in confinement a babillard, (*Curruca garrula*,) of such a pugnacious and fiery disposition, that I am compelled to keep it by itself. It attacks indiscriminately every bird that is placed with it, though double or treble its own size, plucking out their feathers, and darting about with such agility, that no small bird seems a match for it. This bird has many times attacked and pulled feathers from the oxeye, (*Parus major*) above mentioned, who, though double its size, flies from it as he would from a shrike: the babillard is generally, if not always, of a very domineering disposition; but I have frequently known them to live very peaceably along with other birds. Instances of similar diversity of temper must indeed be familiar to all who have paid any attention to animals.

It is therefore as impossible to judge of the character of a whole species from the temper of a single individual, as it would be to judge of a national character from the peculiar disposition of one man.

Tooting, Surrey, Feb. 1833.

ON THE STOMACH AND SWIM BLADDER OF THE FAHAKA
OF THE NILE. (*Tetrodon Physa*).BY M. G. ST. HILAIRE, PROFESSOR OF ZOOLOGY, AT THE JARDINS DES PLANTES,
PARIS.

Figure of the Fahaka.

I ONLY know two naturalists, the celebrated Bloch and Count Lacepède, who have treated of the pouch in the fahaka. Bloch has shown that it communicates with the cavity of the gills; and my illustrious colleague (Lacepède) has seen that it is formed by a membrane situated between the intestines and the peritoneum.

The latter observation having been made from the inspection of a dry and ill-preserved specimen, is of course very incomplete; but having had the opportunity of examining as many fahakas as I pleased, I am able to complete the description.

I have opened a great number of these fishes, and have ascertained that it is the stomach which, without losing its ordinary functions, serves also the purpose of an air bag, (*reservoir aérien*).

This organ, generally occupying but a small space, escapes, if I may use the term in this case, from the cavity in which it is contained, and swells out to a size larger than that of the animal itself. This is so singular that our first impression is, that it does not deserve belief. But if we consider that nature never operates by new creations, but simply by modifications of things already existing; and that, of all the combinations to produce this pouch, the most

* Translated by Jacob Dixon, Esq. from "*Description d'Egypte, Partie Zoologique*," published by the French Government.

simple was to employ a sac within reach of the cavities of the mouth and of the gills, and of which there was only wanting an increase of capacity, we shall be less astonished that this modification, however wonderful it may seem, should have fallen upon the stomach, and that this organ should acquire so prodigious a volume.

It is, moreover, a fact established by observation. If the interior of the air pouch (*poche aérienne*) of the fahaka be examined, two openings will be found in it, one of which corresponds with the neck of the gullet (*œsophagus*), and the other with the commencement of the intestinal canal.

The thinness of this sac leads us, at first sight, to suppose that it cannot be the stomach; but this thinness is incidental to its distended condition, inasmuch as it is formed of as many coats as all other stomachs, and is covered in the same manner with the muscles and skin of the abdomen. It is known, and this is the answer to this kind of objection, that when an organ is disproportional to the limits which are, as it were, marked out for it, it is always at the expense of its mass: thus a glass-blower makes, with a given quantity of matter, globes of greater or less capacity, according as he is required to make the sides thicker or thinner.

This large stomach, situated more inferiorly, covers nearly all the other abdominal organs. Taking its origin from the fauces (*arrière-bouche*), it covers the liver, the swim-bladder, the intestines, to which it adheres by means of a very thin cellular tissue; then, returning upon itself, it covers all the abdominal muscles, which are enlarged in the same proportion as itself, and then passes to the last portion of the breast-bone (*sternum*), where we saw its point of departure. There all is adherent, the several coats of the stomach, the muscles of the abdomen, and the skin; so that, in order to study the structure of these parts, it is necessary to take the trouble to separate all the layers of which this portion of the great sac is formed.

We easily comprehend then how the abdominal muscles, forming an intermediate layer between the coats of the stomach and the skin, expel the air which produces the enlargement of the fahaka. This is effected by the contraction of thin muscular fibres, seconded by the non-activity or the restitution of the muscles of the chest.

These muscular fibres, in contracting still more, force as well the membranes of the skin without, as those of the stomach within, to fold themselves: and the stomach, compressed, as it were, and reduced to dimensions which are more in harmony with the other organs of the animal, returns to its ordinary functions.

The figures containing the anatomical details will render evident all the facts which we have stated.

Fig. 1.

Fig. 2.

Fig. 1. shows the abdominal organs in their natural position : all the surface A is the interior of the stomach ; B is the continuation of it, except that, instead of forming a large apron which would cover all the intestines, it has been cut off, detached, and rejected, in order that the abdominal organs may be seen.

Fig. 2. shows, on the right, a part A of the coats of the stomach, and on the left, the inferior layer or the muscles of the abdomen.

This consists of two muscles L and M. The muscle M arises from the great straight one, and has its attachments posteriorly, some to the joints (*osselets*) of the spine, and the others in less number to those which sustain the vent fin : it becomes lost forward, on a tendinous band ; two lines (*aponeuroses*) traverse it and divide it into three nearly equal portions, while the fibres of which it is composed become collected, lengthwise, into bundles, to the number of from seven to ten.

The other muscle L takes its origin behind, at the last tendinous band of the former, and is carried obliquely upon the gills ; its fibres are closer together than in M.

A cellular tissue, rather abundant, covering these two muscles and

separating them from a third, more external and more slender, numbered O, leads us to think that this last does not belong to the abdominal muscles, but that it is analogous to the fleshy wattle (*panicule charnue*) ; it extends considerably beyond the region of the stomach, is continued to the head, and furnishes branches which spread themselves over the muscles of the breast fins : the direction of the fibres is across, and some are seen as well above as below.

It always concurs, with the two other muscles L and M, in the expulsion of the air from the pouch, and of course in diminishing its capacity : it folds the skin across L obliquely, and M lengthwise ; forming three powers, the concurrence of which diminishes the surface of it.

We now know then the nature of this great air pouch of the fahaka : let us next show by what agents the air is kept in it while distended.

The Swim Bladder.

The most remarkable of these agents is the swim-bladder, which only acts by impulsion and in a passive manner. It will excite surprise, I dare say, that it should figure here, when its functions are transferred to the stomach. It is known that, in many fishes, its use is to communicate with the fauces (*arrière-bouche*), and to receive air from it. This is not the case with that of the fahaka, which does not communicate with the mouth by any air-tube or opening ; but is a sac closed in every part, of the form of a horse-shoe, the circular margin of which is directed forward, and the terminating branches backwards. Fig. 2 represents it of the natural size.*

Its surface, visible in the design, is adherent, but by a very loose cellular tissue to the part of the stomach which is above it ; the other surface adheres in a similar manner to the spine, so that it is there only suspended in a manner, and may be carried both forward and backward.

The opening marked G, which is seen above the swim-bladder, is the section of the gullet or intermediate canal, which is between the fauces and the stomach.

* This is diminished two thirds in our copy of the figure.—EDITOR.

NATURAL HISTORY OF THE BIRDS OF AFRICA.

TRANSLATED FROM THE FRENCH OF LE VAILLANT.

THE WHITE GOS EAGLE (*Morphnus albecens*, CUVIER.)

Le Blanchard, *Le Vaill.* Ois d'Afrique, pl. 3.p. 12. *Falco albecens*, Lath. Ind. Orn. Sup p iv. Daud. ii. 45. Shaw's Zool. vii. 98. Noisy Eagle, Lath. Gen. Syn. Sup. ii. p. 21. *Id.* Gen. Hist. i. p. 143. Cuvier, *Régne Anim.* I. 331, Note. *Drapiez*, Dict. Classique, I. 162.

IF intrepidity and courage are the moral characters which distinguish eagles from other birds of prey, this bird is as much an eagle as that which I have above described under the name of the *Griffard*: he is the tyrant of all the larger birds which inhabit the same district,—a true despot, who, abusing his power, wages war against all who surround him, and immolates all who approach him. Destined to make birds his prey, nature has endowed him with great facility of flight; a very long tail serves admirably to direct his course with quickness, and accommodate it to the frequent and sudden veerings of the birds who seek to escape his talons: a rapid zigzag flight, which, almost always, enables them to escape from every other bird of prey, becomes useless when pursued by the White Gos Eagle. It is while in pursuit of wood pigeons that I have had most occasion to admire the address of this eagle; he seems indeed to prefer to hunt those birds whose flight is the most rapid and irregu-

lar; that species of pigeon which I have described under the name of *Ramron*, and which is remarkable, in this respect, forming his ordinary prey. I have seen falcons, goshawks, sparrow-hawks, and hobbies, all in chace of our pigeons in Europe, but they have seldom succeeded even when they have precipitated themselves into the midst of an entire flock of these. Their methods, however, are very different from those which the White Gos Eagle so successfully employs. Birds of prey generally seek to overtake their game by their very rapid flight, and endeavour to attack them either from above, or on one side. This eagle, on the contrary, controls himself, measures his flight, and leaves nothing to fortune. The spotted wood pigeon, as I have remarked in giving the description of it, rises above tall trees, and seems to amuse himself with a singular mode of flight peculiar to himself; while the pigeon is thus engaged, our eagle darts from his ambuscade, and if he succeeds in getting beneath the pigeon before he can manage to precipitate and conceal himself in the wood, it is all over with him: all his turns and all his rapid doublings will avail him nothing: his enemy meets him at every turn, and seems to wish rather to tire his victim out, than actively to pursue him; always below him, his only care seems to be to prevent him from gaining the trees: the sooner the pigeon throws himself towards them, the sooner is he taken; for our eagle, traversing the shortest line in the same space of time, is sure to meet him, and his prey thus falls into his power at the very moment he thought to have escaped. It is only when the pigeon is forced to betake himself to the open plain, that our eagle flies straight at him, when he is able to seize him in an instant, in consequence of his being exhausted; but he very rarely dares to quit the wood, knowing that his only resource is to get into the thickest of the trees, where, in consequence of our eagle not having free scope for action, he may hope to escape. The White Gos Eagle strips the feathers from his prey before he tears it, devouring it while perched upon the under branches of some large tree, upon the trunk of a fallen one, or upon a rock, or other high spot, but never on the ground.

The White Gos Eagle frequents forests only; and seems to prefer those places where the largest and fewest trees are found. In one of these, concealed under a branch, he lies in wait for pigeons and wood-partridges, among the latter of which he precipitates himself downwards with much noise. He also makes prey of a very small species of gazelle, which is only found in forests, and of which I have spoken in my travels under the Hottentot name of *nometjes*.

I had the satisfaction of observing for a considerable time a pair of White Gos Eagles, who had established themselves near my camp in the delightful Auteniqua country. I watched them for more than three weeks before I shot them. I used to pass entire mornings, seated at the foot of a tree, in observing their various movements and stratagems. As they happened to be hatching at this time, I was always sure of finding them in the same places; when one of them had mastered any prey, all the crows of the vicinity would flock round in vast numbers, screaming for a share of the booty, but the eagle would appear to take but little notice of them, and they, not daring to approach too near, would satisfy themselves with the fragments which fell from the tree. When any other bird of prey appeared in the district, the male eagle would pursue it in the most determined manner till out of his domain. The very small birds might approach his eyry, and even alight upon it with impunity: the eagle would do them no harm, they were there even in safety against the attack of any inferior bird of prey.

The wings of the White Gos Eagle do not appear to extend so widely as those of the other eagles; for, not stretching farther than to about the middle of the tail, they seem to be shorter in proportion with that, which is very long; but if we consider the size of the body, the expansion of the wings will be found sufficiently great.

The White Gos Eagle has a smaller body than the European eagles, and is longer and of a lighter figure. He is admirably constructed in every respect for bird-hunting, and bears to our European eagles the same relation that harriers do to wolf-dogs.

The White Gos Eagle is characterized by a kind of crest, which takes its origin behind the back part of the head, (*occiput*), but it is much less apparent than in the preceding species. It is but slightly perceptible in the female; she is larger by one-third than the male; her colour is generally more tinged with fawn-brown over the mantle and wing-coverts; both of them are booted, that is, feathered to the toes. The tail is striped across with black and white. The great external plumelets of the wing-feathers are brownish, and striped in all that part which is covered when the wing is folded. The iris and the toes are of a fine yellow colour; the talons, which are very strong, are lead coloured, as is also the beak.

All the feathers of the White Gos Eagle are white, dashed with brownish black upon the mantle; they are soft, and not rough to the touch, as those of eagles are in general. Its cry is formed of several shrill sounds, uttered hurriedly, and which may be expressed by *cri-*

qui-qui-qui-qui. When perched after feeding, it may be heard for entire hours repeating these sounds, which seem rather feeble for a bird whose size is equal, by nearly one-third, to that of the Griffard.

The White Gos Eagle builds upon the top of tall trees. The male and female take it in turn to sit. I have never met with more than two eggs in the same nest. They are white, and of the size of a guinea-fowl's, but rounder. When I was obliged to quit my camp, I decided upon killing the old birds; I then found the young ones were covered entirely with a whitish fawn-coloured down. I attempted to rear them, but my dogs killed them before they were covered with all their feathers. Judging by those they already had, the first colours of the White Gos Eagle seem to be nearly the same as those of the adult bird, excepting that the brown is fainter, and that all the wing-coverts have reddish borders.

GEOLOGY OF MOUNTAINS.

BY M. ELIE DE BEAUMONT.*

THE independence of successive sedimentary formations is the most important result of the superficial beds of our globe; and one of the principal objects of my researches has been to show, that this great fact is the consequence and even a proof of the independence of mountain-systems having different directions.

The fact of a general uniformity in the direction of all beds upheaved at the same epoch, and consequently in the crests formed by these beds, is, perhaps, as important in the study of mountains, as the independence of successive formations is in the study of superimposed beds. The sudden change of direction in passing from one group to another has permitted the division of European chains into a certain number of distinct systems, which penetrate and sometimes cross each other without becoming confounded. I have recognised from various examples, of which the number now amounts to twelve, that there is a coincidence between the sudden changes established by the lines of demarcation observable in certain consecutive stages of the sedimentary rocks, and the elevation of the beds of the same number of mountain-systems.

Pursuing the subject as far as my means of observation and induction will permit, it has appeared to me that the different systems,

* From Mr. De La Beche.

at least those which are at the same time the most striking and recent, are composed of a certain number of small chains, ranged parallel to the semi-circumference of the earth's surface, and occupying a zone of much greater length than breadth, and of which the length embraces a considerable fraction of one of the great circles of the terrestrial sphere. It may be observed respecting the hypothesis of each of these mountain-systems being the product of a single epoch of dislocation, that it is easier geometrically to conceive the manner in which the solid crust of the globe may be elevated into ridges along a considerable portion of one of its great circles, than that a similar effect may have been produced in a more restricted space.

However well established it may be by facts, the assemblage of which constitutes positive geology, that the surface of the globe has presented a long series of tranquil periods, each separated from that which followed it by a sudden and violent convulsion, in which a portion of the earth's crust was dislocated,—that, in a word, this surface was ridged at intervals in different directions; the mind would not rest satisfied if it did not perceive among those causes now in action, an element fitted from time to time to produce disturbances from the ordinary march of the phenomena which we now witness.

The idea of volcanic action naturally presents itself when we search, in the existing state of things, for a term of comparison with these great phenomena. They nevertheless do not appear susceptible of being referred to volcanic action, unless we describe it, with M. Humboldt, to be the influence exercised by the interior of a planet on its exterior covering during its different stages of refrigeration.

Volcanos are frequently arranged in lines following fractures parallel to mountain chains, and which originate in the elevation of such chains; but it does not appear to me that we can thence regard the elevation of the chains themselves as owing to the action of volcanic foci, taking the words in their ordinary and restricted sense. We can easily conceive how a volcanic focus may produce accidents circularly and in the form of rays from a central point, but we cannot conceive how even many united foci could produce those ridges which follow a common direction through several degrees.

Volcanic action, such as it is commonly understood, could not, therefore, be itself the first cause of these great phenomena, but vol-

canic action appears to be related (and this is a subject which has long occupied M. Cordier, though he has considered it under another point of view) to the high temperature now existing in the interior of the globe.

Now the secular refrigeration, that is to say, the slow diffusion of the primitive heat to which the planets owe their spheroidal forms, and the generally regular disposition of these beds from the centre to the circumference, in the order of specific gravity,—the secular refrigeration, on the march of which M. Fourier has thrown so much light, does offer an element to which these extraordinary effects may be referred. This element is the relation which a refrigeration so advanced as that of the planetary bodies establishes between the capacity of their solid crusts and the volume of their internal masses. In a given time, the temperature of the interior of the planets is lowered by a much greater quantity than that on their surfaces, of which the refrigeration is now nearly insensible. We are, undoubtedly, ignorant of the physical properties of the matter composing the interior of these bodies, but analogy leads us to consider, that the inequality of cooling above noticed, would place their crusts under the necessity of continually diminishing their capacities, notwithstanding they should not cease to embrace their internal masses exactly, the temperature of which diminishes sensibly. They must, therefore, depart in a slight and progressive manner, from the spheroidal figure proper to them, and corresponding to a maximum of capacity; and the gradually increased tendency to revert to that figure, whether it acts alone, or whether it combines with other internal causes of change which the planets may contain, may, with great probability, completely account for the ridges and protuberances which have been formed at intervals on the internal crust of the earth, and probably also of all the other planets.

CHAPTER OF VARIETIES.

CLOUD ECHOES AND THE ROLLING OF THUNDER.—The rolling of thunder has been attributed to the echoes among the clouds; and if it is considered that a cloud is a collection of particles of water, however minute, yet in a liquid state, and therefore each individually capable of reflecting sound, there is no reason why very loud sounds should not be reverberated confusedly (like bright lights) from a

cloud. And that such is the case, has been ascertained by direct observation on the sound of cannon. Messrs. Arago, Mathieu, and Prony, in their experiments on the velocity of sound, observed that, under a perfectly clear sky, the explosions of their guns were always heard single and sharp, whereas when the sky was overcast, or even when a cloud came in sight over any considerable part of the horizon, they were frequently accompanied with a long continued roll like thunder, and occasionally a double sound would arrive from a single shot.

But there is, doubtless, also another cause for the rolling of thunder, as well as for all its sudden and capricious bursts and variations of intensity, of which our knowledge of the velocity of sound furnishes a perfect explanation. To understand this, we must premise, *cæteris paribus*, the estimated intensity of a sound will be proportional to the quantity of it, (if we may so express ourselves,) which reaches the ear in a given time. Two blows equally loud, at *precisely the same distance from the ear*, will sound as one of double the intensity; a hundred, struck in an instant of time, will sound as one blow a hundred times more intense than if they followed in such slow succession that the ear could appreciate them singly. Now let us conceive two equal flashes of lightning, each four miles long, both beginning at points equi-distant from the auditor, but the one running out in a straight line directly away from him; the other describing an arc of a circle having him in its centre. Since the velocity of electricity is incomparably greater than that of sound, the thunder may be regarded as *originating* at one and the same instant in every point of the course of either flash, but it will reach the ear under very different circumstances in the two cases.

In that of the circular flash, the sound from every point will arrive at the same instant, and affect the ear as a single explosion of stunning loudness. In that of the rectilinear flash, on the other hand, the sound from the nearest point will arrive sooner than from those at a greater distance; and those from different points will arrive in succession, occupying altogether a time equal to that required by sound to run over four miles, or about twenty seconds. Thus the same *amount* of sound is in the latter case distributed uniformly over twenty seconds of time, which in the former arrives at a single burst; of course, it will have the effect of a long roar, diminishing in intensity as it comes from a greater and greater distance. If the flash be inclined in direction, the sound will reach the ear *more compactly*, (i. e. in shorter time from its commencement,) and be

proportionally more intense. If (as is almost always the case) the flash be zigzag, and composed of broken rectilinear and curvilinear portions, some concave, some convex to the ear, and if, especially, the principal trunk separates into many branches, each breaking its own way through the air, and each becoming a separate source of thunder, all the varieties of that awful sound are easily accounted for.—SIR JOHN HERSCHELL.

ENEMIES OF THE HIVE BEE.—Being an enthusiastic lover of Natural History, I gladly take up my pen to communicate a few of the main *facts* which have fallen under my observation. Living in a retired village, and delighting in field amusements, I have had many opportunities of studying the habits both of animals, birds, and insects; and as I am always intent on making discoveries, I have managed to pick up a little useful, and I trust, correct information. In my little garden I have a few hives, which are to me a source of much pleasure. Often do I stand observing them, and I know nothing so interesting as the habits of these extraordinary insects, and the wonderful policy of their little kingdom. I was always watchful lest any enemies should worry my little favourites, and often, during the summer, I paid them a visit very late at night, and examined the hives by candle light. When the evening had been raining, I frequently found a huge, gray snail, at the mouth of the hive, busily employed in rasping off that varnished coating of farina, or propolis, which the feet of the bees leave upon the board at the entrance. I had often noticed that the board had the appearance of having been rasped with a file, but I never knew the cause till I caught the snail at work. The sentinel bees often came in contact with the intruder, but they never expressed anger; only shrinking back in disgust the moment their antennæ touched its cold slimy skin. I confined one of the snails till morning, and then caused a bee to sting it in order to observe its effects. The instant the sting entered, there issued from the wounded part so great a quantity of viscid humour as completely entangled the bee before it could extract its sting; I thought it therefore probable that the bees were aware of this, and abstained from all needless hostility. Sparrows, and the ox-eye, (*Parus major*,) I frequently saw early in the morning, but their visit to the hives was for the purpose of picking up the maggots and dead bees which had been cast out. One day, however, at the latter end of July, I observed an unusual number of swallows in my garden, and watching narrowly, I saw them, as they

swept past the hives, seize upon the bees, and, as it seemed, with difficulty devour them. I instantly recollected what Virgil has said of the swallow, as well as other birds.

“ *Omnia nam late vastant, ipsasque volentes
Ore ferunt dulcem nidis inmitibus escam.*”

I took my gun, and marking those swallows, which had evidently seized something in passing the hives, I shot them; I then opened them carefully, and was grieved to find that, though they were literally crammed with drones, there was not a vestige of a working bee. Hence I concluded that swallows prey only on the drones, and are consequently no enemies to bees.—R. D.

BLUE COLOUR OF THE SKY.—If I might hazard my opinion of the cause of this appearance, it would be the following:—As the atmosphere extends upwards, its density becomes gradually less and less, and of course its power of reflecting the sun's rays in like proportion diminishes, till at last, at the extreme verge, where it terminates, there is no reflection at all, or total darkness. The extreme strata then being most rarefied, have the least powers of reflecting the rays of light, and the light thus reflected is of a bluish tint, or consists principally of the blue rays.

In this manner, a dark-brown mountain, whose surface has small reflective capabilities, when seen at a distance, has a deep-blue appearance, exactly similar to the atmosphere. It cannot be the medium of the air, through which it is seen, that renders it of this colour; for if part of the mountain be covered with snow, which has strong reflective powers, this snow is still seen of a pure white colour.

It has been ascertained, too, that the atmosphere, when seen from the top of a very high mountain, has a deep-blue tint, approaching to black, and this tint becomes deeper the higher you ascend.

It may be observed, also, that the centre of the atmosphere, looking perpendicularly upwards, always appears of a deep-blue colour, which gradually passes to a whiter appearance towards the extreme verge of the horizon, or in the lower strata next the earth. Here most dense air is accumulated, and here the reflection is most perfect, or nearly approaching to white light; whereas perpendicularly overhead, the rays of light pass through less of this air, the reflection is fainter, and hence the deeper blue colour.—WILLIAM RHIND.

THE PROTEUS ANGUIS, SIREN ANGUINA, OR AUSTRIAN SIREN.—This rare little animal has as yet only been discovered in the subterraneous caverns of Carniola at Adelsberg, and Sittich, and very lately in those of Heiligenstein, near Zirknitz; and is also mentioned in a German journal as having been found in Sicily. In shape it much resembles an eel, whence its specific name; but it has never yet been found of more than fifteen or sixteen inches in length, and about three-fourths of an inch in diameter. It is either of a pale rose-colour or perfectly white, but after having been for some time exposed to the light it becomes brown. Its skin is very smooth and even, the head somewhat depressed, and with a lengthened obtuse snout; the eyes are situated beneath the skin, and are exceedingly small; on each side of the neck are three ramified bronchial gills, of a bright blood-colour during the life of the animal. It is furnished with four legs or rather appendages, for they appear to be of no use to it, which are about three-fourths of an inch long, and the feet of the fore legs have three toes, whilst the hind feet have only two. Its motion when touched in the water is brisk and rapid, and is entirely produced by the action of the tail unaided by the legs, as I observed was the case with one which I procured from a professor at Laibach. It has very fine and sharp teeth, which it seems scarcely to need, having been kept for years together in fresh water, apparently without any nourishment, but it has never been known to bring forth young, nor is its origin or real abode at all known. From the period of its discovery, its nature has been a subject of discussion amongst naturalists, some imagining it to be the larva of a larger animal, whilst others maintain that it forms a new genus; nor is the question yet determined.—DR. J. TOBIN.

FRENCH EXPERIMENT ON AN ENGLISH POINTER.—It is well known that spaniels, and even mongrels from them, have the faculty of setting game, imparted at first to the animal by constraint and chastisement, and afterwards apparently transmitted to their offspring. We may hence ask, whether the talent of carrying is in the same manner transmissible, though this does not seem to have ever been denied. The French setters having never been known to prove this incontrovertibly, M. Magendie learned that in England there were pointers which carried naturally: he procured a couple full grown. A handsome bitch bred from these was kept constantly under his eye, and, without receiving any sort of instruction, she pointed and carried game the first day she was taken out, and showed as much

firmness and assurance, as dogs who had been carefully bred under the influence of the whip and the collar.—M. DE LA MALLE.

EFFECTS OF LIGHT ON THE COLOUR OF FLOWERS.—In the month of June I had in a flower-pot a bunch of sweet-williams, of a dark crimson, forming part of a nosegay. They stood in a flower-pot on the mantelpiece. Some of the buds opened in this situation, and displayed a white flower, slightly spotted with pale pink. There was a window next the mantelpiece, and though there was considerable light, it appears there was not sufficient to perfect the colour. I can assign no other reason for this phenomenon, which seems to prove the effect of the light on the colour of flowers, unless we can suppose that the plant, when in the ground, imbibes from the earth certain mineral or metallic particles in peculiar chemical combination, which may, by circulating through the fine tissues of the corolla, serve to give colour by reflection of certain rays of light to the eye of the observer, according to the theory of colours.—E. G. BALLARD, *Islington*, Feb. 2, 1833.

GRUBS EATEN IN GUIANA.—The grubs of certain beetles are very destructive to coco trees. They excavate a hole of about an inch diameter in the terminal leaf-bud, and, when the leaves expand, the leaflets appear full of holes, as if they had been perforated with shot of different sizes. In consequence of the injury done to the bud by these insects the trees are sometimes killed. The larva, or grub of one of the species of beetles, which infest coco-nut trees, is called ducuma, or grugan, in British Guiana. It is about two or three inches long, and three-quarters of an inch in diameter, and the head is black. They are reckoned a great delicacy by wood-cutters and epicures of that country, and they are generally dressed by frying them in a pan. By some they are preferred in a raw state; and after seizing them by the black head, they are dipped in lime juice, and forthwith swallowed.—H. MARSHALL, *Dep. Inspector of Army Hospitals*.

SQUIRRELS.—In the north of Hampshire a great portion of the squirrels have white tails. None of this variety, as far as I can learn, reach the London market. I was much surprised at hearing from a man who kept a bird and cage shop in London, that not less than 20,000 squirrels are annually sold there for the *menus plaisirs* of cockneys, part of which come from France, but the greater number are brought in by labourers to Newgate and Leadenhall markets,

where any morning during the season 400 or 500 might be bought. He said that he himself sold annually about 700: and he added, that about once in seven years the breed of squirrels entirely fails, but that in other seasons they are generally prolific. The subject was introduced by his answering to a woman, who came in to buy a squirrel, that he had not had one that season, but before that time in the last season he had sold 500. It appears that the mere manufacture of squirrel cages for Londoners is no small concern.*—HON. AND REV. W. HERBERT.

MOULTING OF THE COCKROACH.—Some years ago, when resident in Westminster, I was called into the kitchen by the servant to look at what she called a *white black beetle*, when I found the curiosity to be a cockroach in the act of casting its skin. I secured him immediately after he had effected his escape from his old coat, and kept him for some days under a wine-glass, during which period he gradually assumed his sable suit, although he contrived to get away before he quite rivalled "Warren's Jet." The object of my present note is, however, to state the very extraordinary circumstance, that my poor friend was assisted in disrobing himself by some of his fellow cockroaches. The operation, which I watched until it was completed, appears to be one of some difficulty, and took place under a stone slab which was placed across the fire-place, under the chimney-board, but within "ken."—W. J. T., 11, *St. Mary Abbot's Terrace, Kensington*, 11th Feb. 1833.

THE CHOUGH.—On the 13th of August last a red-legged crow or chough, (*Pyrrhonorax graculus*, TEMMINCK), was killed on the Wiltshire downs, near the Bath road, between Marlborough and Calne, by a man employed in keeping birds from corn. It was flying by itself, and he took it for the common crow, till it came to hand.

This very local species has always been considered as confined to the rocky coast of Devon, Cornwall, and Wales, a distance from either in a straight line of not less than sixty miles (and inland too) from where this was killed; by what accident it should be driven so far from its native rocks is difficult to be conjectured.

It was a female, in pretty good plumage, and weighed 12 oz. It is now in the possession of Mr. Butler, of Kenneth.—MERLIN, *Marlborough*, Feb. 13, 1833.

* From the Notes to White's Selborne. 8vo. London, 1832.

THE CROSS-BILL AND THE PARROT CROSS-BILL.—Among other valuable information on almost every branch of natural history, which I have obtained from a man in my neighbourhood, was an interesting description of four young cross-bills, (*Loxia curvirostra*), which were reared to maturity by one of his relatives. The nest was found in a bush, close by a small brook, in the vicinity of Seven Oaks, Kent; and the parent hen was taken upon it, and continued to feed her offspring when in the cage. What at length became of them he could not inform me; but the account he gave of their manners left no doubt as to their being actually of that species; indeed the peculiar and very singular form of the beak, in this genus, precludes the possibility of a mistake. The young birds, he informs me, were about half fledged when he first saw them, of a uniform brown colour, and had the bill as much crossed as the adults. There is, I believe, as yet, no instance on record of the cross-bill having been known to breed in this country; but the truth and consistency to nature, which I have ever observed in the communications of my informant, fully entitle him to belief.

It has generally been said, that the grosbeak or hawfinch, (*Coccothraustes communis*), does not breed here; three instances, however, have come under my notice during the last two summers, all in the vicinity of the metropolis.

I may avail myself also of this opportunity, to mention, that I lately saw a fine specimen of the parrot cross-bill, (*Loxia pytiopsittacus*), in the possession of an artizan in Southwark, who has a small collection of stuffed birds, &c. It was shot in the neighbourhood of London.—E. BLYTH, *Tooting, Surrey*.

SIR WM. JARDINE'S NATURAL HISTORY OF HUMMING BIRDS.*—We have seen a specimen copy of this work, which exceeds in cheapness any thing which has hitherto appeared in this speculating age. There are upwards of thirty beautiful engravings, remarkable for scientific accuracy both in the outlines and the colouring, and all for six shillings. To those who are acquainted with the previous writings of Sir Wm. Jardine, we need not say that the descriptions which he has given of the subjects of Mr. Lizars's elegant plates, fully bear out the opinion we have already expressed and exemplified in our notice of Sir William's notes to the American Ornithology. When the volume is regularly published, we shall take an early opportunity of noticing its contents, and in the mean time we wish all success to the praiseworthy undertaking.

* The Naturalist's Library, conducted by Sir Wm. Jardine, Bart.; the plates by W. H. Lizars, foolscap 8vo. Stirling and Kenny, Edinburgh.

EXPERIMENT ON AN EARWIG.—I have remarked that the earwig is very unwilling to expand its beautiful and delicate wings, probably from the fear of their being accidentally injured. I placed one, some time since, upon a piece of cork floating in the centre of a basin of water, but still it was not inclined to effect its escape by flight, but preferred swimming to the sides of the basin, which it tried ineffectually to climb. Having made several attempts at this, and perhaps finding itself exhausted, and likely to be drowned, it made all haste to regain its station upon the cork, where it remained all night, though by spreading its wings it might have regained its liberty. Yet that earwigs do fly, is an unquestionable fact, and they do so particularly at night, as I have more than once had proof. I have good reason to believe, too, that they fly in swarms, having sometime since observed, upon the Woolwich road, in a small space about one foot and a half square, no less than fifty or more of these insects sticking to some palings, which I had seen on the previous day a labourer coating all over with pitch. Some of them I observed had still their wings expanded, being unable to fold them up under their wing cases, owing to their adhering so strongly to that substance.—J.*

ACCOUNT OF THE CAPTURE OF A SEA DEVIL. (*Cephalopterus*).

BY M. LE VAILLANT.

Figure of a Sea Devil.

In the latitude $10^{\circ} 15'$ north, longitude 355° , we met with a calm that delayed us several days, and in the interval I witnessed a phe-

* The Figures of another communication from J., are engraving for next Number.

nomenon, which, though known to our ship's crew, was to me perfectly novel.

An enormous flat fish, of the ray genus, came and swam round our vessel. It differed from the common ray, however, in the shape of its head, which, instead of being pointed, formed a crescent, and from the extremities of the semicircle issued two arms, as it were, which the sailors called horns. They were two feet wide at the base, and only five inches at the extremity. This monster, they told me, was called the sea devil.

A few hours after we saw two others with this, one of which was so extremely large, that it was computed by the crew to be fifty or sixty feet wide. Each swam separately, and was surrounded by those small fish which usually precede the shark, and which are therefore called by seamen pilot fish; lastly, all three carried on each of their horns a white fish, about the size of a man's arm, and half a yard long, which appeared to be stationed there on duty.

You would have said they were two sentinels placed to keep watch for the safety of the animal, to inform him of any approaching danger, and to guide his movements. If he approached too near the vessel they quitted their posts, and swimming briskly before led him away. If he rose too high above the water, they passed backward and forward over his back, till he had descended deeper; if, on the contrary, he swam too low, they disappeared and we saw no more of them, because, no doubt, they were passing underneath, as in the preceding instance they had passed above him. Accordingly we found him re-ascend towards the surface, and then the two sentinels reassumed their posts, each on his horn.

During the three days that the calm continued, and we remained motionless for want of wind, these manœuvres were many times repeated before our eyes as to each of the three monsters.

I was desirous of catching one of them, in order to examine it at my leisure. But when I proposed it to the crew they treated it as impossible. However, on my promising a dozen bottles of wine to any one who should accomplish it, their ardour was roused; and the attempt, which was before deemed impracticable, was now only difficult.

They all ran to their harpoons, and posted themselves here and there by the ship's side in readiness to strike. A sailor standing near the bowsprit, more fortunate than the rest, struck one of these fish on the back, then, letting out his line that he might have room to beat about and tire himself, he at last towed him gradually to the

surface of the water. The animal lay perfectly motionless, and we made no doubt of easily drawing him on deck. One harpoon, however, being insufficient to support him, particularly as it had penetrated but a little way, twelve or fifteen more were struck into him at once, so as to fix him completely; several hawsers were passed round his body, and he was thus hoisted on board.

This was the least of the three, being only eight-and-twenty feet in its extreme breadth, and one-and-twenty in length from the extremity of its horns to that of the tail. The tail, which was thick in proportion to the body, was 22 inches long.

The mouth, placed exactly like that of the ray, was wide enough to swallow a man with ease. The skin was white under the belly, and brown on the back, like that of the ray.

We reckoned the animal to weigh not less, certainly, than a ton.

About twenty small sucking fish were fastened to different parts of his body so firmly, that they did not drop off when he was hoisted on board, but were taken with him.

Some naturalists have said, that the head of the sucking fish is viscous on the lower part, and furnished with rough points, similar to the teeth of a file; and, according to them, it is by means of these two qualities, its roughness and viscosity, that it is enabled to adhere to other fish.

"Figure to yourself," says one of them, "a row of nineteen sharp-edged and dentated laminæ, placed cross-wise, and issuing immediately from the rim of the lower jaw, and you will have a just idea of the part with which the remora makes itself fast."

This description is exact as far as relates to the figure and number of the dentated laminæ; but it places them on the lower part of the head, whereas they are, in reality, on the upper. Accordingly, when the remora fixes itself, it is obliged to turn upon its back, with its belly upward.

I am ignorant whether the two white fish that post themselves on the arms of the sea-devil, and appeared to serve him as pilots, were also of the remora kind. But this at least I can assert, that they appeared to stick firmly to the extremities of the arms I have mentioned, notwithstanding the arms were in continual motion. I must observe, however, that if these white fish had a flat surface, like that by which the remora adheres to other fish, it must have been on the lower part of the body, and not on the upper, since the animal continued in its natural position, and had no occasion to turn over to fix itself at its post.

It would have been highly gratifying to me, if these fish had remained at their stations, and allowed themselves to be taken with the sea-devil, as I should then have had an opportunity of examining them; but the moment the first harpoon was thrown, they let go their hold and disappeared.

I hoped, however, that we might perchance catch one of those that served as sentinels to the other two monsters, which, by all the noise we had made, had not been driven away. Different baits were tried for them, but to no purpose; when the bait was thrown into the water, they came and examined it, and immediately returned to their posts.

I do not at present recollect that any naturalist has spoken of these white remoras. Yet other travellers besides me have seen them. I shall cite on this head Dubadier, known in natural history for his rare and ample collections of the Crustacea of the Carribbee Islands. In his last voyage this naturalist saw, in latitude 45° north, longitude 333°, a similar ray, which he supposed to be about twenty-five or thirty feet in breadth, accompanied by its two white pilots. He made a drawing of it, as I did of the rays which I saw, and on comparing these drawings, the fish evidently appear to be of the same species.

REMARKS ON THE CLASSIFICATION OF BIRDS, PARTICULARLY THE BRITISH WARBLERS, (*Sylviana*.)

BY EDWARD BLYTH.

NONE of our small British birds seem so little known to the generality of observers, as that numerous and interesting group usually denominated "Warblers." Among no common birds has there existed such strange confusion in works on natural history; a confusion which may have originated partly in the resemblance which some few of the species bear to each other, and partly perhaps in the shy, inobtrusive, and retiring habits of the whole group; but which must nevertheless be mainly attributed to that culpable deficiency of personal observation, that ignorance of living nature too often discernible in the compilations of some who would be thought naturalists. The persevering researches, however, of White, of Montagu, and of many living field observers, have done much towards elucidating the species, and have enabled us to recognize

with tolerable precision the majority in their native haunts ; though yet, to judge from their usual arrangement in our systems, it would still appear that the generic resemblances of some had been traced in their stuffed skins, rather than from a careful observation of their manners and habits when alive.

In attempting to arrange the dried skins of foreign birds, of the habits and economy of which we are nearly, or perhaps wholly ignorant, there is, of course, no alternative but to class them according to the forms and proportions of their several members ; and these characters, to a practised naturalist, will generally afford tolerable criteria ; still, the inferences thus drawn are often but vague and uncertain, and it is from practical observation alone of their manners and habits when living, that a correct system of classification can be obtained.

The British Warblers are all, with one or two exceptions, very common ; indeed, I have observed them all to be much more abundant than what I have read of them would lead me to suppose ; they inhabit every hedge, and abound in every garden ; they swarm in every thicket, and enliven every bush with their melody : yet, however, to most persons residing in the country, they are but little known ; strange as it may sound, the very existence of some of them is doubted by professed naturalists.

The various birds called "Warblers," together with a host of dissimilar and widely differing groups, were all associated by Linnæus in one huge and comprehensive genus, *Motacilla*. Subsequent writers have restricted that term to the group to which the common field wagtail belongs, and the different warblers were arranged by Latham in his extensive genus *Sylvia* ; that again is now divided into several smaller groups, and the majority of our British warblers are at present (by most writers) arranged in an undecided manner, partly in the genus *Curruca* of Brisson, and partly in the Latham's *Sylvia*, &c.

It might, perhaps, be unnecessary now to discuss the comparative merits of large or of small genera ; nor need I here dilate on the propriety of arranging those only together in one genus, which naturally assimilate, not only in some vague, trivial, and often fancied resemblance in the form of the bill, but which possess also a general similarity of structure, habits, and mode of life.

Every distinct and natural group, which the mind can clearly and definitively recognise, in idea, should (I consider) be formed into a genus, and distinguished by a generic appellation, alluding to some

particular habit or peculiarity common to the whole group; or which would at any rate more especially apply to that particular group, than to any other.

To a person conversant with natural history a generic name, to be appropriate, ought to convey at once to the mind a distinct and definite notion of the kind of animal to which it is affixed. Thus, speaking of a bird, if we call it according to the old system of nomenclature, a finch, (*Fringilla*,) we convey at best but a very vague and indefinite idea of it: it may be a siskin, or a sparrow, or it may be of the chaffinch kind, or of some other of those distinct and very natural groups into which the small granivorous birds, called finches, are now usually divided; groups distinguished even in common language, but confused together by the old writers under that one name, *Fringilla*. But if, however, according to more modern arrangement, we style the bird a *Carduelis*, (*siskin and goldfinch genus*,) a *Linaria* (*linnet*,) or a *Coccothraustes*, (*grosbeak or hawfinch genus*,) and call it also one of the *Fringillina*, not only do we convey the idea that it is a finch, but we express also that particular family of finches to which it belongs.

By this method of arrangement, we certainly avoid the incongruity of classing animals of different natures and habits in one genus; while, by uniting under one general appellation the various modifications of the different leading forms,—thus comprising, for example, the several genera of finches under the term *Fringillina*, or the various warblers under *Sylviana*,—we possess, also, in addition, every possible advantage that could be derived from the former system of classification.

But while we thus confine a generic appellation within smaller and more natural limits, we must at the same time be cautious not to run into the opposite extreme; and we must also be continually on our guard against that strange but decided tendency in the human mind, to imagine a greater uniformity in nature than actually exists: an illusion which in all ages has manifested itself more or less in every branch of science, and which has given rise to more theoretical absurdity than the aggregate of all the other sources of error, so acutely descanted upon by Lord Bacon. There is, therefore, no necessity for stiffening our arrangements into exact quinary, or trinary sections, with which it is now so much the fashion to cramp our ideas of nature: all such frivolities having an obvious and manifest tendency to contract our ideas, to shut from our perception whatever militates against a favourite theory, to superinduce

a partial view of things, and to close accordingly the grand avenue to knowledge.

To some, perhaps, such a system of divisions and sub-divisions may at first sight appear intricate, and needlessly complicated; but the difficulty soon vanishes as we acquire a little knowledge of birds. The principle is simple, and the various groups may easily be recognized by a genuine field observer. The chief perplexity is to affix to each division a significant and appropriate name; a name that should apply to every member of the division, and, if possible, to that particular division exclusively. Such a name, however, it is often extremely difficult to find; the most dissimilar groups being in every way so immediately and intimately interwoven by such various connecting links, that it frequently defies our utmost ingenuity to devise a name that should possess in a sufficient degree the requisite and necessary qualifications.

There has been considerable diversity of opinion, as to the best manner of forming those orders, or grand divisions, which are to contain the mass of small land birds. The *Orders* of M. Temminck are, I consider, generally speaking, the most consistent with nature; but they certainly require a little occasional alteration, and I prefer the union of his two orders, *Granivores* and *Insectivores*, under the old name *Passeres*, as adopted by Mr. Selby in his valuable work on British Birds. This order, or general division, *Passeres*, (a very indefinite name certainly, but which, for want of a better, we are compelled to use,) falls into several extremely natural sections; as, for example; the *Laniadæ*, or birds of the shrike kind; the *Fringillidæ*, containing the several families of finches, bullfinches, buntings, and other small granivorous birds; the *Sylviadæ*, &c.

Under each of these several sections, again, many minor groups are comprised; all very natural, and by no means difficult to be distinguished. Thus, under the general head *Sylviadæ*, may be arranged the *Sylviana*, containing the different genera of warblers; the *Saxicolina*, or birds of the robin and wheatear kind; the *Muscicapina*,* or fly-catchers; the *Myotherina*, comprising the different genera of ant-eaters and wrens; the *Merulina*, or thrushes; &c. comprising, in short, the majority of those birds commonly denominated *soft-billed*; throughout which there is undoubtedly a strong general resemblance which cannot but be at once perceived by all who have paid any at-

* Under the term *Muscicapina* I do not include the tyrant-flycatchers of America; they, the *Tyrannina*, range more naturally under the general head *Laniadæ*.

tention to birds. In our present state of knowledge, this is the only method of arranging birds that can well be resorted to; the different systems that have been advanced agreeing generally in the principle of small divisions, but differing as to the terms by which such divisions are to be distinguished. It may indeed be generally observed, that the most strenuous supporters of the old system are usually those persons whose acquaintance with the productions of nature was derived more from dry museum specimens, than from the observation of living nature; and it is also not unworthy of remark, that several of our most eminent naturalists, who in their earlier productions advocated the old system of classification, now perceive the absolute necessity of dividing birds into smaller and more natural genera.

Tooting, Surrey, February.

THE EDITOR ON SCIENTIFIC GARDENING.*

It is the design of the little work, whose title is given in the note, to explain what may be termed the philosophy of gardening, in the plainest language that can be selected, while the technical terms are thrown to the bottom of the page, so as not to impede the progress of beginners, who are presumed to be ignorant thereof. An extract from the work itself, however, will show the method pursued, better than any detail we could introduce.

"SCIENTIFIC PRINCIPLES OF GRAFTING.

"WHEN the finger is cut with a knife, soon after the blood vessels contract their cut extremities into an opening so narrow, that the thicker and red-coloured part† of the blood cannot pass, and the bleeding therefore ceases. But even then there oozes out the thinner watery part‡ of the blood, consisting chiefly of matter the same or similar to the white of an egg, which being thus separated from the rest of the blood, thickens by the heat of the body, as the white of an egg does by boiling. If the lips of the finger-cut accordingly be kept close together by sticking-plaster, they will become united by means of this natural glue,§ as it may be termed, in little more than a day. Upon the same principle, when I was a student of medicine, I once succeeded, as others have done, in managing to unite the whole tip joint of a finger which a boy had had chopped off by machinery; and experiments have been successful in causing the spur of a cock to unite and grow upon his comb.

* "Alphabet of Scientific Gardening," by J. Rennie, A.M. 12mo. London, 1833. With numerous engravings on wood.

† "In Latin, *Crassamentum*."

‡ "In Latin, *Serum*."

§ "Technically, *By the First Intention*."

"It is upon similar principles that the science of grafting is founded; for if a young branch, like the boy's finger, be chopped off by a clean cut, and the cut extremities immediately joined, the descending pulp will thicken like the watery part of the blood, and while it remains soft, the sap from the cut ends of the sap vessels will force its way through to their continuation above in the cut slip, which, if the process be successfully managed, will grow as well, or nearly, as if it had never been cut.

"If, again, instead of applying the same cut slip* to the part it was cut from, a slip from another tree be applied, as if I had applied to the boy's finger the tip of another boy's, chopped off by the same accident, there seems no good reason to doubt that a similar healthy joining might by care be effected. In the case of animals, indeed, such joinings are rare, because rarely tried; but in garden plants they are exceedingly common; for the purpose of continuing esteemed varieties of fruits and flowers, accidentally produced by cultivation, as well as for forwarding the fruiting of young trees—since seedlings require years to arrive at a bearing state.

"On examining the joining of a graft about a fortnight after it has been made, I have found, as in a healing finger-cut, a number of small roundish grains, in form of a thin layer, produced from the thickening of the pulp, and destined to form the hard substance,† which in general projects a little externally, and the scar‡ differs in appearance from the other parts of the bark. It is, however, only in the space between the pulp-wood§ and the bark that the uniting substance is formed, and therefore it is evident the slip to be grafted must have

"*a*, a black-heart cherry tree, naturally of soft bark, and of large diameter, grafted on a bird-cherry *b*, naturally hard, and of small diameter. *c*, the scar, much bulged, from the pulp being interrupted in its descent. *d*, a paper birch, with a smooth thin bark grafted on the white birch. *e*, with rough thick bark. *f*, the scar, where there is no bulging, because the descent of the pulp is not interrupted.

* "Technically, *Scion*."

† "In Latin, *Cicatrix*."

‡ "In Latin, *Callus*."

§ "In Latin, *Alburnum*."

this part applied to the same part of the stock, and, if these differ in thickness, at least on one side. Nothing can be more erroneous than the doctrine that the buds of the graft "send woody matter downwards, which passes through the cellular substance into the stock, and covers the wood of the stock with new wood;" for every gardener knows that the graft never changes the wood of the stock. This is beautifully shown in the preceding figures, after M. Turpin.

"One of the most obvious principles of this process is, that the sorts to be grafted should be alike, or nearly alike, because, in that case, the arrangement of the sap and pulp vessels being similar, their cut ends will more readily apply mouth to mouth, and less obstruction or interruption of the circulating juices will take place. The ash may, however, be grafted on the olive.

"To this principle there is an exception, arising from the peculiar design which the graft is intended to fulfil. When the design is to increase fruit-bearing, the stock may be of firmer texture than the cutting, as in the preceding figure of the black heart and bird cherry, or when a peach cutting is grafted on a plum stock, which, having narrow vessels, a part of the descending pulp is stopped short and serves to strengthen the branch. If it be intended to increase the branches and leaves on the other hand, a plum cutting grafted on a peach stock might probably do so, by allowing the ascent of more sap.

"I refer, for illustration, to the following figures, from M. Turpin.

"*a*, the *Pavia lutea*, a shrub, which never attains the size of a tree, cleft-grafted on the horse-chesnut *b*, a tree of great size. It is remarkable that the *Pavia* is much enlarged near the junction *c*, like a tree near the ground, a circumstance which would not have occurred but for the graft. The bark of each remains distinct. *d*, the white lime-tree grafted on the European lime tree, *e*; each growing in diameter according to its particular nature, without any intermixture at the line of graft, *c*; a vertical section, *f*, *g*, of an almond tree *f*, cleft-grafted on a *Prunus* *g*, showing that not one of the characteristics of the two individuals ever passes the line of junction, *c*, *c*, no more than a spur grafted on the comb of the cock ever changes its hard horny nature for the soft fleshy nature of the comb.

" Binding of the Graft.

"When the joining has been made by cutting and properly fitting the bark of the slip to the bark of the stock, at least on one side thereof, it must be bound so as to prevent this junction from being deranged. This is usually done with a ball of three parts of clay free from stones, well worked with one part of fresh horse-droppings and a little finely-chopped straw, the whole about an inch thick, and two inches or more in length, being tied with a ribband of bass.

"The principle upon which this is done, is to prevent the oxygen of the atmosphere from getting to the fluid pulp at the joining, where it would unite with the carbon and form carbonic acid gas, and thereby rob the pulp of its solidity.* The exclusion of light is necessary on the same account, for a similar reason, as in the case of a finger-cut, the oxygen would unite with the carbon and prevent the thickening of the matter from the blood. On the same account, moisture, by supplying oxygen, would be injurious; and dryness might act both by exhausting the pulp and by causing the edges of the bark to shrivel and gape, which would facilitate the entrance of the air with its oxygen.

"It must be obvious from this simple principle, (not that I am aware of ever before stated it with reference to grafting), that no composition, whatever may be said of its peculiar power of healing, can act in any other way than this; no more than the farrago of plasters and salves for healing flesh-wounds and cuts, which are only good in so far as they keep the lips of the wound together, and exclude oxygen and light.

" Grafting by Approach, or In-arching.

"This is to grafting what layers are to striking, the graft-slip not being cut off, but taken from a plant growing near the stock upon which it is suffered to remain till the joining is completed. Mr. T. A. Knight employed this mode not only for the purpose of filling up from itself the parts of a wall-tree deficient in bearing wood (*a*), but also of improving the quality of fruits. It might be advantageously used in a similar way to fill up the gaps in quick-set and other hedges, where beauty of appearance is considered of consequence.

" Slip, or Scion Grafting.

"The slips taken off from one plant and joined to another, have the parts to be joined cut in various manners, according to the sort of plant, the size of the parts, and other circumstances. These will be better understood from the figures below than from mere verbal description.

* This is explained in the first part of the work under "GARDEN CHEMISTRY."

"a, whip grafting with a peg ; b, side grafting ; c, whip grafting with a tongue, or tongue grafting ; d, side grafting.

"a, b, c, d, chink, or shoulder grafting ; e, root grafting ; f, g, h, French mode of whip grafting ; i, peg grafting.*

* " Particular details will be given in the ALPHABET OF FRUIT GARDENING."

"Professor Thouin has enumerated about fifty methods of grafting, but they all depend upon the same principles as already explained.

"Bud Grafting, or Budding.

"Instead of a slip, or scion, the bud of one plant may be so inserted into the bark of another as to grow, and produce branches, flowers, and fruit. It is requisite for this purpose that a leaf-bud, known by its tapering sharp point, be selected, and not a flower-bud, known by its bulging and rather blunt point. It is necessary that the leaf connected with a bud be cut off, otherwise it would soon exhaust the sap, and the bud would wither and die. It is also necessary that the bark separate freely, which is the test for there being pulp enough to form a joining. When the bud is inserted, it must be tied round with a rib-band of bass, to exclude the air. Fine rose standards are thus formed.

"a, the bud, cut out with a shield of bark attached to it; b, the stem, with a slit in the bark to receive the shield attached to the bud; c, the bud inserted, and the leaf cut away.

"Herb Grafting.

"Though grafting is usually confined to trees, De Candolle thinks all plants may perhaps be capable of being so treated, and Baron de Tschoudy has in this way succeeded even with annual plants, as well as with the soft young shoots of trees; but it is necessary to success to have it performed near to or at the inner base* of a living leaf, which serves to attract the sap.

"In the case of plants with succulent leaves, it has been asserted, on authority, that "the union is imperfect," from the adhesion being "by the cellular substance only, "no woody matter" being transmitted to the stock. That this is quite erroneous is shown by the following instance of a *Cactus truncatus* grafted on a *Cactus triangularis* in the King's garden at Neuilly, as beautifully dissected and drawn by M. Turpin. This also equally disproves the common opinion that the graft in such cases is merely kept alive by the moisture supplied by the stock, and would do as well if struck into a potato or a piece of moist sponge. It certainly furnishes a strong disproof of the baseless theory that maintains buds and grafts to send down woody matter to the stock as roots descend into the soil.

* "In Latin, *Axilla*, which means armpit."

"A, *Cactus truncatus*; B, *Cactus triangularis*; a, the line of junction of the two individuals; b, the cuticular membrane; c, the cellular tissue of the bark; d, the fibrous and tubular tissue of the wood; e, the cellular tissue of the centre or pith."

A single well authenticated fact, like the preceding, is amply sufficient to demolish the most ingenious and plausible theory. Another striking instance is recorded in this work respecting Sir H. Davy's mistaken preference of unfermented dung.

In the introductory remarks, gardeners are urged, for their own interest, to avoid technical language in conversing with their employers. The attempt to teach those, who have not a classical education, the pronunciation of Latin words by printing them with accents, we deem to be a piece of useless and reprehensible pedantry.

GERMINATION OF THE CABBAGE PALM (*Euterpe oleracea*)*

BY DR. C. F. P. VON MARTIUS, OF MUNICH.

Euterpe Oleracea.

IN the northern parts of Brazil, the palms were so frequently observed by us in every stage of their growth, that we had an opportunity of sketching their progress from their germination to their time of flowering (*ad anthesin*), such as we shall here figure for the sake of agreeable variety.

* Translated from the splendid Latin work, "Genera et Species Palmarum," by the Editor.

Fig. 1.

Fig. 2.

Fig. 1. The ripe seed with its outer coat taken off. Fig. 2. The same cut across to show the albumen.

The mature seed of the *Euterpe oleracea*, after removing the fibrous envelope with which it is originally wrapt, consists of a concrete shell, *a*, having an outer skin which cannot be separated, smooth, shining, and of a brown colour. Upon this a roundish eye (*hylum*) *b*, is apparent, the opening with the germinating hole (*micropyle*), elliptical and chink-like, the vascular cord (*raphe umbilicale*) *c*, depressed, rather broad, and running from the eye half way down the seed to the hole.

The mature seed, after removing the fibrous envelope, on being cut across, is found to consist of a solid nut, with the teat-like albumen, *a*, verging inwards from the shell in form of membranous rays. The embryo *b*, itself is at the side tapering, blunt, looking from the tip towards the central part of the albumen, which is distinguished by a softer structure, and deliquescing upon germination, gives place to the expanded embryo.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 3. The seed with the outer coat not broken off, and just beginning to germinate. Fig. 4. The same seed with the germination farther advanced. Fig. 5. Another seed not so far advanced as fig. 4.

The seed, after germination has begun, is still clothed with its fibrous envelope, at the part where the micropyle and raphe are observed, the outer portion of the embryo appears, which, looking toward the ground ought to be termed the radical part of the cotyledonous body. We have there observed two bodies, namely, the sheath of the first radicle *a*, (*coleorhiza*, MIRBEL) and the radicle itself *b*, thence proceeding.

The same seed at a stage a little more advanced, shows the first radicle *b*, and the sheath including the gemlet (*coleoptilis*, MIRBEL). The first radicle sends out several lateral shoots *c*, and the conical sheath permits the escape of the gemlet through its open tip.

Another seed, whose greater first radicle is produced conspicuously

enough, from the centre to the base; besides the vestiges of two lateral shoots with minute tubercles (*radiculoda*, RICHARD). The sheath of the gemlet *d*, is yet closed, tapering, crooked, and tends upwards.

Fig. 6. Fig. 7. Fig. 8.

Fig. 6. The seed in fig. 5 more advanced. Fig. 7 and 8, the farther progress of the germination.

The same seed sending out at the side an embryo a little more advanced, whose tapering and slightly arched gemlet, *a*, has escaped from the sheath here covered with fibres: the first radicle appears equalling the side shoots in magnitude.

The same seed in an advanced stage of vegetation, the sheath concealed among the fibres, the gemlet stretching out an inch in length, with the tip of the outer leaf slanting abruptly and pierced by the summits of the inner leaf.

Fig. 9.

Fig. 10.

Fig. 9. Another seed with the outer coat removed, after it has begun to germinate.

Fig. 10. The same, more advanced.

Another nut with the fibrous covering removed so as to bring into view the first radicle, *a*, and its sheath *b*, with the gemlet, *c*, and four radical shoots, *d*.

The same nut farther advanced in germination, showing the micropyle *e*, swelling from the supply of juices derived from the soil, and thence become dilated and soft. Its root-sheath sends out the first radicle, now branching, *a*, and four side shoots more, *d*. The sheath, *f*, with a cleft tip, sends out the gemlet from its bosom, whose outer leaf *g*, opened with a slanting tip, is pierced by the inner leaf still unopened.

Fig. 11. Fig. 12. Fig. 13.

11. The embryo taken from the germinating nut, its central part swelled into various twistings (*gyros*) *a*, which upon the pithy part of the albumen being liquified, break out into white teat-like processes, with depressions between, and closely applied, thence exhaust the nutritive juice absorbed into the inner parts, by means of the neck of the embryo, *b*, which is cylindrical, and placed within the shell of the seed. The first radicle *c*, is bluntly tapering towards the base, and thence sends off three branches, while the radiculoda swells up like a roundish scar. The sheath *d*, with the tip equally tapering, is pierced by the tapering gemlet.

12. The same things shown in a plant a little more advanced, where a part of the nut having been removed, the central part of the embryo *a*, is sent off twisted, and remaining within the horny albumen of the shell variegated with rays *b*. The last are explained by the letters of the preceding figure.

13. The same plantlet deprived of its nut, and seen in a side view.

14. A view of the internal structure of the parts of the germinating plantlet, cut through the middle. The central part of the embryo *a*, now moving in two directions, shows traces of twisting; since from these, the crown (*limites*) of the plant tending upwards and downwards, runs. This original division of the plant into a ground and a solaræan

Fig. 14.

part is denoted by a slender line, as if it were the centre of vegetation ; the salient point or primary nodule of the pith of the radicle *b*, whose rudiments or plumelet of the caudex and frond *c*, *d*, may be perceived budding from the centre and tending towards the ground. The side part is seen remaining entire on the root-sheath *e*, like twin tubercles, sending out two side rootlets, of which the upper *f*, partly open lengthwise, brings the pith into view ; but the other part or gemlet of the plumelet, is involved in the base of the coleoptilon *g*, and this itself consists of four imbricated sheaths ; the other part or the rudiments of the stem (*tigellæ*), the hinge of the future evolution, swells out above the dividing line *h*, in the form of a minute papilla. These figures, from one to fourteen, are all one third the size of nature.

Fig. 15.

15. Here we have the plantlet of fig. 9, increased in all its parts, open and bent down by a side cut through the evolved part of the embryo and its neck (*collum*), as far as (*perducta*) the inner part of the central portion. What is here indicated, will be evident enough without a diffuse detail. The body of the seed-lobe (*cotelydon*), seen to the sheath expanded downwards *a*, into the coleorhiza, upwards *b*, into the coleoptilon, is surrounded with the radicles, plumelets, and stem (*blastemati*) which the dividing line *c*, marks out, into radicle and plumelet. The same seed-lobe is confluent with the blastemati in the primary nodule, which we may, with Richard, term syngygia. The first leaves of the gemlet *d*, *e*, resembling hairs, are perforated at last by the central part *f*.

Fig. 16.

The plant in its second leaf.

MIGRATIONS OF THE CLIFF SWALLOW (*Hirundo fusca*, VIEILLOT).

BY J. J. AUDUBON, F. R. S., &C.*

[The following is the most direct evidence of the actual migration of swallows, which I have ever met with, though numerous incidental circumstances lead to the same conclusion.—EDITOR.]

ON the Ohio, a new port in Kentucky, by the 27th of July, the young cliff swallows were able to follow their parents. They all exhibited the white frontlet, and were scarcely distinguishable in any part of their plumage from the old birds. On the 1st of August, they all assembled near their nests, mounted about three hundred feet in the air, and at ten in the morning took their departure, flying in a loose body, in a direction due north. They returned the same evening about dusk, and continued these excursions, no doubt to exercise their powers, until the third, when, uttering a farewell cry, they shaped the same course at the same hour, and finally disappeared. Shortly after their departure, I was informed that several hundred of their nests were attached to the court house, at the mouth of the Kentucky. They had commenced building there in 1815. A person likewise informed me, that along the cliffs of the Kentucky, he had seen many *bunches*, as he termed them, of these nests attached to the naked shelving rocks overhanging that river.

Being extremely desirous of settling the long-agitated question respecting the migration, or supposed torpidity of swallows, I embraced every opportunity of examining their habits, carefully noted their arrival and disappearance, and recorded every fact connected with their history. After some years of constant observation and reflection, I remarked, that among all the species of migratory birds, those that remove farthest from us, depart sooner than those which retire only to the confines of the United States; and, by a parity of reasoning, those that remain later, return earlier in the spring. These remarks were confirmed, as I advanced towards the south-west on the approach of winter, for I found there numbers of warblers, thrushes, &c., in full feather and song. It was also remarked, that the *Hirundo viridis* of WILSON, (called by the French of Lower Louisiana, *le petit martinet à ventre blanc*,) remained about the city of New Orleans later than any other swallow. As immense numbers of them were seen during

*From "Ornithological Biography."

the month of November, I kept a diary of the temperature from the 3d of November until the arrival of the *Hirundo purpurea*. The following notes are taken from my journal, and, as I had excellent opportunities, during a residence of many years in that country, of visiting the lakes to which these swallows were said to resort, during the transient frosts, I present them with confidence:—

November 11.—Weather very sharp, with a heavy white frost. Swallows in abundance during the whole day. On inquiring of the inhabitants if this was a usual occurrence, I was answered in the affirmative by all the French and Spaniards. From this date to the 22d, the thermometer averaged 65°, the weather generally a drizzly fog. Swallows playing over the city in thousands.

November 25. Thermometer this morning at 30°. Ice in New Orleans a quarter of an inch thick. The swallows resorted to the Cypress Swamp, in the rear of the city. Thousands were flying in different flocks. Fourteen were killed at a single shot, all in perfect plumage, and very fat. The markets were abundantly supplied with these tender, juicy, and delicious birds. Saw swallows every day; but remarked them more plentiful the stronger the breeze blew from the sea.

December 20.—The weather continues much the same. Foggy and drizzly mist. The thermometer averaging 63°.

January 14.—The thermometer 42°. Weather continues the same. My little favourites constantly in view.

January 28.—Thermometer at 40°. Having seen the *Hirundo viridis* continually, and the *Hirundo purpurea*, or purple martin, beginning to appear, I discontinued my observations.

During the whole winter many of them retired to the holes about the houses; but the greater number resorted to the lakes, and spent the night among the branches of *Myrica cerifera*, the *cirier*, as it is termed by the French settlers.

About sunset they began to flock together, calling to each other for that purpose, and, in a short time, presented the appearance of clouds moving towards the lakes, or the mouth of the Mississippi, as the weather and wind suited. Their aerial evolutions, before they alight, are truly beautiful. They appear at first as if reconnoitring the place, when suddenly throwing themselves into a vortex of apparent confusion, they descend spirally with astonishing quickness, and very much resemble a *trombe*, or water-spout. When within a few feet of the *ciriers*, they disperse in all directions, and settle in a few moments.

Their twittering, and the motions of their wings, are, however, heard during the whole night. As soon as the day begins to dawn, they rise, flying low over the lakes, almost touching the water for some time, and then rising gradually move off in search of food, separating in different directions. The hunters, who resort to these places, destroy great numbers of them, by knocking them down with the light paddles used in propelling their canoes.

ON THE LUMINOSITY OF THE SEA.

BY BARON DE HUMBOLDT.*

IN the immense waters of the deep, animal life is very profusely distributed, and particularly gelatinous worms are so numerous, as to bestar the surface of the ocean and transform it into a sea of flames,—a spectacle which stamped upon my memory an ineffaceable impression, and always excited fresh astonishment, although it was renewed every night for months together. It may be seen in every zone; but those who have not witnessed it within the tropics, and above all upon the main ocean, can form but a very imperfect conception of the grandeur of the phenomenon; particularly if the spectator places himself in the shrouds of a ship of the line, during a fresh breeze, when she ploughs through the crests of the waves, and, at every roll her side is raised out of the water, enveloped in ruddy flames, which stream like lightning from the keel, and flash towards the surface of the sea. At other times, the dolphins, while sporting in the waters, trace out sparkling furrows in the midst of the waves.

Le Géntile and the elder Forster, explained the phenomena of these flames, by the electric friction of the waves against the hull of the ship, as it advances. But, according to our present knowledge of physical causes, this explanation is inadmissible.

There are few points of natural history which have been so long and so much disputed, as the illumination of the sea water. All that is known with any certainty, may be reduced to the following facts: there are several shining mollusca which, during their life, emit at pleasure a phosphoric light, which is rather pale and generally of a bluish colour; this is observed in the *Nereis noctiluca*, the *Medusa*

* Translated from the German.

pelagica, var B., and the *Monophora noctiluca*, which M. Bory St. Vincent has recently discovered during the expedition of Captain Baudin. The microscopic animals which Forster saw swimming in innumerable multitudes on the sea, near the Cape of Good Hope, are of this number, and still undefined. The luminosity of the sea is, sometimes, occasioned by these living lights; I say sometimes, as more frequently, although the animals increase in size, none can be perceived in the luminous water; yet whenever the waves strike against a hard substance and disperse in foam, particularly where the sea is greatly agitated, we perceive a gleam of light similar to lightning. The source of this phenomenon is probably the decomposed fibres of the dead mollusca, which abound in the depths of the sea; when this luminous water is strained through cloth of a close texture, these fibres are sometimes separated in the form of luminous dots. * When we bathed at night in the Gulf of Cariaco, near Cumana, some parts of our bodies remained luminous after coming out of the water, the luminous fibres attaching themselves to the skin. From the immense quantity of mollusca dispersed in all the seas of the torrid zone, it is not astonishing that the sea should emit light, although we cannot extract from it organic matter. The infinite division of the dead bodies of *Dagysæ* and *Medusæ*, may lead us to consider the entire sea as a gelatinous fluid, which consequently is luminous, has a nauseous taste, is unfit to be drunk by man, but is nourishing to many fish.

If a board be rubbed with a part of the *Medusa hysocella*, the part rubbed becomes again luminous whenever a dry finger is passed over it. During my voyage from the south to America, I sometimes placed a *medusa* on a pewter plate. If I struck the plate with other metal, the least vibration of the pewter was sufficient to make the animal shine. Now, I may ask, how did the shock and vibration act in this case? Did they immediately raise the temperature? Did they discover new surfaces? Or, did the shock elicit the phosphoric hydrogen gas, which, coming in contact with the oxygen of the atmosphere, or of the sea water, cause this appearance? The effect of a shock, which excites light, is most astonishing in a troubled sea, when the waves dash against each other in all directions. Between the Tropics, I have seen the sea luminous in all temperatures; but it was more so on the approach of a tempest, or, when the sky was lowering, stormy, or obscured. Cold and heat seem to have little influence on this phenomenon; for on the sandbanks of Newfoundland, the phosphorescence is often very strong

in the most rigorous period of winter. Sometimes, all circumstances being apparently equal, the phosphorescence is considerable during one night and scarcely visible the night following. Does the atmosphere favour the escape of light, or this combustion of phosphoric hydrogen? or do these differences depend on chance, which conducts the navigator into a sea more or less filled with the gelatine of mollusca? Perhaps these shining animalcules come to the surface of the sea only when the atmosphere is in a certain state. M. Bory St. Vincent asks, with apparent reason, why our swampy fresh waters, filled with *polypi*, are not luminous? It would seem that a peculiar mixture of organic particles is necessary to favour the production of light; the wood of the willow is more frequently phosphorescent than that of the oak. In England, they have succeeded in rendering salted water luminous, by throwing into it the brine of herrings. On most other points, galvanic experiments prove, that the luminous state of living animals depends on the irritation of the nerves. I have seen a dying fire-fly (*Elator noctilucus*) emit a strong light when I touched its anterior extremities with pewter or silver.

DR. G. JOHNSTON ON THE NATURAL SYSTEM IN BOTANY*.

ALL genuine field observers must be familiar with the name of Dr. George Johnston; for though we are not aware that he has published any separate work, besides the one now before us, he has contributed a considerable number of detached papers to various scientific periodicals, all characterised by accurate and acute personal observation, by a fine vein of excursive and tasteful literary illustration, and, what is still better, by sterling common sense, founded on induction, and uncontaminated by fashionable discipleship to schools and systems. In these respects, the Doctor seems to us to stand unique and alone among our British naturalists, as well as in his peculiar attention to neglected branches of his favourite science,—neglected, from the subjects being usually unobtrusive; and on this account it may not be improbable that they attracted his notice, as being in unison to his own retiring and unobtrusive character, which all who know him must

* Flora of Berwick-upon-Tweed, Vol. II. Cryptogamous Plants. By George Johnston, M. D., &c. 12mo. Edinburgh.

admire and highly respect. Our readers will perceive from the following extracts from his remarks on the cryptogamic class of Linnæus, that we have rather under-rated than over-rated our author's merits.

"The class has been said to be a truly natural one; but the word natural must here be used in a peculiar sense, for the materials of which it is composed are of the most heterogeneous character. The mushroom has surely no relation with the fern, nor the sea-weeds with the moss, yet they are all cryptogamous. Even of the orders into which the class has been divided, it is, perhaps, too much to say that they are natural. The dorsiferous ferns and the mosses are natural orders in the judgment of the vulgar as well as of the botanists; but if the latter will maintain that the fungi and algæ are natural groups, it is, I should think, at the expense of common sense, which revolts from the decision. These orders have no one character common to all their constituents; and plants which differ both in their structure, appearance, and mode of propagation, may be bound together by the fancy of botanists, and for their convenience, but they are not the less unnatural on that account. We are apt to deceive ourselves in this. Practice has made us familiar with a certain classification, and at last we find so little difficulty in referring any plant to its order and place, that we persuade ourselves we do so from some real resemblances between the plants, and consequently that there must be something natural in our systems. But were our first attempts remembered, how often they were abortive and erroneous, or grounded on guess rather than on an induction, I am confident it would be admitted that our present facility is solely the result of tutorage and practice, by which our associations have been made to run in an artificial channel. The practised botanist at once refers the moulds and the parasitical blights of corn to the mushroom tribe; but do any others perceive any semblance between mushroom and mould, or is there really anything in their structure to warrant such a collocation? So far is this from being the case, that were the latter to grow habitually under water, they would probably be considered as the members of another order, viz. that of the algæ; yet all algæ are not aquatic, nor, were it so, has the habitat ever professedly been allowed to influence our decision relative to affinities. Nor will the uninitiated believe that arrangement a natural one, which unites under one head the sea-tangle with its woody stem and fibrous frond, and the green scum which floats on the surface of stagnant fresh water, rootless, stemless, leafless, and scarcely organised.

"I offer these remarks, not because I disapprove of our present systems—that would be presumptuous in one who has none better to propose,—but because they are invented and adopted by authors who avowedly disdain the aid of artificial methods, and sneer contemptuously at their followers as the bigoted idolaters of Linnæus, and less wise. The local florist is too humble a character to be the object of these sneers; and regardless of a censure which there is no danger of encountering, I would gladly avail myself of any method in arranging this work, had it the sole recommendation of conducting the student easily to the names of the objects sought after, and that in preference to any natural system, if the latter were the more difficult of the two. No one will ever study with success or zeal the relations of objects until he knows something of their structure and qualities; and that method which communicates most easily the competent degree of knowledge for the purpose, is, in my opinion, the most proper for the beginner."—page 3.

There are few of our readers, we imagine, who are not blinded by theory, that will not agree with these well-put and judicious remarks, applicable as strongly, or even more so, to other parts of what is so preposterously termed the *Natural System** of Botany. One of the mischievous results of hunting after this chimæra of a *natural* system is the endless change of names applied to the same plant, according as botanists are pleased to suppose it belongs to this or that order or genus. In many instances, we meet with about half a dozen or more names given to the same species, an evil which Dr. Johnston has exemplified, and smartly ridiculed, in his account, of what we may call in English, Golden Crow silk (*Amphiconium aureum*, SPRENGEL; *Byssus aura*, LIGHTFOOT; *Conferva aurea*, DILLWYN; *Ceramium aureum*, HOOKER; *Ectocarpus aureus*, GREVILLE, &c. &c.)

"A little history of this alga," says Dr. Johnson, "from one having authority in these matters, might afford a useful lesson; but our attempt will, probably, subject us to the charge of ignorance, or of wilful blindness to the merits of our superiors. The plant was placed by Linnæus in his genus *Byssus*, which, we will admit, was made up out of somewhat heterogeneous materials, and could not, of course, be permitted to remain unaltered, when the fashion came to have all the members of a genus as like to one another as was Sebastian to Viola. And firstly, then, the subject of our story became a *Conferva*; a change of nomenclature which, as the consequence of some little additional acquaintance with its structure, was perhaps not to be found fault with; but scarcely was the name familiarised to us, until another change was deemed necessary to fit it for its proper place in the natural system. Could any thing be more natural than to arrange a terrestrial, slightly organised, filamentous production, among plants which are natives of the sea, live constantly submerged, and possess a comparatively high and complex structure? Certainly not; and so our late *Conferva* was located amongst the *Ceramia*! Botany, however, has been said to be a progressive science; hence, in another year or so, a *Ceramium* this plant was not, and it figured next as an *Ectocarpus*. How many months or days it retained this appellation I do not know; it certainly, in no long space of time, was degraded to a synonym, and the very euphonical *Trontepohlia* usurped the higher station, too soon, alas! to be displaced, or perhaps it ousted—for here my learning fails me—the little-less-euphonical *Amphiconium*. If the reader should ask a reason for my choice of this name, in preference to the others, I might be puzzled for an answer,—“a sad choice led him perplexed;” and if I have erred it may plead some palliation of the error, to remember, that, if a new name had been invented for the occasion, this little volume might have had a chance of being quoted in future by great botanists and in great books! But let not the reader suppose, that *Amphiconium* is the latest alias for this plant; the name was used in a celebrated system of vegetables published in the year 1827, and

* See some remarkable instances of this in "ALPHABET OF BOTANY," pages 115—118.

botany, in its nature a progressive science, has fully participated in that improvement of all things, physical, political, and moral, which has distinguished the intermediate years. And it is now discovered, what, indeed, was always too obvious, that all the above-mentioned mutations in its nomenclature, have not only not added one iota to our knowledge of the plant, either in structure or its relations to other plants, but have led to error and confusion. For in the "natural system" most approved of at present, this alga finds no place of rest among the Algæ, and is said to be a sort of mould, and figures away as an Azonium, a genus which stands next to, and differs little from, the Linnæan genus Byssus!—The preceding sketch may appear, to the general reader, to be drawn up in the spirit of ridicule; but I am sorry to say that it is a true history, and only sins through defect, for at least one other synonym (*Dematium*) might have been added to the useless catalogue. Herschel has asserted, that, "there is no science in which the evils resulting from a rage for nomenclature have been felt to such an extent as in mineralogy," but he would have divided the censure, had he bestowed a passing thought on the labours of cryptogamic botanists."—Vol. II. p. 245.

We conclude this brief notice, by putting it to the good sense of the author, whether the quaint and fanciful, though common, title of "FLORA" can possibly apply, in the most remote manner, to the half of his very interesting work.

ON THE CIRCULATION OF THE FLUIDS OF PLANTS.

BY PROFESSOR DE CANDOLLE, OF GENEVA.

THE ascending sap rises towards the foliaceous parts, charged essentially, setting aside the earthy matter, with carbonic acid, or with bodies capable of being converted into carbonic acid; it loses by exhalation a very considerable quantity of the water which it contained, and in consequence of the decomposition of carbonic acid gas it gives off a large quantity of oxygen, and is reduced to simple carbon.

This sap then exists in a proportion as to its elements very analogous gum—that is to say, of water and carbon.

This gum, dissolved in the water of vegetation, must run by the intercellular passages, both in the bark and wood, when the causes which determine the rapid ascent of the sap during the day cease to operate; this is what constitutes the descending sap. The sap which runs down along the bark, not meeting with the ascending current, passes without obstruction to the root.

The sap which runs down through the woody substances meets the ascending sap, which, during the day at least, is carried up with force; these two mixing with the water, which is exuded from the wood by

the rays and medullary sheath, serve to nourish and develop the cambium into a ligneous and cortical zone.

This gum, dissolved in water in its descent by the bark, is able to assist on one side the secretions which are forming there, and on the other to supply nutriment to the cambium, or the partially-organised juice which contains the rudiment of the new zones. The gummy matter, which also descends through the alburnum, serves likewise to nourish the cambium, or the new woody zone; this is the gum which as it descends by the bark is stopped in its course by an annular section, whereby it is compelled to undergo the action of the cellules for its conversion into ligneous matter for the purpose of nourishing the bark and developing in it a protuberance formed on the trunks of woody vegetables (*bourrelet*).

Throughout the whole of its course the gummy matter can be absorbed by the cellules which are not filled and which retain their vital action; thus all the cellules of the alburnum and of the liber—like so many hygroscopic bladders—absorb the gummy water which surrounds them; each of them elaborates it by its own peculiar action, and can thus, according to its nature, transform the gummy matter into fecula, sugar, or lignine with so much the greater facility, as the whole four substances scarcely differ; and we often in our laboratories have a proof that they can be converted into one another. This is especially the case in the experiments on the conversion of lignine and starch into hydrated sugar by the action of sulphuric acid. The gum and the sugar appears to be, in this series of decompositions, the two transitory conditions, and their extreme solubility in water exposes them constantly to be drawn away towards the most energetic organs.

The fecula and the lignine are of a more permanent nature; the fecula settles itself as though it were stored in the organs which must ultimately be developed; it retains the soluble matter, which is protected from the water by the insoluble covering that surrounds it.

In short, the lignine is deposited in those particular organs which have reached the complete stage of their development, or in the tissues themselves of the vegetable membranes, nor does it appear to be of a nature fitted to be transferred again to the other parts.

[It would be presumptuous in me to assert that the above is erroneous; but I owe it to my readers to state, that however high De Candolle ranks in genuine science, he has also, with a fatuity not uncommon in men of distinguished genius, strongly advocated all the absurd fancies of vegetable metamorphoses, and even piques himself upon being in a great measure the author of these fancies.—EDITOR.]

NATURAL HISTORY OF THE BIRDS OF AFRICA.

TRANSLATED FROM THE FRENCH OF LE VAILLANT.

THE VOCIFEROUS EAGLE (*Haliastur vocifer*, SAVIGNY).

Le Vocifer, *Levaill.* Ois. de l'Afrique, i. p. 17, pl. 4; Falcon Vocifer, *Lath.*, Ind. Orn. Sup. p. vi.; *Daud.* ii. p. 64; *Shaw's Zool.* vii. p. 94; Aigle nonette, *Gaby*, Voy. en Nigritie: Piscivorous Eagle, *Lath.* Gen. Syn. Sup. ii. p. 33; *Id.* Gen. Hist. i. p. 158; *Haliastur vocifer*, *Cuv.* Règne Animal, i. 327, note; *Lesson*, Manuel, i. 85; *Drapiez*, Dict. Classique, i. 285.

THIS is beyond all question one of the most beautiful species of the eagles, being remarkable for the fineness of its plumage, the elegance of its form, and its large size, which is equal to that of the osprey. It is also remarkable for the whiteness of the fore part of the body and of the tail, and also for the mixture of reddish brown and black, which contrasts so well with the rest. The feathers of the head, the scapularies, and the tail, are also white, with brown on the sides, while those of the breast display scattered longitudinal spots of a blackish brown colour: the rest of the plumage being of a nut-brown, dashed (*flambé*) with black. The smaller wing-coverts are of a pale rust-colour; the scapularies near them are mixed with black, and show very prettily

under the white of the upper ones. The wing feathers are black, and are here and there finely marbled with red and white on their exterior plumelets. The lower part of the back, and the upper tail coverts, are black, with a mixture of dull white. Between the beak and the eye the skin is nearly naked, being only covered by a few hairs; its colour is yellowish, as also are the base of the bill, the shanks and feet. The iris is reddish brown; the feathers of the thigh descend half an inch over the shank in front; the claws and the beak are horn-blue; the craw, which is slightly perceptible, is covered by long curly down. The tail is slightly rounded; that is, the outer quills are the shortest, while the others are successively longer as far as the two middle ones, which are the longest of all, and of equal length.

The female has much less black in her plumage, the white less pure, and the reddish colour less deep. She is larger than the male.

The wings, when folded, reach to the extremity of the tail, and when extended, measure nearly eight feet across.

The vociferous eagle, in those parts which subsequently become white, is, when young, of an ashy-grey colour. His tail is then entirely of this colour, but becomes white with age. At the second moulting, there is an equal portion of white and grey; some of the tail feathers are then absolutely white, others brownish-grey, and some partake of both these colours. It is not till the third year, that the birds assume their elegant plumage, such as may be observed in the coloured plate, [*of the original work*] which represents the female.

The vociferous eagle is found on the sea coasts, and, for the most part, at the mouths of the large rivers, on the eastern and western shores of Africa. Wherever I have been I never met with it in the inland countries, except on the banks of the Orange, or Large River, which is plentifully stocked with fish, this forming its principal food. It chiefly frequents those places which are visited by the tide, and the rivers of Africa being generally only torrents which descend from the mountains, it is easy to conceive that fish must be as scarce in them as it is abundant on the coast, and at the mouths of rivers.

The vociferous eagle, like the osprey or baldbuzzard, darts with great velocity from a height in the air, upon the fish which it perceives. I have often had an opportunity of seeing this eagle precipitate himself with much noise on the surface of the water, immerge his whole body, and rise up, holding a large fish in his talons. Perched on rocks, or piles of uprooted trees, which have been washed down by the floods, he devours his prey; here he makes his regular and permanent esta-

blishment for fishing. That he habitually feeds upon his fish in the same places, is not difficult to perceive, by the masses of fish heads and bones which are there met with. Among these remains I have noticed the bones of gazelles, which proves, that he makes them his prey likewise. He disdains, it would appear, to make war on birds; for I never found any remains of them in the heaps which I have just mentioned; but I have often distinguished those of a species of lizard, which is very common in several rivers of Africa.

I have taken the name of vociferous eagle from the habit which these eagles have of uttering loud and frequent cries, in different tones, and of answering each other from a very great distance, when perched upon rocks which border on the sea, or upon the trunk of a tree, lying on the sand-bank of a river. While carrying on this sort of conversation, they make extraordinary motions with the neck and head, showing that it costs them very great exertion. These cries always discover them; but it is, notwithstanding, very difficult to get near enough to shoot them. In order to do this, I was obliged to have a hole dug, and covered over with a mat, over which I directed some earth to be strewed; and in this ambuscade I passed three whole days, close to the trunk of a tree, upon which a pair of these eagles used generally to come to devour their prey. They deserted the spot as long as the earth which was placed over me had a fresh appearance, and different from that which is dried by the heat of the sun. At the expiration of the third day, I shot the female, and as may be seen in the history of my travels, it nearly cost me my life to go and seek her on the other side of the Queur-Boom on which she had fallen. I resolved to pass the river during the high tide water, and was not able to swim over it; and but for the stratagem which I adopted I should probably have quitted Africa without enjoying the pleasure of possessing a bird of such rare beauty. The male, in search of his female, was killed near the camp, as he was devouring the remains of a buffalo, which I had directed to be thrown there for the purpose of attracting carnivorous birds.

[The original narrative of this interesting exploit, runs thus.] "The wish to procure a specimen of this eagle, more than once put my patience to the proof, and had like to have cost me very dear. Every day, I saw the bird hovering over my camp, but at such a distance, that it could not be reached by a ball. I made a person always keep watch, and never lose sight of it, and I constantly observed its motions. Having one day crossed the Queur Boom, while walking along the bank opposite to that on which my camp stood, I perceived a number

of fragments of large fishes, and the bones and remains of small antelopes, strewed on the ground, near the rotten trunk of an old tree. I immediately concluded that this must be the place where two of these eagles had established their fishery, or at least their ordinary haunt, and it was not long before I saw them soaring round in the air, at a great height. Without loss of time I concealed myself in a thick bush; but this stratagem was not executed with sufficient alertness to deceive the piercing eyes of the eagles. They doubtless observed me, for they did not descend. Next day, and for several days successively, I returned to my station; at break of day, I posted myself in the thicket, but all my vigilance was ineffectual. This business was very laborious, because to go and return I was obliged to pass the river twice; and at these times it was necessary to wait for the ebbing of the tide.

“Tired out at last, as I wasted time without being able to succeed, I took two Hottentots with me, and crossing the river in the middle of the night, conducted them to a spot near the trunk of an old tree, where I made them dig a hole three feet wide and four deep. When it was made, I placed myself in it; and having ordered them to cover the hole over my head with a few sticks, a piece of a mat, and some earth, I reserved only a small opening, sufficiently large for me to put my fowling piece through it, and to see the old trunk. I then desired my people to return to the camp. Day approached, but the cruel birds did not make their appearance. The earth seeming to be newly thrown up, had no doubt rendered them suspicious; and this was a circumstance of which I had not before thought. At the close of the night, I came forth from my hole, and went to pass a few hours at my camp, after which I went and interred myself as before. I continued this expedient for two days successively, with much patience; and during that interval, the sun had dried the earth, and made it all of one colour. About the middle of the third day of my anxious watch, I observed the female soaring above the tree, upon which she soon alighted, with a very large fish in her claws. I instantly discharged my piece, and had the pleasure of seeing her flap her wings and fall; but before I could disengage myself from my mat, and the earth which covered me, she so far recovered her strength as to fly a little; and, brushing the surface of the water, reached the other side, where she expired.

“The joy that I felt on finding myself in possession of this bird was so great, that, without observing that the tide was up, I threw myself into the water with my fowling-piece on my shoulder, and I was not

sensible of my imprudence till, in the middle of the river, I found myself up to the chin. To add to my misfortune, I was alone, and entirely unacquainted with the art of swimming. Had I attempted to return, the rapidity of the current would have undoubtedly thrown me down. Without knowing what was to become of me, I pursued my way, as it were, mechanically; and I had the good fortune to reach the opposite bank: an inch more would have infallibly drowned me. I rushed upon the eagle; and the pleasure of securing my prey, soon effaced every remembrance of fear and danger. I was, however, obliged to pull off all my clothes, and to spread them out to dry; in the mean time I amused myself in examining my prize; and when my clothes were perfectly dry, I returned without any danger to my habitation. When I arrived, I was told that several of my people were gone in pursuit of a buffalo, which they had met with; and, towards evening, I saw them return loaded with the limbs of the animal, which they had cut up on the spot. Next morning very early, I did not neglect to send in search of the fragments, which they had left to attract birds of prey. This method procured me the male eagle; which differed from the female in nothing but the general distinction of 'carnivorous birds,—that of being a third smaller."

The vociferous eagle is very suspicious, and difficult to be approached; as the sportsman is in view it mounts on the wing and removes to a considerable distance. It ascends to a prodigious height in the air; its flight has a peculiar grace, during which the male frequently utters sounds that may be rendered by

Ca--hou--cou--cou

The syllables, pronounced with slowness, the second sung some tones higher than the first, and the remaining two successively in a lower tone, will imitate very perfectly this bird's call-note of pleasure. It must be remarked, that the vociferous eagle never indulges in these call-notes or song, but when he is sailing through the air; and then not when he is hovering, but when he accompanies his flight with a singular movement of the wings, as if with a sort of complaisance, turning them underneath his body, until they nearly touch. There may be observed, in this movement, which accompanies his voice during flight, an analogy with the preceding remarks on that which accompanies his cry, when he is perched, and which, in my opinion, shows the necessity of increased effort in this bird, whose voice is extraordinary and exceedingly remarkable; inasmuch as it is very sono-

rous, and contains a certain harmony, which is pleasing, and flatters the ear, without any mixture of that disagreeable, piercing, shrill, and plaintive tone, which is peculiar to the generality of birds of prey.

The male and female do not separate, and with the best understanding share whatever either takes in fishing or hunting. They construct their eyry on the tops of trees or among rocks: it is made precisely in the same manner as the griffard's, except that it is furnished on the inside with soft materials, such as feathers, wool, and the like, upon which two or three eggs, of a perfect whiteness, and of a form resembling the turkey's, but larger, are deposited.

The colonists of the Cape of Good Hope, call this bird the great fisher (*groot-vis-vanger*), or white fisher (*witte-vis-vanger*).

I heard the vociferous eagle but once, in the vicinity of False Bay; so that this bird appears very seldom in the neighbourhood of the Cape. About sixty or eighty leagues from this, I began to see it commonly, but the place in which it is in the greatest abundance, is Lagoa Bay. It seems, also, that the vociferous eagle is found at Nigritia; for we may say the same of it, as Gaby relates of an eagle, which he mentions under the name of Nonette. "It has," he says, "the colour of a Carmelite's habit, with his white scapulary." This short description is certainly much more suitable to the vociferous eagle, than to the baldbuzzard of Europe, to which Buffon has injudiciously applied it.

ON THE DIFFUSION OF THE SEEDS OF IVY.

BY RURICOLA.

My attention has been recently drawn to a large number of seeds, of an oval shape, and exceeding the size of hemp-seed, scattered under the bay trees in my garden. My first supposition was, that they were the produce of the bay trees, the seeds of which, however, are very different both in shape and size. On further observation, I perceived the same seeds, but not so plentifully, under other trees, and at last, on opening some of the ivy-berries, which abound in the garden, but at some distance from the trees in question, I was satisfied of the quarter whence they came; each berry containing four seeds, such as I have described above. I may add, that some small plants of ivy were found also to be growing here and there among the seeds, two or three inches high. The garden is the haunt of many of the smaller birds, especially house-sparrows, hedge-chanters, red-breasts, chaffinches, blue tits, and occasionally

one or two black-birds and song-thrushes. Some of these birds must have gathered the ivy-berries, it would appear, from the garden walls, and carried them to the bay and other trees at some distance, and in breaking open the berries for their food, have shed some of their contents on the ground beneath, so as to produce the appearance, which I do not remember to have seen remarked by writers on such subjects. Ivy-berries, I believe, are a favourite food with certain birds; and it is remarked by some naturalists, I think the Rev. Gilbert White, in his delightful "Natural History of Selborne," that they afford a proof of the bountiful care of Providence, inasmuch as they supply birds with food through the winter and far into the spring, in consequence of their not being injured by the frost.

It is our custom to throw a few crumbs out of window for the birds every morning after breakfast; and it is pleasing to observe, not only the actions of the birds whilst they are picking up the crumbs, but how they previously hover about the breakfast-room window, and perch on the neighbouring boughs, evidently *expecting* their morning meal.

I do not know how far the notice of such trifling incidents as the preceding, may fall within the scope of your Magazine; but as you appear to invite communications containing "the slightest hints" derived from personal observation, on the productions of nature, I venture to trouble you with these; and I hope that your undertaking will tend to the encouragement of a fondness for natural history.

*Bath, 10th Feb., 1833.**

SIR WILLIAM JARDINE, ON HUMMING BIRDS †.

THE Count de Buffon, whom it is the fashion among certain closet classifiers to try to ridicule because his brilliant sun-light outshines their farthing candles, has given an eloquent sketch of the character

* Any other communication from Ruricola will be highly acceptable.—EDITOR.

† The Naturalist's Library. Ornithology. Vol. I. Humming Birds. By Sir William Jardine, Bart., F.R.S. & E. F.L.S., &c. 12mo, pp 147. 35 coloured plates, and portrait. Lizars, and Stirling & Kenney, Edinburgh. 1833.

of the pretty little birds chosen by Sir William Jardine as the leading subject of his NATURALIST'S LIBRARY. "Of all animated beings," says the Count, "this is the most elegant in form and most splendid in colouring. Precious stones and metals artificially polished can never be compared to this jewel of nature, who has placed it in the order of birds at the bottom of the scale of magnitude—*maximè miranda in minimis*—while all the gifts, which are only shared among others—nimbleness, rapidity, sprightliness, grace, and rich decoration—have been profusely bestowed upon this little favourite. The emerald, the ruby, and the topaz, sparkle in its plumage, which is never soiled by the dust of the ground, for its whole life being aerial, it rarely alights on the turf. It dwells in the air, and flitting from flower to flower it seems to be itself a flower in freshness and splendour; it feeds on their nectar and resides in climates where they blow in perpetual succession; for the few which migrate out of the tropics during summer, make but a transitory stay in the temperate zones. They follow the course of the sun, advancing or retiring with him, and flying on the wings of the zephyrs, wanton in eternal spring."

Such then are the birds which Mr. Lizars has, in the volume before us, undertaken to exhibit, with his well-known skill, in their natural colours; and Sir William Jardine, to characterise, by descriptive distinctions. The engravings are the most extraordinary feature of the book, when we consider the price; for, besides a beautifully-finished nest as a vignette to the title-page, there are thirty-four plates of birds, as scientifically accurate in the details, as rich and exquisite in colouring. Besides these there are a number of cuts, none of which, however, are equal in execution to the rest of the work; and a portrait of Linnæus, so admirable in character and so delicately finished, as to be well worth the whole price at which the volume is published. It represents the extraordinary man who has done so much good and so much injury to our science, at the age of twenty-five, in his Lapland dress, with plant-boxes and other travelling apparatus hung at his girdle, and holding in his hand a specimen of *Linnæa borealis*. The countenance exhibits little of the enthusiasm which must have inspired the young botanist to wander over Lapland in search of plants, but is sedate and contemplative, as if his thoughts were absorbed in some engrossing idea—the idea, no doubt, of indexing the whole productions of creation, taking for his starting point the pretty plant which he holds in his hand.

The memoir of Linnæus, with which Sir William Jardine has prefaced

the work, is excellent in its way; we mean it is well and elegantly written, and exhibits in a striking manner the characteristic enthusiasm of Linnæus, which is not apparent in the engraved portrait; but it is not so much to our taste as Sir William's Life of Wilson, probably because Wilson is a greater favourite with us than Linnæus. We are glad to perceive that the author has not followed certain pedantic English writers, in changing Linnæus into *Linné*; but we do not exactly see the propriety of the memoir being coupled with humming birds, which Linnæus did little to illustrate. M. Audebert ought in justice to have had the preference. This consideration, however, is of little weight, and we are exceedingly pleased both with the engraved and with the written portrait of the distinguished Swede, which are well worth six shillings, independently of the thirty-five coloured plates.

We shall now advert to the humming birds, and passing over two paragraphs about *representation*, as theoretical notions which we consider fanciful, we come upon the following sketch, which we request the reader to compare with what we have quoted above from Buffon, expressly with this view, and we think he will agree with us in thinking our author not inferior in eloquence, while he is certainly superior to the Count in correct taste.

"The beautiful and delicate beings," says Sir William, "to which we must now particularly direct the attention of our readers, appear to have excited the admiration of their discoverers, and, indeed, of every one who has observed them, either revelling in their native glades, or at rest in the mere artificial display of our museums, by the spirited proportions of their form, and the dazzling splendour of their plumage,

'——Delicate and beautiful,

'Thick without burden, close as fishes' scales.'

"The nation of the Aztecs call their capital Tzinzunzan, from the number of humming birds in its vicinity, with which the statues of their gods are adorned; and the Indians of Patzquara are still famous for this art. They compose figures of saints with the feathers of the colibri, which are remarkable for the delicacy of the execution and the brilliancy of the colours.

"The ancient Mexicans used their feathers for superb mantles in the time of Montezuma, and the pictures so much extolled by Cortes were embroidered with their skins; the Indian could appreciate their loveliness, delighting to adorn his bride with gems and jewellery plucked from the starry frontlets of these beauteous forms. Every epithet which the ingenuity of language could invent has been employed to depict the richness of their colouring; the lustre of the topaz, of emeralds and rubies, have been compared with them, and applied in their names. 'The hue of roses steeped in liquid fire,' and even the 'cheveux de l'astre du jour' of the imaginative Buffon, fall short of their versatile tints. Let us inquire, however, whether an exterior of 'gorgeous

plumery' is all which they possess, and if there is no beautiful adaptation of structure to supply the wants of so frail a tenement?

"These birds are nearly confined to the tropical portions of the New World, and, according to our best information, that great archipelago of islands between Florida and the mouths of the Orinoco, with the mainland of the southern continent, until it passes the Tropic of Capricorn, literally swarms with them. In the wild and uncultivated parts, they inhabit those forests of magnificent timber, overhung with lianas and the superb tribe of bignonaceæ, the huge trunks clothed with a rich drapery of parasites, whose blossoms only give way in beauty to the sparkling tints of their airy tenants; but since the cultivation of various parts of the country they abound in the gardens, and seem to delight in society, become familiar, and destitute of fear, hovering over one side of a shrub, while the fruit or flowers is plucked from that opposite. There appears to exist great familiarity in their manners. They are of a lively and active disposition, almost constantly on the wing, and performing all their motions with great rapidity: their flight is in darts, and it is at this time, in a brilliant sun, that the variations of their plumage are displayed with the greatest advantage.

' Each rapid movement gives a different dye;
Like scales of burnished gold they dazzling show,
Now sink to shade—now like a furnace glow.'

"But when performing a lengthened flight, as during migration, they pass through the air in long undulations, raising themselves for some distance, and then falling in a curve. When about to feed, or in search of a favourite flower, they hover stationary, surveying all around, and suddenly dart off to the object. 'I have often stopped,' says Wilson, 'with pleasure, to observe their manœuvres among the blossoms of a trumpet flower. When arrived before a thicket of these, that are in full bloom, he poises or suspends himself on wing for the space of two or three seconds so steadily, that his wings become invisible, or only like a mist.' And Bullock says, 'they remain suspended in the air in a space barely sufficient for them to move their wings; and the humming noise proceeds entirely from the surprising velocity with which they perform that motion, by which they will keep their bodies in the air, apparently motionless, for hours together.' An older writer, Fermin, a Surinam physician, compares this action to the balancing of the beautiful bee-like flies on foetid waters; perhaps it may be also likened to the motions of a large hawk-moth, before alighting on a flower.

"They seldom alight upon the ground, but perch easily on branches. The ruby-throated humming-bird settles on twigs and branches, where they move sideways in prettily measured steps, frequently opening and closing their wings, pluming, stroking, and arranging the whole of their apparel with neatness and activity. They are particularly fond of spreading one wing at a time, and passing each of the quill-feathers through their bill in its whole length, when, if the sun is shining, the wing thus plumed is rendered extremely transparent and light." (AUDUBON.)—page 55.

Every reader must agree with us that this is beautifully written, full of correct information, such as none but a genuine naturalist could have given, and such as none but a writer of fine literary taste could have penned. The style, it may be remarked, has a character of its own, quite different, though of the same delightful school as White,

Knapp, and the Wilsons, in the same way as we would say that Claude Lorraine, Vernet, and Cuyp, are of the same school in landscape painting; though each of these distinguished painters is characterised by personal peculiarities, as is uniformly the case with original genius in every department of literature, art, or science. We are half tempted to extract largely from the introductory remarks; but, considering our limits, we must for the present remain contented with another, which we select on account of having remarked in a previous page, that Sir William did not pay much attention to physiology. The following quotation will show that he can, when he so chooses, give excellent illustrations of this interesting branch of science:—

“When we examine attentively,” he says, “the structure of any bird, we soon come to the conclusion that the most important parts of its outward form are those organs which serve for the means of transporting it from place to place. On presenting a humming-bird to the most common observer, the first exclamation generally is, ‘What a beautiful little creature it is!’ The second, ‘What large wings it has!’ Such, indeed, is the case, and in most cases, the size of their wings and strength of their quills, are entirely out of proportion to our ideas of symmetry in a creature clothed with feathers; but, upon comparing them with its necessities, and the other parts of its frame, their utility and design become obvious. All their other parts, not called into action during flight, are very slender, almost frail; their tarsi short, and feet small, so as not to incommode during flight, while they point out an inability for any long support or assistance in procuring sustenance, by climbing or hanging in various positions as we see employed by the titmouse, and many of the slender-billed warblers. Their food is derived from the sweet nectar of flowers, or from insects which must either be taken in a rapid flight, or withdrawn from the deep tube, or cup-shaped recesses of blossoms which grow and hang in every direction, and which it would be impossible to reach, unless by suspension above or under. Another great necessity for possessing organs of such power, is to enable them to pass in safety through the migrations, and the long flights which are sometimes necessary for their preservation, and during which they have often to withstand a passing gale, showers, or even the rigour of a snow storm. The beautiful climes where we have seen they inhabit, are at seasons subject to perpetual rains, which drench and almost inundate their abodes, or to hurricanes that in a few minutes leave a wreck of all that was before so magnificent and luxuriant; and they pass by these means, before the dangerous season, to districts where the reparation of a previous wreck is proceeding with all the magical rapidity of tropical vegetation.

“The form of the wings is very nearly similar to those of the swift (*Cypselus*, ILLIGER) whose power of flight every one is acquainted with. They in general exceed the tail in length, unless when that member is extraordinarily developed. The exterior outline of the wing is much curved, and the first quill is always longest, the others gradually shortening. The secondaries are very short, and the lesser wing-coverts occupy very little room. The plumelets of the quills are quite narrow and compact, firmly united together, forming a substance, and which, by presenting resistance to the air when struck, and allowing no part to pass through the webs, as in

nocturnal feeding-birds, produces that humming noise which is heard during their suspension, and whence their common name has been applied. In all, the shafts of the quills are remarkably strong and elastic, but in a few species, known under the denomination of sickle or sabre-winged humming-birds, and forming the genus *Campylopterus* of Swainson, they are developed to an extraordinary degree at the base, and nearly equal the breadth of the plume.

"The birds composing this division are large, but not the largest of the family; and our present information of their habits does not point out any peculiarity to which this development is adapted. It besides, is wanting, or in a great measure reduced, in the females of some of them. Mr. Swainson has figured two birds, which seem almost identical, except in the absence of the broad shaft in the one, and in specimens of the sabre wing, which we have figured at Plate xxxiv, the shafts of the female bird were in breadth only about one half.

"The organ of next importance, as directing the flight, is the tail. This is always powerful, and presents every modification which we find in those birds endowed with powerful or rapid flight, and will be of use to the systematist in directing the forms which present themselves in analogy with the other families of the feathered race. In one species, (see Plate xxvii) it presents a very curious anomaly among birds, by being composed of only six feathers. This species is rare, and I have had no opportunity for an examination; but the testimonies of Temminck and Lesson show that it is not an accidental variation, but that it remains constant in all the birds which they have examined."—page. 67.

These extracts, we think, will fully prove the opinion we have expressed of this beautiful and surprisingly cheap volume; and we shall only add, that there are but few allusions to the objectionable theories of the Lamarekian school, which we regret to find so frequent in Sir William's notes on Wilson.

The chief objection, indeed, which we have to this excellent volume, is the introduction, already mentioned, of the doctrine of *Representation*; by which it is maintained, for example, that the fire-fly of the West Indies is the real representative of our glow-worm. If this representation be, as it is alleged, so universal, we surely have a right to ask what European representative we have of the humming-birds, the subject of this volume? No bird will answer to this; and our humble bees are represented in America, not by humming-birds, but other species of bees. The whole doctrine, indeed, is as fanciful as that of Buffon, which maintained the degeneracy of American animals, on account of the climate.

ACCOUNT OF AN ALPINE SWIFT, SHOT IN NORFOLK.

BY THE REV. THOMAS FULCHER.

This engraving was reduced from the exquisite drawing of the rev. author.

ON the 14th of October, 1831, a bird-stuffer, then living in the adjoining parish, showed me the skin of a species of swift which was shot in this village in the previous month of September, and was warm and bleeding when taken to him. I afterwards directed him to stuff it for me; and the specimen is now in my possession, but not in a very good state. In measuring it, some allowance must be made for the shrivelled state of the skin. The length, from the tip of the bill to the end of the tail, is rather more than eight inches; breadth across the wings twenty inches; it is much more bulky than the common swift (*Cypselus murarius* TEMMINCK), and must have weighed, at least, as much again. Bill nearly two-fifths of an inch long, measured from the base of the upper mandible, curved and black; the colour of the irides unknown, but I believe it was dusky. The head, back of the neck, back, wings, and tail grey brown, and the edges of the feathers of a paler colour. Round the breast is a collar of grey brown. The throat, lower part of the breast, and the body to the commencement of the under tail-coverts white; the sides dusky, with a mixture of dull white; under surface of the wings and tail, and the under tail-coverts dusky. The quill-feathers are darker than the back, and remarkably strong and pointed; the quills dusky white. The back, wings, and tail have copper-coloured and green reflections when viewed in particular lights. The tail is more than three inches long, forked, and consists of exactly ten feathers. Legs short and strong, flesh coloured, and feathered to the toes, which are all placed forward, as in the common swift; the claws strong and brownish black.

When I first looked at the bird I was puzzled to know what it was; but it soon struck me that it might be the bird referred to by White (Letters 40 and 61) under the name of *Hirundo melba*, or great

white-bellied swift of Gibraltar; and on receiving from my friend—before alluded to—the description given by Latham in his Synopsis of that bird, I had no further doubt on the subject. The Quarterly Review, in an article on American Ornithology, mentions a specimen having been shot off the coast of Ireland; but I am not at present aware that naturalists have noticed any other as having been seen in the British Isles. I find no notice of it in your valuable edition of Montagu. Latham gives the length eight inches and a half, and weight two ounces five drachms. He says the species is not numerous; that it builds in the holes of the rocks in the mountainous parts of Spain, and is found at Gibraltar, and in Savoy, &c.

Old Buckenham, near Attleboro', Norfolk.

19th Feb., 1833.

THE ALPINE SWIFT. (*Cypselus Alpinus*, TEMMINCK.)

Hirundo Melba, Linn. i. 345. Gmelin, i. 1023. Germ. iv. tab. 413. Faun. Arag. 90. Latham, Ind. ii. 582. Gen. Syn. ii. 586. Gen. Hist. vii. 323. Vieillot, Gall. No. 121. Baron Cuvier, Règne Anim. i. 395. Hirundo Alpina, Scopoli, Ann. i. 166. No. 252. Bechstein, Nat. Deutsch. iii. 935. Hirundo major Hispanica, Brisson, ii. 504. Klein, 83, iv. 2. Micropus Alpinus, Meyer, Tasschenb. Deutsch. i. 282. Cypselus Alpinus, Temminck, Manuel, ii. 423. Lesson, Manuel, i. 416. Ranzani, iii. 4, 195. Le Grand Martinet à ventre blanc, Buffon, vi. 660. Drapez, Dict. Class. x. 236. Cipselo Alpino, Ranz. l. c. Rondine maggiore, Storia Nat. Uccelli, iv. tab. 413. Alpen Schwalbe, Meyer, Vög. Deutsch. i. 8. Greatest Martin or Swift, Edwards, Glean. tab. 27. White-bellied Swift, Shaw, Zool. x. 74.

ALL the upper parts of the body are of a uniform greyish brown, having in some lights a metallic gloss or iridescence of greenish or reddish, more particularly on the wings and tail, which are darker. The throat, breast, and belly are white, but there is a band across the breast of brownish grey, intermixed with black. The iris is brown, the bill is blackish; the legs carnation red, covered with long brownish feathers on the fore and inside. The tail is forked like the common swift, and the wings are likewise very long. The length is about nine inches, the bill half an inch, the breadth of the expanded wings twenty inches, and weight is about two ounces and a half.

Ranzani says it is usually first seen about Modena on the 12th of March, and in Savoy at the beginning of April; and Mr. White observed them arrive at Gibraltar about the 25th of March. It is common indeed, in most of the mountainous countries in the south of Europe, building in rocks a nest composed of straw, moss, dried leaves, and the like, simply interlaced according to Spallanzani, and without any glutinous material to bind it. On the contrary, Meyer, Wolf, and

Delamotte say they have found in the nest a transparent viscous material, probably similar to that mentioned by Wilson in his account of the nest of the American swift (*Cypselus pelagicus*, LATHAM). It has two broods each summer, the first consisting of three to four young, the second seldom more than two. The eggs are longish and white, and the hatching is performed in three weeks. It remains in the high mountains near Modena, according to Ranzani, up till October, but the following account, from the observations made at Gibraltar by Mr. White, renders this, I think, doubtful.

"This," he says, "as the common swift, is larger there than authors mention, being nine inches and a half long, twenty two and a half broad, and weighing three ounces and seven eighths. They arrive often as early as the 25th of March, never sooner; first to be seen about the highest summit, and then proceed further, and several successions seem to come before they stop there; often in the beginning of the season, fly so high as to be out of sight, and known only by their being heard; during the west winds, always remain on the summit, seen only near the town in a levant wind, on the sudden rising of which they swarm over the whole town among the common swifts; but after breeding time, although the levant winds blow, they do not come to the town: hence it may be supposed that the reason for their frequenting the town is to collect materials for their nests, as all those shot in the town have had their mouths full of feathers, hair, wool, and such like. The nest is composed in the same loose manner as in the other swift; the eggs are five or six in number, and the young fly in June. They depart usually the first week in August, and great numbers from other parts also congregate here, till the first week in September. The voice is peculiar; a shrill, jarring, tremulous scream while on the wing, very distinct from the common swift, not unlike the cry of some eagles or hawks; at other times they twitter like a swallow. The flesh is accounted a delicate morsel, and they are at first coming very fat."

Spallanzani, in his experiments on torpidity, subjected a young bird of this species to an artificial cold of $8\frac{1}{2}$ degrees below zero, without causing its death.

It has long been suspected that stragglers occasionally reached this country, and Dr. Latham was told that such had been observed; but he adds that the evidence was too slight to be trusted as actually proving the fact. The preceding instance is conclusive, independently of the accounts from Ireland.

Lee, Kent, 23d March, 1833.

ON PREPARING SPECIMENS FOR MUSEUMS.

BY R. B——, ESQ. DUBLIN.

THE preparing of a collection of specimens being one of the most seductive modes of fostering a taste for natural history, it appears of importance to facilitate as much as possible the formation of museums. The loss of useful discoveries may by this means in many instances be prevented, and numerous improvements may possibly arise. I make this suggestion with a full consciousness of the vast difference between the naturalist of the museum, and the naturalist of observation in the fields. Yet the importance of a museum cannot be denied, and if put together by the observing and practical naturalist, it will much enhance his pleasure by serving as vivid memoranda to the information he has gleaned from observation of the specimens in their various localities. In accordance with these views the following details are offered, presuming them to be quite new to the public.

Birds are too often rejected as not worth preserving, from being bloody or otherwise soiled; but they can be perfectly restored to purity of plumage in the following manner. Having mounted the bird in the attitude designed, wash the soiled parts gently in the direction of the feathers, with a sponge and cold soft water, which, if carefully performed, will not discompose the plumage. Then, having made a mixture of raw starch and cold water, of the consistency of thin mortar, lay a coat of it about the eighth of an inch thick over the parts to be cleansed, and in about twenty-four hours, when it is dry, it may be removed by a few taps of the finger, and will carry with it the blood or other soiling which it was sought to remove. This useful plan was suggested from seeing extensive stains removed from carpets by starch, and was first put in practice with complete success on a golden-eyed duck (*Clangula vulgaris*). This bird had been badly shot, was much soiled with blood, mud, the discharge from the mouth, and had been many days killed; yet by the foregoing means its feathers were restored to perfect cleanness. The same method has since been tried on birds many years mounted, with great advantage, and even stains produced in performing the operation after stuffing, may be readily removed in a similar manner.

In mounting mammalia, the natural expression is attained with considerable ease as follows. Take a mould of the skinned breast of the animal in Paris plaster, a simple operation, from which a cast of the same material is to be made, inserting at the time, one or more wires

according to the size of the subject, into the neck, to represent the spinal bones. An articulated bone skeleton is easily formed on this principle, which being covered with tow to represent the muscles, and the prepared skin sewn over it, a fac-simile of the original is produced capable of being placed in any position the operator pleases. Other advantages over the old plans are, that the skull, or even the entire skeleton is preserved, and an unchangeable likeness obtained. In the ordinary way, however modelled the head may be, yet upon the skin shrinking, it is more or less distorted, a circumstance which does not occur in the present plan ; for if care be taken that the drying proceeds equally, the minutest parts are all completely preserved.

The escape of spirit so much complained of by those who keep wet preparations, may be alleviated in the following manner :—Take a portion of one of the toys, commonly sold under the name of Indian rubber balls, not unlike a globular bladder, and having pulled it for some time between the fingers, it will stretch to an astonishing tenuity, being then drawn tightly over the mouth of the vessel containing the preparation, it will, on being let go, contract round the edge, and form a stopper, impenetrable to the vapours of either water or spirit, and its elasticity allowing it to yield to the expansion of the enclosed liquids, remedies the chief cause of the escape of spirit in the former modes : for expansive force having hence established a passage through the old elastic stoppers, vapour was expelled at every increase of temperature, a neat appearance may be given to bottles or jars covered in the manner shown, by tying a piece of coloured paper over the Indian rubber, and pasting beneath a collar of the same. It is unnecessary to observe that the India rubber should not be wetted during the operation of stretching, as in that state it is apt to tear.

In mounting fish, particularly flat-fish, having covered one side of the specimen with a slight covering of gum, and laid over this a piece of silver paper, lay the fish with the papered side uppermost in a tray made of board or sheet lead, having slightly touched it with oil. Pour over it plaster of Paris just about to set. When quite firm, reverse the whole, and remove the intervening parts of the fish from the exposed side to the skin of the papered part ; an operation which a little experience will render easy. Then fill it up with a cement made of bees' wax and rosin melted together, which must be very cool before it is poured in, otherwise it will cause the skin to curl up. When cold, remove the plaster and silver paper, and wash the skin with a varnish thus compounded :—Take six parts of gum arabic, and one part of gum tragacanth dissolved in water, and squeezed through fine linen ;

reduce it with water to the consistency of cream, then add half its bulk of spirits of wine, having a very small quantity of corrosive sublimate, and a few drops of oil of thyme dissolved in it. This is a very useful varnish, applicable to bones, shells, &c., and does not suffer much from damp or heat. Several coats of this will be required at intervals for the fish. The advantages of the foregoing plan are, that it requires very little skill in the operation, the natural form of the fish is retained in the utmost possible perfection, and the scales are kept in their places. It is, perhaps, unnecessary to observe, that only one side of the specimen is preserved by this process.

An insect net frame, very portable, exceedingly cheap, and applicable to any common walking-stick, may be made of two semicircular wires looped together, having pieces of slit tube soldered to the other ends, and bent in the direction of the diameter of the entire circle, a gimlet being looped both through holes in the pieces of tube and the stick; a piece of strong twine tied near the gimlet will make all fast.

Dublin, March 23, 1833.

CHAPTER OF VARIETIES.

ON REARING OAK PLANTS IN HYACINTH GLASSES. The following experiment on the germination and growth of plants, may be new to many of the readers of the "Field Naturalist's Magazine," as it was to several friends to whom I showed it, though they were by no means inattentive to natural phenomena.

Let a common hyacinth glass, or other glass if more convenient, be filled about a half or a third part full of water; and a piece of card be prepared as a cover for the opening of the glass, so as to fit close and exclude the air. Fasten a strong thread, or a piece of brass wire, round an acorn; not iron wire, for it will rust and corrode the acorn, and frustrate the experiment. Suspend the thread or brass wire

from the card, (*a*) or from a small transverse bar of wood or metal beneath it, so that the acorn (*b*) may be sustained at a short distance above the surface of the water, but near enough for the steam, which will be generated by the glass being kept in a warm room, to be communicated to the acorn, from which it will depend in a large drop.

In a few days the germ will be found to burst the shell of the acorn, and in about a fortnight afterwards the radicle, or little root, will protrude itself through the cleft, and take a downward direction into the water, where it will be continually extended and enlarged, by degrees throwing out external fibres, until, after a few days more, the other member of the germ will be seen to rise upwards till it comes near the card that covers the vessel, through which a hole must be cut to allow of its free passage. This forms the stem of the tree, which will shortly be seen to throw out two leaflets at its extremity, and shortly again others; till in the course of a few weeks from the commencement of the experiment, the tree will have grown to the height of several inches, and be ornamented at its top with leaves of two or three inches long, and wide in proportion, besides smaller ones breaking out at its sides, the root meanwhile having continued growing to a length exceeding that of the stem. In six instances of this experiment commenced in November last, the hyacinth glasses having been kept during the cold weather for the most part on the mantel-piece of an inhabited parlour, of the usual temperature of such apartments, the stems have grown to different heights, being respectively about five inches, which

is the lowest, and so on to about nine inches, with intermediate heights, at the date of this letter, March 4th; the acorn itself having in the meantime become shrivelled, and lost much of its substance and weight.

The annexed sketch represents one of the examples above described. The growth of a similar plant will, I am sure, afford an interesting object of observation to any of your readers who are fond of natural history, and may be disposed to try the experiment; and if, when they have satisfied their curiosity by the phenomenon, they desire to turn it to further account, they may do so, by removing their nursling from the glass to the garden, where they may have the pleasure of seeing the stem, at least, continue to improve under their eyes, the progress of the root being of course known only by its effects in continuing to supply moisture, and thereby giving increase and vigour to the stem. I have in my possession a couple of small oak plants, now growing in the earth, which were raised two or three years ago in glasses after the manner above described.

Bath, 4th March, 1833.

ON THE HEDGE-HOG.—During three seasons I had a black setter dog which was remarkably fond of discovering and pointing hedge-hogs in their winter retreat. By this means I had many opportunities of examining those singular animals, and of ascertaining whether or not they lay up food for winter. It is an opinion as old as Pliny, “*præparant hyemi cibos*,” but though I have examined many dozens of their hybernacula, I have never been able to discover any of their hoards. It appears to me from a consideration of the very curious, I may even say intricate, manner in which they are inclosed in their globe of withered grass and moss, that they intend it for their dormitory till spring, and can therefore have no occasion for any store of provisions. The hedge-hog feeds on vegetables, slugs, beetles, eggs, &c. The knowledge of the last fact, and the havoc they therefore commit among the game, will, I fear, cause many a keen sportsman to destroy this poor animal as an enemy; for the true sportsman is a very selfish person, and will not allow either bird or beast to interfere with the objects of his pursuit. The hedge-hog was in great request among the Romans, who eagerly hunted it for its spiny skin, which they converted into cloth brushes. “*Hac cute expoliuntur vestes*.” Pliny details the method of catching and killing it.

R. D.

[Pliny's account, which is in many things fanciful and fabulous, runs thus.—EDITOR.]

“ Hedge-hogs also make their provision before-hand of meat for winter, in this wise. They wallow and roll themselves upon apples and such fruit lying under foot, and so catch them up with their prickles, and one more besides they take in their mouth, and so carry them into hollow trees. By stopping one or other of their holes, men know when the wind turneth, and is changed from north to south. When they perceive one hunting of them, they draw their mouth and feet close together, with all their belly part, where the skin hath a thin downe and no pricks at all to do harme, and so roll themselves as round as a foot-ball, that neither dog nor man can come by any thing but their sharpe-pointed prickles. So soon as they see themselves past all hope to escape, they let their water go, and pisse upon themselves. Now this urine of theirs hath a poisonous qualitie to rot their skin and prickles, for which they know well enough that they be chased and taken. And, therefore it is a secret and speciall policie, not to hunt them before they have let their urine go ; and then their skin is very good, for which chiefly they are hunted ; otherwise it is nought ever after, and so rotten, that it will not hang together, but fall to pieces : all the pricks shed off, as being putrified, yea although they should escape away from the dogs and live still : and this is the cause that they never bepisse and drench themselves with this pestilent excrement, but in extremitie and utter despaire ; for they cannot abide themselves their own urine, of so venomous a qualitie it is, and so hurtfull to their own body ; and do what they can to spare themselves, attending the utmost time of extremitie, insomuch as they are ready to be taken before they do it. When the urchin is caught alive, the device to make him open himselfe again in length, is to besprinkle him with hot water ; and then by hanging at one of their hind feet, without meat, they die with famine, otherwise it is not possible to kill them, and save their case or skin. There be writers who bash not to say, that this kinde of beast, (were not those pricks,) is good for nothing, and may well be missed of men : and that the soft fleece of wooll that sheepe bear, but for these prickles, were superfluous, and to no purpose bestowed upon mankind ; for which the rough skin of these urchins, are brushes and rubbers made to brush and make cleane our garments. And in very truth, many have gotten great gain and profit by this commoditie and merchandise, and namely, with their crafty device of monopolies, that all might passe through their hands only ; notwithstanding there hath not bin any one disorder more repressed and reformation sought by sundry edicts and acts of the senate in that behalf : every prince hath been continually troubled hereabout with grievous complaints out of all provinces.”

EGGS OF A SPIDER ATTACKED BY A PARASITE.—The preceding figure represents a deposition of eggs, which I found attached to the

slender stalk of a fir tree during, March, 1832. I carefully placed them in a breeding box, and in a few days they were hatched, and a number of small flies made their appearance, having black bodies, four transparent wings, the upper pair having a pretty tinge of changeable hues, and a small square black spot in the middle of the exterior margin, the hind pair of legs disproportionately long, and of a rather dark red colour, and the antennæ filiform, and bending upwards like an inverted arch. They were submitted to a gentleman distinguished in this department of natural history, and they were returned to me labelled, (*Micorogaster alvearius*, FABRICIUS,) which is a species of parasite. When found, the whole mass of eggs were covered over by a very thin film of silk, of a light pink colour, and the apertures from which the flies made their exit were not very apparent until they were near upon opening, which, when they did, the round lid of each cell turned back as though by a hinge, and the cells were divided from one another by a thin delicate partition. I think it not improbable that the eggs were deposited by a spider, as I have often found them in somewhat similar situations, and, like the present, protected by a thin web; but as that is only conjectural, I should feel obliged if you could solve the mystery.—SOLIVARIUS.

EXPERIMENTS ON THE AIR CAVITIES AND THE COLOURS OF LEAVES.

—In a late number of the *Annales des Sciences Naturelles* appeared a paper by M. Dutrochet, stating some experiments in which, for the purpose of showing the air cavities in leaves, he put them, submerged in water, under the exhausted receiver of an air pump. The pale underside of the leaf thus treated assumes the deep green colour of the upper surface. The air leaving its cavities allows the water to enter and fill them. On repeating these experiments I observed, that as the water evaporated and the underside of leaf resumed its colour, it did so not in all the parts of it at the same time, but the air cavities afforded different degrees of facility to the evaporation; and of contiguous cavities some of them remained for some time full of water and of a deep green colour, while others were dried up and filled with air, having regained their paler colour. By this means, the form, size, and arrangement of the air cavities were easily distinguishable. The enquiry naturally suggested itself whether, if, instead of water, a coloured fluid were used, the cells might not be permanently tinged so as to become perceptible to the eye. Red and black inks were tried, but without effect, and from these and other trials it appeared highly

probable, that the fluids used were filtered, and their colouring particles thrown back, by the minute openings of the air cavities. That difficulty may be avoided by filling the air cavities successively with two different fluids ; such as prussiate of potass and sulphate of iron in solution.

Assuming these air cavities to perform that necessary function in vegetable, which is performed by the lungs in animal, life ; that is, the aëration of the circulating fluids, their number and capacity must be in proportion to the quantity of fluids circulated. The sap or circulating fluid, is more abundant in young trees than in old ones, and in fresh shoots than in matured ones. As regards the trees themselves, the necessary supply of aëration may be provided for by an increased foliage, as we find to be the case with respect to young trees. But with respect to branches when the same leaves remain on the same branch during a whole summer, the varying supply cannot thus be provided for, since, while the degree of succulency and rate of growth diminish, the aërating surface of the leaves increases. Another expedient appears therefore to be adopted. Take the young shoot of a vine, with its newly pruned leaves. Both sides of each leaf are alike pale-coloured and covered with air cavities. The quantity of aërating surface is thus increased by being extended to both sides of the leaf. As the leaf grows, and the branch on which it stands is matured, the upper surface loses its air cavities, which have become no longer necessary.—W. B. 20th March, 1833.

ATTACK OF SPARROWS ON A MOUSE.—In the summer of 1831, one of the residents of the Temple turned a mouse loose in the open grand space, and the little intruder had no sooner made his appearance, than he was simultaneously attacked by the sparrows, which commenced so deadly an attack on him that he ran in all directions, endeavouring to escape their fury, and leaped up in the air in great agony, in vain, for the persecution abated not until the little sufferer ceased to exist.—*VERITAS*, March 6, 1833.

SOCIALITY OF A RAT WITH A YOUNG CAT.—We have frequently opportunities of observing the association of animals, which in a state of nature exist in hostility to each other ; but this is generally the result of education. It may therefore appear the more surprising, that without any apparent cause for such an act of friendship, our cat (a young one) should have permitted a rat to partake of her morning's breakfast. During the last summer, when our cats were lapping their morning's portion of bread and milk, a rat was frequently observed to

join them without molestation from either ; indeed the kitten was invariably deprived of a comfortable meal by her dam's hospitality, as the little thing was so frightened as to scamper off the moment the intruder made his appearance. I cannot imagine the cause of such change of habit, and it appears the more strange as I have reason to think that, from the servant's peculiar dislike to cats, they were not too well supplied with food. What could have led the rat to suppose his presence would have been tolerated in such dangerous company ? Perchance the worthy company of rats, in imitation of the mice in the fable, had held a council of war, and come to some dreadful resolution, which this favourite was elected to execute. He has discontinued his visits some time ; he has perhaps accomplished his object, or he may have been once too often — VERITAS, March 6, 1833.

THE DANCING WITCHES' ROCK, JERSEY.—During a short stay in the Island of Jersey, I frequently heard of the rock upon which the witches danced previous to a storm at sea ; and being disposed to visit the *salle à danser* of the “ weird sisters,” I started from St. Helier, the principal town of the island, *à pied*, accompanied by Captain St. Jewin, and after walking over a fertile country, descried the huge mass of stone, which the islanders denominate the Dancing Witches' Rock.

This block of granite rests nearly on the centre of a meadow, about an hundred yards from the sea shore, is of irregular form, of about twenty yards in diameter, twenty feet high, and presents on its summit a flat surface, occupying about three square yards ; this surface is marked with numerous impressions, resembling the feet of sheep or goats, and is also impressed with a representation of the skeleton of an animal similar in shape to a crocodile. The tracing of ribs, vertebræ, and in fact the osseous system of some animal, appear carved on the rock. From what cause these fanciful appearances proceed I am unable to state, neither, as far as I have means of ascertaining, does the history of the island furnish a clue to their origin.

There are remains of ancient temples of the Druids in the island, and it is possible that the mass of stone had been employed by them for the celebration of their mysteries. We are informed by Herodotus, that the people who lived in the neighbourhood of Thebes and the Lake Maeris, suspended gold ornaments from the ears of the crocodile, the fore feet being secured by a chain ; they fed it with the flesh of the sacred victims, and it was treated with great attention ; and when it died it was embalmed, and afterwards deposited in a consecrated chest.

I am not aware that the Pagan priests of Britain held the crocodile in religious veneration, but the sacrifice of animals was performed upon their cromlechs or altars, which, says Borlase, sometimes were single stones erect. If Druidism acknowledged the crocodile a necessary appendage to its pretended incantations, and if the sheep or goat held a place in the catalogue of its animal sacrifices, the curious appearances on the Dancing Witches' Rock will admit of explanation.

I am not acquainted with the geological constitution of this rock, but its exterior appearance is that of a close-grained granite. Assuming that the granite is of the most prevalent compound, namely, quartz, felspar, and mica; assuming that an animal of anatomical structure resembling that of the crocodile, had been deprived of life on the rock, and had thereon lain till its bones came in contact with the surface of the rock; I presume it is not probable, under those circumstances, that natural chemical agency, acting either on the rock or bone, would stamp the impression of the bone upon the rock. If the bone had a considerable time rested in contact with a chalk rock, it is assumed that chemical agency reposing in the bone, and influenced by certain states of the atmosphere, would be roused into action, causing the rock to take the figure of the bone. Doubtless there are changes continually going forward in the great laboratories of nature—changes forming compounds of every kind, developing their elements as if by mere accident, and showing their existence by the spontaneous activity of their operations.

From the foregoing observations I think it may be said, that the cause of the characters on the Dancing Witches' Rock is to be attributed, in absence of better proof, to Druidic superstition; the reasoning applied to chemical transformation is liable to more difficulties, and is influenced by circumstances not so immediately under the control of probability.—R. T. C., *Shouldham*, 1st Feb., 1833.

SWALLOWS.—I think I have somewhere read that swallows do not stop to rest during their migrations until they have reached their destined port, unless they are overtaken by stress of weather, in which case they have been known to alight upon the masts and rigging of ships at sea; but the following circumstance which came under my observation, gives me reason to suppose that, when they pass over land, they rest from their fatigues. Last March, when I was residing near Lee, I was loitering one evening in a field, in hopes of finding the nest of a blackbird frequenting a hedge on one side of the little stream

called Kidbrook. As I could not find any nest upon the field side of the hedge I went round to the opposite side, and walking along by the sandy margin of the brook tried to discover it. I crept slowly along upon tip-toe, and was nearly opposite the place at which I expected to find it, when suddenly I was surprised by a flight of swallows rising up into the air close from the place where I was standing. When disturbed, they seemed quite lost in confusion, and uttering a sharp plaintive cry, they dispersed in various directions, perhaps owing to the darkness of the evening preventing them from collecting together, and did not fly high up into the air, but, on the contrary, so low that they swept the grass. Being interested in this occurrence, I went on the following day and examined the place from which they arose, and found that there was a long hollow fissure running under the bank, in which no doubt they were secreted, and most likely were clinging to its sides and asleep when I came up and disturbed them. However, after that evening, I never saw one of them at that spot either flying in or out, from which circumstance I think I am warranted in concluding that they were just arrived in this country, and were resting from their fatigues, previous to their repairing to their respective stations.—*SOLIVARIUS*.

THEORY OF RAIN.—The commonly received opinion, I believe, is, that the water which evaporates from the surface of the earth is held in a state of chemical solution in the air, which ascends into higher regions, where the moisture is precipitated in the form of clouds, which are sustained there by the joint agency of heat and electricity, and the deposition of rain is the result of the electrical action of the clouds upon each other.

The atmosphere, at the elevation of a few hundred yards, is at a tolerably uniform temperature with that near the surface of the ground, and therefore the condensation of the evaporated moisture must take place at a considerable height; in tropical countries this condensation in the form of clouds is not so frequently witnessed as in our colder climate, where the temperature of the air is continually subject to variation.

That evaporation does take place at all temperatures, when the air is tolerably dry, may be easily shown, by placing a cup on the surface of water, containing dried potash, or fused chloride of calcium; either of these substances will deliquesce with great rapidity, or if concentrated sulphuric acid be substituted it will speedily absorb nearly half its bulk of water; the vapour, which appears to rise from water and

low ground after sunset, is merely the moisture precipitated from the air upon the earth cooled by radiation.—W. E. H.

19th Feb. 1833.

ON THE OBJECTIONS OF MR. HART, PAGE 76, RESPECTING THE THEORY OF RAIN.—The whole of Mr. Hart's objections are highly curious and interesting, and the subject has always much puzzled me, particularly the fact, that a hot sun will dry a wet pavement by heat, and a cold wind, if strong, though there is no sun, will produce the same effect often in the same time.

Objection 1. The reason of this seems to be, that the vapour rises imperceptibly, both above and below 60° , and is condensed in the atmosphere when it is below that temperature. Thus the vapour is imperceptible in the neck of a Florence flask boiling over a lamp, though clearly seen above it, when the temperature is less. Again, when a draft of cold air dries a wet pavement, no steam is perceptible on the surface, though five or six feet above it may be felt as a sensible dampness on the clothes and linen.

Objection 2. In this case the temperature is raised both in the air and on the surface of the earth. We know not what becomes of water when raised in the atmosphere, by a high or very low temperature, as in both cases it is imperceptible, though its particles are no doubt affected by heat or the absence of heat, the one expanding it into dispersed and incoherent particles, the other condensing it into the form of hail or snow. By the absence of caloric which, at any temperature above the freezing point, is sufficient to keep it in a state of fluidity.

Objection 3. This would undoubtedly be the case were water raised by the heat of 300° in usual summer heat, but this is not the case in any part of the globe. Again, in all cases of evaporation we must make allowance for currents of air which disperse the vapours and separate its particles, counteracting its tendency to gravitate.

Objection 4. This proves the effect of the condensation of the aqueous particles by cold, but does not disprove their rarefaction by heat, which would keep their particles divided, and thus prevent condensation.

Objection 5. Here the agency of increased temperature in the surrounding air renders the vapour invisible, as with our breath, which is only visible when the temperature is below that of itself when it comes from our bodies. The glass is raised on its surface to the temperature of the surrounding atmosphere, and therefore does not condense the steam, but were it taken out of a pail of ice, wiped dry, and immediately held

over the river, would it not condense the vapour? Though water does not BOIL without heat, it would be too much to say it does not *evaporate*; or, in other words, that no vapour rises from it when the air is above the freezing point. Upon the whole question I think we must allow that evaporation is constantly going on from the vast bodies of water on the surface of the globe, though its condensation, on which its visibility depends, must always be regulated by the temperature of the atmosphere, as before explained.—E. G. BALLARD.

Islington.

ANECDOTE OF A CAT.—The collecting together and recording of a variety of curious facts and occurrences, which would otherwise be forgotten and lost, is certainly one of the principal objects and advantages of a magazine of a natural history; and as various remarkable incidents cannot but continually occur to every student of nature, it behoves all who are interested in the science to avail themselves of the opportunity thus afforded them, to make known their observations to the world. The following instance of remarkable cunning, or rather sagacity, in the domestic cat, is worthy the attention of the naturalist:—A cat, belonging to the Castle public-house, Tooting, is in the constant habit, whenever the poultry are fed, of crouching herself in the midst of the fowls, whilst they are all collected together round their food; by this artifice she very frequently contrives to seize some unfortunate sparrow, who, descending for his share of the grain, little suspects his ready foe to be lurking in such a strange hiding-place.—

Tooting.

EDWARD BLYTH.

SINGULAR LAYING OF THE BARN OWL.—A curious fact has been related to me respecting the barn owl, and it is well attested by several credible witnesses. A nest of that bird last summer, in this neighbourhood, contained two eggs, and when these were hatched two more were laid, which latter were probably hatched by the warmth of the young birds; a third laying took place after the latter were hatched, and the nest at last contained six young owls of three different ages, which were all reared.—EDWARD BLYTH.

Tooting.

ON THE HAWFINCH AND BRAMBLEFINCH.—I have now in confinement a beautiful cock hawfinch; but he is a sad cripple, having nearly lost the use of his limbs; he eats very heartily, but I fear it will take a considerable time before he recovers his strength. Day after day passes on and I can hardly perceive any alteration; but he cer-

tainly does not get worse ; indeed he is now much stronger than he was. It seems a kind of paralysis, and I have been trying the effects of electricity upon him, by drawing sparks from the joints. This, at first, seemed to have been of great service to him, but it appears now almost to have lost its effect. He is an uncommonly handsome bird, and well worth the trouble of curing, if I can manage it. It is worthy of remark, that the mule of this bird is enclosed in a film like that of a nestling, incontrovertibly establishing the fact, that this film is caused by the bird being in a constant state of quiescence. He is fond of pieces of almond, and the kernels of hazelnuts, and he consumes a great deal of hempseed, but seems indifferent to any other small seed that I offer him ; eating them when he takes them from my finger, but never pecking them from the ground. He refuses haws, and though he takes them from the hand, as he does every thing that is offered, yet he invariably rejects the berries from which he takes his name. I should very much like to ascertain the musical powers of the hawfinch. I have also a very fine male brambling, which, in form, in manners, and in every thing I have yet observed, entirely resembles the chaffinch ; even in the peculiar strut when on the ground. I have not yet heard him sing, but he has had the migratory feeling very strong upon him, and until that has quite left him, I cannot expect him to sing. I keep the brambling along with my pugnacious little nettle-creeper, and each seems equally afraid of the other. The brambling has the migratory feeling upon him chiefly in the daytime ; the warblers migrate ONLY by night.—EDWARD BLYTH.

Tooting.

CURIOUS INSTINCT IN A EWE.—A ewe belonging to Mr. ———, of Merton, has, for the last *six weeks*, been endeavouring to entice from the mother every lamb that has been dropt of the flock to which she belongs, and about a fortnight since she succeeded in getting a sickly twin lamb to follow her, which would probably have died, had it remained with its own mother. This lamb she has suckled ever since, although she has not herself lambed yet ; but is expected to drop a lamb in the course of three or four days.—EDWARD BLYTH.

Tooting.

REDBREAST BUILDING WITH LEAVES.—Having always lived in the country, I have had many opportunities of observing the habits of the feathered race, particularly in the part of nest building, though I have never studied natural history in a scientific way, but only as a rural

amusement. It has occurred to me whether local situations may not make more difference with respect to the mode and the materials used by birds in constructing their nests, than has been generally thought, for it is very common in this neighbourhood to see a large quantity of leaves used in the construction of the redbreast's nest. The robins, however, do not confine themselves to the use of one particular sort; but seem to depend very much upon the situations, or, perhaps, upon the sort of trees in the neighbourhood. They sometimes use the ivy leaf, the apple, the elm, and the hazel, but more frequently the oak. A specimen that I saw at Dorking a few weeks ago, appeared at first sight to have the outside entirely formed of oak leaves intermixed with moss, but upon a closer examination I saw there were three sorts of leaves,—the hazel, the oak, and the elm; but the oak formed the greater part.—CHARLES ANDREWS.

Horsham, Surrey.

[Specimens of such nests sent, free of expense, to the publisher's, would be highly acceptable.—EDITOR.]

SIMULATION OF DEATH BY A CORN CRAKE.—When the interesting bird, named from its cry the corn crake (*Ortygometra crex*), is alarmed, it has the instinct, in common with some other animals, and especially insects, to feign death. A gentleman had one brought him by his dog, it was dead to all appearance. As it lay on the ground he turned it over with his foot; he was convinced it was dead. Standing by, however, some time in silence, he suddenly saw it open one eye. He then took it up, its head fell, its legs hung down, it appeared again totally dead. He then put it into his pocket, and before very long, he felt it all alive, and struggling to escape; he took it out, it was lifeless as before. He then laid it on the ground, and retired to some distance; in about five minutes it warily raised its head, looked round, and decamped at full speed.—E. G. BALLARD.

Islington.

ON THE BEARDED TIT.—Mr. Blyth, in his zeal to find a place suitable for this beautiful bird, in some known genus, has, I think, made a most unfortunate selection in adopting that of the shrike. It appears to me, that even in similarity of marking, the resemblance is but slight, and that with regard to the bill, which Mr. Blyth considers "as perfectly that of the shrike," there is a perfect dissimilarity; the one being strong, powerful, and toothed, the other weak, slender, and

toothless. This, I am sure, will be evident to any careful observer; who will further remark the different shaped tails, and the absence in the tit of the ferocious look and strong-built head of the flusher. The tooth is so plainly visible in the *Lanius* family, that it must at once decide the question, and completely sever the new-formed connexion between the shrikes and bearded tits. Though I am a novice in the science, and perhaps rather too presuming, I cannot but think *Laniellus* an unfit term, and would rather place this tit in the genus *Muscicapa*, to which, in its general form, and in its shape of bill, it is rather more nearly allied; but closer observation will, no doubt, assimilate it yet farther, or form of it a distinct genus.—WM. FOWLER.

1, *Poland-street*, 9th March, 1833.

[I thought it right to submit the preceding to Mr. Blyth, before I published it; and the following are his remarks, given, as it appears to me, in the genuine spirit of a lover of truth and candour.—EDITOR.]

ON THE BEARDED TIT.—On reconsideration, I admit that I was perhaps too hasty in placing this species in the shrike family, (*Laniina*), though I am still of opinion that the bearded tit resembles the shrikes in several particulars, more than it does any other group of birds. The article was written from an observation of the living bird; and if an *alive* bearded tit be taken into the hand, and examined, especially if it be an old bird, the resemblance of its physiognomy to that of a shrike is very striking; as in the various members of that family the upper mandible of the bill is curved and pointed, though undoubtedly very weak in comparison with those birds; and it has also a very distinct rudiment of a tooth or notch, the latter, however, cannot well be observed in a stuffed specimen, unless very recently preserved, as the bill of the bearded tit is so soft and delicate, that it shrinks considerably as it becomes dry; the colour also of the beak changes in drying from a fine yellow to a dark reddish brown. Let it be observed also, that in many of the smaller shrikes the bill is very small and weak, and the tooth far from being well defined; I allude to the smaller species at present ranking in the genus *Lanius*, but for which the term *Collurio* has, I believe, lately been proposed as a generic appellation. The flusher (*Lanius Collurio*, LINN.) can hardly be adduced as an example, as it is one of the strongest formed birds that can range under the generic name *Collurio*: but the weakness of structure in many of the smaller shrikes fully entitles them, I consider, to be separated from the genus *Lanius*; and although the flusher

assimilates to these smaller species rather than to those shrikes to which the term *Lanius* is to be restricted (the *L. excubitor*, *L. borealis*, &c.), yet it is a much too powerfully formed bird to warrant, of itself, any generic separation.

I am rather surprised that the form of the tail should be adduced as a striking dissimilarity, as in most of the shrikes the tail is more or less wedge-shaped; there is full as much difference in the tails of the whitethroat and the Dartford warbler (species in other respects closely resembling each other), as there is in the form of the flusher's tail and that of the bearded tit. In its plumage also, I think, this latter species is very similar to many of the shrikes, and few birds look fiercer when held in the hand, or (if I may be allowed the word), have a more *shrikish* expression of countenance than the little bearded tit. Its song again, if song it can be called, bears a considerable resemblance to that of the flusher shrike. For these reasons, I think the term *Laniellus*, applied to this bird, is by no means inappropriate; a genus of the American tyrant fly-catcher (*Tyrannina*), is called *Milvulus*, the members of which resemble the kites (*Milvus*) only, I believe, in having forked tails.

If the bearded tit is still to be considered a member of the tit family (*Pariana*), it must be placed in one of the most extreme limits of that group; to class it in the same genus with the ox-eye (*Parus major*), to which it bears not the slightest similitude, must, to all who have any knowledge of the living birds, appear absurd in the extreme. There is however, certainly, some resemblance between the bearded tit and the bottle tit (*Parus caudatus*, RAY); but the latter bird also differs very considerably from the other British species associated with it in *Parus*. The bottle tit is one of the few small British birds that I have not yet been able to procure alive, and as my knowledge of that species is at present confined to field observation, I would rather defer noticing its peculiarities until I could have an opportunity of studying its manners in confinement.

Few animals, I observed in the paper to which Mr. Fowler refers, appear so isolated as the bearded tit; and let it be remembered that one or two particulars were there mentioned, in which a great dissimilarity was pointed out between that species and the shrikes; namely, the different formation of the digestive organs, and the difference also, in their progressive motion when on the ground; that of the bearded tit being a decided walk, whilst the shrikes, and the tits also, move forward by successive hops. The bearded tit,

it may be added, does not hop, but walks up and down among the reeds, &c., amongst which in its wild state it is always found.

I may take this opportunity of mentioning another curious habit of the bird, which, at the time that article was written, I kept in confinement. Among the seeds which were daily put in the cage for the sustenance of his finch companion, was a small foreign seed of which the bearded tit was particularly fond; and as there were never but a very few of these seeds at a time, the bird had of course some difficulty to find them from among the rest; the method he therefore took to scatter the seed about the cage, to get at the bottom of the pan, was curious; not with his bill, as a finch, or as indeed most other small birds would have done, but by jumping into the pan, and scratching with his feet, much in the manner of a gallinaceous bird.

I have been informed by a dealer that, whatever number of these birds they may have together in the same cage, (and I have myself seen thirty or forty,) they always separate at night, and roost in pairs. A male and female, that I possessed last autumn, appeared extremely attached to each other, and when the cock bird died the hen continued to call for him almost incessantly, for two or three weeks. I afterwards procured another male, but she did not appear to take the least notice of him, and in the afternoon of the same day she died in a fit. In this female the moustaches were very conspicuous, though of the same colour with the surrounding plumage; I have since observed them in two other hen bearded tits, but they are only visible when the light falls on them in a particular direction; they are more distinct in the living bird, or in one but recently dead, than in stuffed specimens.

I am obliged to Mr. Fowler for noticing the article in question, and hope that the various observations that have been made upon the habits and peculiarities of this elegant little bird, will assist in furthering the endeavours of some more competent person than myself, to assign the true and proper situation of the bearded tit, in a systematic arrangement of birds.

It may be as well here to observe, that the cut which accompanied the article "On the habits of the bearded tit," was any thing but a correct representation of the living bird, and gave it much more the appearance of a species of *Parus*, than a drawing taken from life could possibly have had. The form and attitudes of the living bearded tit are most peculiar, and totally unlike those of any other British bird.

Tooting, Surrey.

NATURAL HISTORY OF THE BIRDS OF AFRICA.

TRANSLATED FROM THE FRENCH OF LE VAILLANT.

THE BLAGRE EAGLE. (*Haliastur Blagrus*, SAVIGNY.)

La Blagre, *Levaill.* Ois. de l'Afrique, i. pl. 5 ; *Falco Blagrus*, *Lath.*, Index Orn. Sup. p. viii. ; Blagre Falcon, *Lath.* Gen. Sup. ii. p. 34 ; Gen. Hist. i. 159 ; *Daud.* ii. p. 70 ; *Shaw's Zool.* vii. p. 96 ; *Drapiez*, Dict. Class., i. p. 333.

THE Blagre Eagle is in Africa what the baldbuzzard is in Europe. He is modelled upon the same proportions, and possesses precisely the same manners. His principal food consists of fish, which he observes from a great height in the air, and seizes by precipitately plunging into the water. Perched upon a tree that is situated on the margin of a river or lake, or upon a rock bordering on the sea, he passes whole mornings pouncing upon the fishes which are presented to his view. He is seldom found in the interior of the country, where the land is dry and sandy ; he only frequents the sea-shore, or rivers, where fish are plentiful. He soars to a prodigious height, whence he is heard to

utter the shrillest screams. These birds appear to have a piercing eye, for I have seen them descend almost from the clouds directly upon fishes that were swimming upon the surface of the water, and carry off some of a tolerable size in their talons. The flesh of the Blagre Eagle has an insipid fishy taste, and its fat, which is exceedingly abundant, is so oily, that, in skinning the bird, it penetrates all over the feathers. Two individuals of this species, which I had prepared with the greatest care, were totally spoiled, because the fat, in time, spread over each of these birds' feathers; so that they were as completely soaked by it, as if they had been steeped in oil.

The Blagre Eagle is of the size of our baldbuzzard; his feathers have the ruddiness of those of the kingfisher, especially those upon the belly, whose beards are very close and strongly united. The head, neck, and all the plumage of the fore part of the body, are of a satiny white. On the top of the head, and back of the neck, the side of each feather is brownish; the mantle and small wing-coverts are of a light grey brown, as well as the tail, whose tip is white. The large quills are blackish; the intermediate ones have their outer beards of the same colour as the mantle; the bill is brownish, the legs yellow, the nails black, and the iris of a deep brown.

Naturalists who, like Buffon, have a desire to diminish the number of species, will not fail to class the Blagre Eagle as a mere variety of our baldbuzzard; but I, who repose no confidence in those great variations produced by the influence of climate, consider it as unquestionably a second species of the same genus.

Kolben, in his voyage to the Cape, mentioned several eagles, which, he says, he saw; but in glancing over the portion of his books respecting birds, it may readily be perceived that he had not the slightest acquaintance with this branch of science. The *stront-vogel*, which he reckons as an eagle, is a large sized vulture of the Cape, and of which I shall hereafter give some account. At the Cape, I never beheld the osprey, nor the bird which he names the duck-eagle, because, according to him, it soared to a prodigious height, and devoured ducks in the air. It is absurd to advance a story of this kind, which is perfectly false; for birds of prey never feed upon their booty whilst on the wing. Buffon compares, but I cannot tell why, this duck-eagle to his small eagle; there is not in fact a single word in the description of Kolben, to warrant him in making the comparison. As for the other eagle, which this traveller saw on the sea, devouring flying-fish, they probably were only frigate-birds and albatrosses, of which he has made eagles: as for in-

stance, he has made a peacock of the Cape ostrich, because the colonists call that bird the wild peacock. It would be more than astonishing, that, after five years' residence at the Cape, and engaged solely in researches after birds, I should never see any of the eagles of which Kolben speaks, and declares moreover to be so exceedingly common. Indeed, I should never have been induced to offer any remarks upon birds mentioned by that writer, if Buffon had not taken occasion to make comparisons from his descriptions, and to arrive at conclusions, which are, in many instances, completely absurd.

There is not a bird, in respect of which so many fables have been circulated as eagles, and particularly our baldbuzzard, which was known in the early days of antiquity, if, indeed, the term *known* may be applied to designate the gross errors, which have been perpetuated about this bird. Albertus the Great wrote, that the baldbuzzard had one foot like a kite, and the other like a goose; Gesner, Aldrovand, Klein, and even Linnæus, propagated the same story. Nothing affords more conclusive evidence of the manner in which the observations of ancient ornithologists were conducted; and, unfortunately, there is no new work which is altogether free from the errors and absurdities of ancient writers. The task is easier and shorter leisurely to compile a book, than to depend upon personal observations; and hence it most frequently happens, that consequences are deduced from the most absurd and improbable relations; for ornithologists who have never studied nature but in the writings of their predecessors, and who yet have a desire to furnish us with their own ideas, heap new and absurd reflections upon ancient errors, which never fail to produce results of a still more monstrous character. In this way Buffon himself, often confounding three or four very different and unknown species, in order to make of them so many varieties of the same species, eventually presents us, for a second species of the same genus, with a bird of which he has no other indication than a description so imperfect, as to render it impossible to understand to what genus it belongs.

For my own part I am of opinion, that those who have given varieties of age and sex of the same species, as so many different species, have done less mischief than Buffon, who is strongly against them, when he indicates as three varieties of climate, three birds, which are not only of different species, but even of different genera, as I shall have occasion to remark in speaking of the Shrikes of the Cape; and in a hundred other articles I shall also prove, that this eminent naturalist, in writing his ornithology, had perhaps never seen the bird

which he described, or at least, that he had never examined it. Besides, there is no work upon birds, to which the observation I have just made cannot be applied. Of what use is it, indeed, in each new ornithology, to notice a number of species so superficially described, either by travellers or the ancients, that it is doubtful even whether such birds ever existed. I think it is better to describe with the utmost accuracy, a species which has been seen, and of whose existence no doubt is entertained, than to dispute upon the analogy of another which has been described some centuries ago; and certainly the more indecisive we are about the species to which we attribute a described individual, the more mischief will result from that description. Again, when I open a book for my instruction, and see a bird that is well known, as for example the baldbuzzard, to which the foot of a bird of prey and of a duck have been assigned; and when another tells me, that such is impossible, since he knows that water-fowls exist which have their feet half-webbed and half-cleft; whilst another pretends, in reference to the same bird, that the male and female parents destroy such of their young ones as cannot support the rays of the sun; and others again, that baldbuzzards are the offspring of eagles of different species, which have coupled together, and that these baldbuzzards again produce small vultures, which, in their turn, generate large vultures, &c., &c., I say, that we must never open those books for our instruction, and that their authors were nothing less than *ornithologists*, and certainly not observers. We cannot, then, place confidence in their writings as naturalists. Buffon, who combated these absurdities, fell moreover into them, on the subject of the Urubu and stront-vogel of the Cape, which have been described by Kolben. I invite the reader to peruse from beginning to end, Buffon's article on the Urubu, *ouroua*, *oura*, or merchant; he will there see the utmost mass of absurdities in comparison that it is possible to compile.

ON THE NIGHTINGALE.

BY EDWARD BLYTH.

AT the head of the British warblers (*Sylviana*) is usually placed the nightingale, (*Curruca Luscinia* of recent authors), a bird however differing in many respects from the other species which have been classed with it in *Curruca*, and which, as I shall hereinafter endeavour to show,

can hardly be arranged even among the *Sylviana*. The other British species to which the term *Curruca* has been applied, are the fauvette, greater pettychaps, or garden warbler, (*C. hortensis*); the blackcap, (*C. atricapilla*); the babillard, or lesser whitethroat, or nettle-creeper, (*C. garrula*); the whitethroat, (*C. cinerea*); the Dartford or furze warbler, (*C. Provincialis*); the reed warbler, (*C. arundinacea*); the sedge warbler, (*C. Phragmitis*); and the grasshopper warbler, (*C. locustella*). These have usually been divided into two sections; namely, the "aquatic warblers," containing the three last; and the "sylvan warblers," comprising the remainder. The aquatic warblers form a numerous and extremely natural group, possessing in common several peculiarities, by which they may be at once distinguished from the members of the other section. The sylvan warblers, also, excluding the nightingales, form another very natural genus; although, if we compare the extremes, that is to say, the fauvette with the furze warbler, we may still perceive considerable diversity both in form and in habits; though certainly insufficient to warrant any generic separation. The nightingales, however, differ in so many particulars from the other species associated with them in *Curruca*, that it is really surprising they have never been separated, especially as genera have often been founded on much slighter and more trivial differences.

In the first place, the bill of the nightingale is formed differently from those of the various warblers; and, as is invariably the case, a difference in structure always intimates a diversity of habit. Accordingly, the nightingale never touches fruit, of which the sylvan warblers are all great devourers. The latter are very rarely seen upon the ground; the nightingale picks his chief subsistence there: they, when no fruit is to be had, live principally on flies and other small insects; the nightingale on worms, beetles, and their grubs. I may here remark that nightingales when wild feed very much upon earthworms; though Mr. Sweet observes, in one of his interesting notes to the late edition of White's Selborne, that "there is scarcely any insects that they will refuse, except the common earthworm and hairy caterpillars." This may be true, generally, with respect to birds in confinement, but even in the cage I have known one individual to be greedily fond of worms. Very few caged redbreasts will deign to swallow an earthworm, but that redbreasts feed very much upon worms when wild, is a fact familiar to everybody. Birds in captivity are apt to become dainty, and having at all times plenty of artificial food to their taste, will frequently reject that which, in a wild state, they would have greedily devoured.

The difference, however, between the nightingale and the other birds with which it has been classed, is much more obvious in confinement; the quiet sedentary habits of the former contrasting strongly with the activity of the smaller warblers confounded with it at present in the same genus. The nightingale in confinement requires more nourishing food than what is necessary for the sustenance of the other various warblers. Many, I am aware, keep both on the same diet; but the warblers will thrive on a variety of food, which will not support the nightingale. The general habits and manners also of the latter, in captivity, much resemble those of the robin and redstart genus, (*Phœnicura*;) and bear a still closer similitude, if possible, to the manners of the thrush group (*Merulina*;) but they differ greatly from those of the various warblers.

In tracing the resemblances which assimilate different species to one another, much assistance is often afforded by a close attention to their nidification: thus, if we examine the nests of the fauvette, the blackcap, the babillard, the whitethroat, and the furze warbler, (all sylvan or fruit-eating warblers,) we find the same generic similarity existing, which we perceive in the birds themselves: and if we were to trace also the various intermediate links, which almost imperceptibly connect the most dissimilar forms together, we should generally find a regular gradation in their nests, corresponding to the gradual modification of structure in the birds. Thus, the wood-wren, (*sibilatrix*), the species that assimilates the sylvan warblers to the genus to which it belongs, and which is even classed in *Curruca* by Dr. Fleming, may be observed to maintain a similar resemblance in its nest: it being of the same oval form with those of its congeners; but never lined with feathers, as is invariably the case with the nests of the willow-wren and chiffchaffs, the two other common British species of its genus. The gold-crests (*Regulus*) again, which closely assimilate to the willow-wrens in appearance and structure, resemble in their general habits, and even in their common call-notes, the tits; and the nest of the common gold-crest (*R. cristatus*) is deep, and lined with feathers as in the willow-wren genus; but instead of being placed on the ground, as are the nests of those birds, it is frequently suspended from a branch, like that of the penduline tit, (*Parus pendulinus*;) which latter bird also resembles the gold crests in the slender form of its bill, and in the weakness of its general structure. The bottletit, (*Parus ? caudatus*, with whose beautiful nest most persons are well acquainted,) assimilates the penduline to the various species which build in holes; which

last vary as to the quantity of feathers, &c. they make use of in lining, the variation being always in accordance with the structure of the bird.

From this it would appear, that the resemblance which exists between birds of the same genus, is generally apparent also in the structure of their nests. That of the nightingale differs exceedingly from those of the other birds associated with it in *Curruca*; it being built of decayed leaves and lined with dry grass and horse hair, more resembling those of the different species of *Phænicura*; while the nests of the sylvan warblers are formed of various small slender stems woven together into a kind of basket-work, and lined with dry grass and hair; certainly as unlike that of the nightingale as they can well be. The situation, also, of the nightingale's nest is always on the ground, among the materials of which it is composed; whilst those of the sylvan warblers are as invariably placed in a bush.

The eggs of the five above-mentioned sylvan warblers possess great generic similitude, in colour, and in markings; assimilating most in those species which resemble most each other. That of the nightingale is very unlike any of them. This of itself, however, does not constitute any very material dissimilarity, as we occasionally find species which closely resemble each other, (as the robin and redstart, for instance,) differing remarkably in this respect. But it is at the same time worthy of remark, and the more so, as the eggs of the other species are so similar.

The song also of the sylvan warblers is usually delivered in a long, continuous, hurried warble; generally beginning low, and increasing in loudness as they proceed. That of the nightingale is loud, broken, and interrupted; being uttered more in the manner of the song thrush (*Turdus musicus*). I would not, however, lay too much stress on any of these particulars, taken singly, as they are all subject to many exceptions; but taken conjointly, and altogether, they seem to intimate, that our nightingale, with the *Sylvia Philomela* and *S. sericea* of M. Temminck, (species closely resembling it), possess sufficient peculiarities to warrant their being placed as a distinct genus.

A striking diversity again presents itself in the plumage of the young birds; in the various warblers the young and the adults are nearly alike; but the plumage of the young nightingale is mottled, like that of the young redbreast, or redstart; each feather having a whitish spot at the tip; in which they also resemble the young of the

various thrushes (*Merulina*). In short, on a close and critical examination, the nightingale will be found to resemble the sylvan or fruit-eating warblers in little else, than in being, like them, a migratory species, and exceedingly shy, and impatient of being observed.

In the various above-mentioned particulars, the nightingales, which I would distinguish by the generic name *Philomela*, not only differ from the sylvan warblers, (the fauvette, blackcap, whitethroat, &c.), but more or less from all the various genera comprised under the term *Sylviana*. They may be considered as an intermediate genus, assimilating the warblers (*Sylviana*) with the thrushes (*Merulina*), and from a long and careful observation of the general habits and economy of our British species, both in captivity and in the woods, I am inclined to doubt whether they would not range as naturally in the latter as in the former group.

As these remarks will probably fall into the hands of many who have but little field acquaintance with the nightingale, a few observations on the history of this celebrated bird, may not here, perhaps, be deemed superfluous.

This renowned songster is of a size, intermediate, between the thrushes and the warblers; at least, he is much larger than any of our British warblers; and one of the continental nightingales, the *Sylvia Philomela* of M. Temminck, (or, as I should prefer terming it, the *Philomela major*), is a still larger bird. From its usual habit, however, of puffing up its plumage, the nightingale generally appears more bulky than it really is. But they vary considerably in size, and the variation does not indicate the sex, some of both sexes being much larger than others. The hue of the plumage, also, is subject to much variation, some of both sexes being of a rufous tinge, and others inclining to an ash-brown. The sexes therefore in this bird are not to be distinguished, either by the colour of their plumage, or by their comparative size.

It makes its first appearance in the neighbourhood of London about the middle of April, the period of its arrival being most remarkably regular, generally even to a day. The females, however, do not arrive until ten days or a full fortnight after the males; a curious fact which may be observed in all our small migratory birds. It resorts chiefly to woods and thickets, and is often found in large double hedges, and in gardens where there are plenty of thick shrubs. In such situations its powerful and loud song may be heard at all hours, over that of every other bird. Like the various warblers, he is very

shy of being seen, and is usually concealed in the thickest part of a bush, or small tree, where, as soon as he has fixed his abode, he sings almost incessantly until his notes have attracted a mate; after which he is not quite so much heard, though he continues to sing until the young are hatched, when his song ceases for the season. It is well worthy of remark, that caged nightingales, also, cease to sing at precisely the same time with the wild birds, being seldom if ever heard after the first week in June.

The characteristic trait of the nightingale's song consists in his very superior powers of execution; he has an infinite variety of the most beautiful and complex rolls and quavers, all of which are delivered with a perspicuity and richness of tone peculiar to himself. The best description, however, would convey but an inadequate idea of the musical powers of the nightingale; he must be heard to be duly appreciated. His song is generally wild and unconnected, like that of the thrush; but when he joins his notes a little, as he sometimes though rarely does, nothing can be conceived more exquisite. His habit also of singing during the calm stillness of the night, when almost without a competitor, adds considerably to the effect. To hear him however in perfection we should ramble along the margin of a wood on a fine spring morning; when, after a passing shower, the sun bursts forth in all his splendour, and nature smiles in all her vernal loveliness; when drops of water glisten through the opening leaves, and every breeze wafts fragrance: then it is the feathered choristers are heard in all their melody; the thrilling music of the thrush; the deep-toned mellow warble of the blackbird; the whistling of the willow-wren and blackcap, loud and clear; the charming, ever-varied song of the little garden warbler, rising and falling in softest, sweetest cadences on the enraptured sense; with the joint chorus of a thousand little throats each striving to excel the rest in harmony; while the murmuring of the turtles, and the pleasing call of the cuckoo serve to furnish variety, and to give an exquisite finish to the whole,—then it is the nightingale is heard to advance; high over all the rest he makes the woods re-echo to his song of joy.

The nightingale may easily be distinguished from all other British songsters by the wonderfully clear and distinct manner in which he executes an endless variety of most complicated and inimitable shakes and quavers. His song indeed is quite unlike that of any other British bird, and many of his most frequently repeated notes are known to the London dealers by particular names. Thus, one that is universally

admired, is that which is commonly called by them "sweet-jug," from a fancied resemblance in the sound. It is a note that he frequently utters, and may be tolerably expressed thus, *huep, huip, huipp, hueep, huēep, huēep, huēep, chuck, chuck, chuck*; the former part to be pronounced very slowly, in a kind of half whisper, half whistle; the latter part, "chuck," is repeated about a dozen times, and so quick and distinct as to set all imitation at defiance: sometimes instead of *chuck* it is terminated by a kind of roll, resembling *tottle-tottle-tottle*; this sudden transition from high to very deep notes has an extremely pleasing effect. Other remarkably fine notes have been likened to the words *water-bubble whitlow*, &c. This mode of illustrating the song of a bird may perhaps at first sight appear unnecessary, but it is the only method in which a just idea can be given; and if by this description the bird should be immediately recognised by those who had not before heard it, as I conceive it would, the object is, of course, accomplished.

When the nightingale is singing, concealed in a bush, he will not suffer himself to be approached too near, and though he does not immediately fly he ceases to sing, and signifies his displeasure by a peculiar croak—resembling the word *curre*, pronounced with a rolling of the *r*'s,—and if, upon his repeating this three or four times, the intruder should not retire, he flies to another bush; yet if he be approached very gently so that he should not be frightened, he will sometimes show himself and sing within a couple of yards of the spectator, when the wonderful distension of his throat will be very obvious, and when it is impossible not to admire the lightness and elegance of his form, and the amazing long hops he frequently takes from bough to bough.

After the young are hatched, should any person approach their nest, the parent nightingales are extremely clamorous, uttering a loud and very plaintive monotonous cry, (resembling *hweep*,) and repeating at intervals their usual croak, so well known in places where nightingales abound. The nest is, however, most exceedingly difficult to discover; the colour of the eggs and also of the young birds being exactly that of the ground, or rather of the decayed leaves among which, under covert of a thick bush, the nest is usually concealed.

It appears from the experiments of Montagu, that if the hen nightingale be taken from her nest, the male will resume his song, and continue to sing till very late in the summer, or until his notes have attracted another mate. From this, therefore, it would *seem*, that the reason the nightingale ceases his song at Midsummer, is, that his whole time is then occupied in procuring food for his young family;

but as it is well known that caged nightingales that have no nestlings to provide for, cease to sing at precisely the same time with the wild birds, we must of course endeavour to assign some other cause for its silence.

The very partial distribution of this bird can only be accounted for by a peculiarity of food, which may be found in some places and not in others. Montagu observes that the young were principally fed upon a kind of small green caterpillar. It has been said, that the nightingale may possibly not be found in any part but where cowslips grow plentifully; and with respect to Devonshire and Cornwall this coincidence is just, but in the woods of Norwood and Dulwich near London, where the nightingale is extremely abundant, the cowslip is not found. Like all other small migratory birds, it will return year after year to the spot where it first took up its abode; and I have thus often noticed it in gardens and places where I never should expect to have found it, but which were probably at one time more shrubby, and more congenial accordingly to its general habits.

Nightingales in confinement are rather hardy birds, and at their first appearance in the spring are taken by the bird-catchers in considerable numbers. They are usually caught with what is called a nightingale trap, baited with a meal worm: and are fed by them on chopped meat and egg, a food upon which they seem to thrive very well. When first caught, they generally feed the bird about every two hours; taking it in the hand, and opening its beak with a quill, giving it four or five bits of food of the size of a pea, to entice it to eat. They will soon feed of themselves, and generally begin to sing in about a week. In captivity they usually recommence singing about the latter end of November, and continue in full song until the beginning of June.

There can be little doubt but that this bird is the *αἰδων* of Aristotle, notwithstanding he says that when it loses its voice at Midsummer, a remarkable change of colour takes place in its plumage; the rest of his description accords entirely with the natural history of our nightingale, and it is possible that he might have mistaken the mottled nestling plumage of the young birds for a change of colour in the adults. The young of the various willow-wrens are much yellower than the old birds, and I have several times been informed that the willow-wren (under which name the different species are commonly confounded) becomes much brighter coloured in the autumn; a mistake of course arising from the above circumstance. The *αἰδων* of the Grecian poets, however, refers, I suspect, to a different species. Homer compares

Penelope to the green nightingale, *χλωρης αηδων*; and Simonides has the expression *χλωραυχενες αηδονες*, green-necked nightingales; Euripides, again, mentions its yellow cheeks, *ξανθαν γενηων*. These various expressions, I am inclined to think, allude to the bird described in the *Field Naturalist's Magazine* for February, 1833, under the name of "The Arbour Bird," *Sylvia polyglotta*, Ranzani, (*S. Hippolais* of Bechstein, but not of Temminck; the *S. Hippolais* of the latter referring to the monotonous willow-wren, or ching-ching, of the Hon. and Rev. W. Herbert and Mr. Sweet.) A preserved skin of the *Polyglotta* is now before me: the bill is large, and formed like that of the nightingale, which latter bird it also somewhat resembles in make; in the hue of its plumage, and in the colour of its eggs, it assimilates to the willow-wren genus; and the structure of its nest connects it with the fruit-eating warblers. Upon the whole, it is an intermediate and highly interesting form, and its characters are too peculiar to allow of its being placed in the same genus, with any other known European warbler. I think the term *Horticola*, expressive of its habits, would be a good generic designation, and the species may very appropriately be termed *Horticola polyglotta*.

Tooting, Surrey, April 19, 1833.

EXPERIMENTS ON PLANTS TURNING TOWARDS LIGHT.

BY M. DUTROCHET, MEMBER OF THE INSTITUTE, PARIS.

IN order to ascertain the effect of light on growing plants, the stems of onions and of leeks were taken up with their bulbs, and laid horizontally on the ground, in a dark and dry place. These plants, although taken out of the ground, continued to live for a long time; their stems became curved, and their upper end took a direction towards the heavens. This happened in about ten days; but being repeated in the open air, three days were sufficient to produce the direction. In the first experiment, light being wholly excluded, gravitation only could have operated in giving the stem a perpendicular direction,—that power being the only one which is known to act in a direction perpendicular to the horizon. Modifications of this experiment were instituted, to be certain that humidity had no effect, and the same result was obtained. In the prosecution of these investigations, it also appeared that it was not merely the summit of

the stems which had a tendency to a perpendicular direction, but that all the moveable parts of the plant possessed a similar disposition, provided they were coloured.

Stems are sometimes directed towards the earth, in which they attempt to bury themselves, like roots; a phenomenon worthy of the greatest attention, not only on its own account, but for the sake of the circumstances connected with it: many vegetables, besides their above-ground stems, have also subterraneous stems. These creep horizontally in the interior of the earth, without manifesting any tendency towards the sky. They are white, like roots, of which they assume the course and the station. Sometimes, however, they are pink, as in upright burreed: in such cases it is the rind that is coloured, and not the pulp beneath; but, whenever the point of their stems approaches the surface of the soil, it becomes green; and from that moment they acquire an upward tendency.

Stems are generally directed towards the light, in accordance with their colour, which is usually green; while the roots have usually a tendency to avoid the light, which coincides with their want of colour. The colour of the roots is, in fact, nothing but that of the vegetable tissue; and can by no means be compared to that of the petals of some plants, which arises from the presence of a white colouring matter. Light, which is the principal, but not sole, cause of the colour of stems and their organs, has no power of infusing colour into the roots, as may be easily seen by roots growing in glasses of water. In spite of the influence of the light, they constantly remain colourless; and this does not depend upon immersion in water, because leaves, developed in that medium, are nevertheless green. Although roots have, in general, no tendency towards the light, yet such a disposition does become manifest, provided the terminal shoot of a root becomes slightly green, as occasionally happens. Having induced some seeds of marvel of Peru to germinate in damp moss, I remarked that the young roots, when about as long as the finger, were terminated by a shoot of a slightly green colour. Wishing to know whether these roots would turn towards the light, I placed them in a glass vessel filled with water, having a wooden cover pierced with holes to receive the roots, and fix the seeds. I enveloped the vessel in black cloth, leaving only a narrow vertical slit, through which light could enter the interior. This slit was exposed to the rays of the sun; and, a few hours after, I found that all my roots had hooked back their points towards the slit through which light was introduced. The same ex-

periment was tried with colourless roots; but no alteration in their direction was produced. From this it appears evident, that colour is one of the conditions that determine the directions of vegetables and their parts towards the light, and consequently towards the sky. This is so true, that colourless stems are known to assume the directions of roots. In the *Sagittaria sagittifolia*, this is particularly obvious. Shoots are produced from the axillæ of all the radical leaves which grow at the bottom of the water. These shoots have their points directed towards the sky, like those of all vegetables. The young stems, which are produced by these shoots, are entirely colourless, like roots; and, instead of taking a direction towards the sky, as coloured stems would do, they lead downwards, pointing towards the centre of the earth. In order to take this position, the young shoot forces its way through the substance of the petiole which covers it; thus overcoming a mechanical obstacle in its tendency towards the earth. This subterranean stem next takes a horizontal course, and does not assume any tendency towards the sky, until the points become green. I have also remarked a similar phenomenon in roots. It is well known that exposed stems of many plants, produce roots; when green, they turn upwards, as in *Pothos* and *Cactus phyllanthus*; when colourless, they point downwards. Hence, it is to be inferred, that stems do not descend merely because they are stems, but because their parenchyma is coloured; and that roots descend, not in their quality of roots, but because their parenchyma is colourless. It seems, however, that although this law is uniform in its operation in all terrestrial plants, yet that a deviation, or apparent deviation from it, exists in the parasitic miseltoe. The radicle of this plant, which is of a paler green than the other parts, instead of turning towards the light, avoids it with so much pertinacity, that it is impossible to induce it to take such a direction; so that it seems to be repelled by light.

STORMS PREDICTED FROM THE AURORA BOREALIS.

BY MR. WILLIAM GARDINER, JUNIOR, OF DUNDEE.

I FEEL much pleasure in being able to communicate a fact or two respecting the atmospheric changes indicated by the appearance of the Aurora Borealis, corroborative of these adduced by Captain Winn, at page 108.

For several years past this splendid phenomenon has been of frequent occurrence, and I have observed that it was invariably followed by moist weather, and a southerly wind, or at least a decided change from that which preceded it. Sometimes the change was immediate, at others it occurred after the lapse of a few days, and in extent was proportionable to the brilliancy of the aurora; a magnificent display of the phenomenon being generally succeeded by a violent storm or a continued fall of rain, and a faint one by merely a haziness of the atmosphere, or at most a moderate shower. These assertions are the result of observation, and based upon a multitude of facts, of which the following are examples:—

August 13, 1828. Several beautiful streams of the aurora borealis appeared above the northern horizon about midnight; sky clear; wind E. 14. Cloudy, with passing showers. 15. Cloudy till noon, wind S. The five succeeding days were dull, with occasional soft showers, the wind varying from W. to S.

September 15, 1828. A luminous arch seen about nine in the evening; wind changeable. 16. Wind W. 17. Dull and cloudy; wind variable. 18 and 19. Same as the preceding. 20. Still dull, with a chill east wind. 21 and 22. Mists and clouds still prevailed; wind S. E. 23. Much rain. 24. Cloudy and showery: in the afternoon the equinoctial gale commenced blowing with great violence from the S. W., and continued with little intermission till the 2nd of October, when it gradually diminished to a gentle breeze, and on the 6th veered to the S. E.

October 3, 1829. Vivid aurora illuminated the northern sky, immediately succeeded by a strong gale from the S. W., which continued, with the exception of a few slight variations to the W. and N. W., till the 12th. There were several showers on the 6th, and rain commenced falling about nine o'clock p. m. on the 12th, which continued till the same hour on the following evening.

August 20, 23, and 26, 1830. Bright auroræ boreales, which were attended with cold, wet, stormy weather, and destructive hoar-frosts. *November,* same year. About the middle of the month the aurora appeared in great splendour, and the succeeding day brought a tremendous thunder-storm.

March 3, 1831. Aurora about ten in the evening. 4. Cloudy. 5. Heavy rain.

September 6, 1831. The aurora appeared above the northern horizon; beautiful, resembling the dawn of a summer morning. On the 7th, several

showers. For two or three successive evenings this phenomenon illumined the sky with its radiance, and was constantly followed by moisture.

January 22, 1832. Aurora seen. 23. Some rain. 24. Strong gale from the S. W.

February 26 and 28, 1832. Beautiful aurora. Much rain on the 2d and 3d of March.

March 21, 1833. Aurora resembling the dawn: wind N. 22. Cold S. E. wind, with drizzling showers, and some snow.

I might farther remark, that on those nights when the aurora borealis is brightest, there is a more copious formation of dew than at other times; and as it is now generally admitted that electricity is the principal, if not the sole agent in precipitating, in the form of rain and dew, the aqueous vapour held in solution by the atmosphere, I should think that the influence manifested by the aurora in this operation, is a strong proof of its electrical origin.

The *Luminous arch* is a modification of the aurora borealis of great grandeur, but of rare occurrence. Having witnessed several of these, a short account of them may not perhaps be deemed inappropriate in this place. One of these arches was seen here in 1816, a second in 1824, a third in 1826, a fourth in 1827, and a fifth in 1828. The last mentioned one was observed on the evening of the 15th of September. About half past eight o'clock a stream of white light appeared in the N. W., and another in the opposite point of the compass, which gradually, though almost imperceptibly, approached each other, and, uniting, formed the arch about nine. This arch was about the apparent breadth of a rainbow, but extended from horizon to horizon, passing nearly through the zenith, and had a considerable curvature in its centre, and another near its western extremity. It continued with different degrees of brightness for about a quarter of an hour, and then slowly faded away, the centre disappearing first. The atmosphere towards the north was clear, but the southern portion was crowded with gloomy clouds. On the evening of the 23d of August, 1830, I had the pleasure of beholding another luminous arch. The northern part of the sky was clear; in the east dwelt a few stationary clouds, on one of which the eastern limb of the arch rested, whilst the other was lost amongst a number of dark nimbose clouds that overspread the western sky. These clouds extended from N. W. to S.; and the direction of the arch was from N. E. to S. W. Flashes of light, like those of the aurora, seemed occasionally to issue from

the neighbouring clouds, and rush into the arch, as did also several of those meteors called "shooting stars;" and at these times the arch became more vivid. It was visible to us for the space of an hour. On several evenings during December, 1830, the aurora borealis filled the heavens with its glory. On that of the 25th its brilliancy and diversity of form surpassed every thing of the kind I had ever before witnessed. From seven o'clock till midnight, it occupied more than half the visible hemisphere, with all its magnificence of moving columns, spears, lances, bows, waves, &c. About eight, three bows or arches were formed, stretching from E. to W.; and between nine and ten, another appeared in the direction of N. E. to S. W. composed of alternate stripes or strata of light and shade, which had a singularly striking effect. The eastern extremity was curved or twisted. The last one that occurred here was on the evening of September 17, 1831. It appeared about eleven o'clock, extending from N. E. to S. W., of a beautiful serpentine form, being remarkably curved or waved from one extremity to the other.

Dundee, 5th of April, 1833.

ON THE HABITS OF TAME BIRDS.

BY MATTHÆUS SYLVATICUS.

IT is a common observation, confirmed by those naturalists who have had the greatest experience, that our knowledge of the wonders of creation is still in its infancy. One very interesting point, on which we are much in the dark, is that faculty of the brute creation, called instinct*. Now, Sir, it has always been my opinion, that one clearly substantiated fact tends more to elucidate truth than any number of theories and hypotheses, either wholly unfounded in fact, or built upon some casual exception to the general rule; and, with this feeling, I submit the following statement as a candidate for a corner in the "Field Naturalist's Magazine."

I am extremely fond of what I call practical natural history; but, as I reside in a large town, you will suppose I may find some little

* See page 54 of this Magazine, for an excellent paper on Instinct, by Dr. Virey, of Paris.

difficulty in pursuing it. I am, however, so happy as to possess a garden, about 140 feet in length by 40 in breadth ; in which, besides as many flowers as it will contain, I usually keep one or more tame birds, in the full enjoyment of unclipped wings, and at free liberty to leave my demesne if they feel so disposed ; but several have thought proper not to do so for three or four years ; and I believe that, when they at last disappeared, they were either stolen or devoured by cats. The bird with which I have had the most intimate companionship is the magpie, and I will now proceed to tell you a little of what I have observed in him. I shall not attempt to give you the characters of individual magpies, which I believe differ as widely as those of individuals of the human species ; their loquacity and propensity to theft are well known ; but I do not find many who are aware of the high notions which a magpie possesses of his own rights in whatever he deems his property. My magpie considers my garden as his estate ; he walks jealously behind any stranger who goes into it ; and if any attempt be made to touch a plant, a stick, or a stone, he flies at the offender with every demonstration of rage and fury. He perambulates his boundaries, *i. e.* the top of the surrounding wall, and never by any chance goes beyond them. Every evening he voluntarily enters a cage appropriated to him, shuts the door after him, and goes to roost on the perch. On one occasion, having some greenhouse plants turned out in the borders, I wished to send them, for the winter, to a friend in the country : a cart was accordingly brought to the gate, and a man commenced removing the plants from my garden ; but Mag, seeing his estate thus plundered, made a vigorous attack upon the spoiler ; he would jump on each pot as the man took it up for removal, and peck his hand until the blood sprung from it ; and he followed him, constantly pecking his heels, to the garden gate, but no further ; for he then would run back to me, chattering loudly, and looking up to me for approbation. He once entered the open window of a room where breakfast was set out, before the family came down stairs ; he drank largely out of the milk jug, tasted the butter, and concluded by throwing down upon the floor the toast, spoons, knives, and every thing that he could move. Having done this, he sat on the back of a chair apparently quite delighted at his exploit. If any one looked particularly at a flower, he would nip it off, and bury it for security. I had, for some time, a tame jackdaw to keep him company. This bird is fond of getting into dark holes and corners, which Mag studiously

avoids. In a small lobby, opening into the garden, there is a little cupboard in the wall, about a yard from the ground. I once saw the jackdaw enter this cupboard, and, with great labour, drag out a bunch of large keys, which he threw down to his friend Mag, who was waiting below. Jack then descended, and the two together worked in good earnest at pulling the keys into the garden, no doubt intending to hide them, had I not stopped their proceedings. This jackdaw frequently hid himself in a dark corner by the larder door, waiting patiently until the cook came to open it; he would then try to slip in unperceived behind her, and hide himself behind a large cheese-pan, in hopes of being left among the good things.

I once had a magnificent cock pheasant in the same manner; he was as tame as the magpie, but not so amusing or cunning. I also had a thrush who was perfectly tame; he would wade up to his neck in a little pond of gold fish, which was under the branches of a large mulberry-tree, for the purpose of getting the fruit that fell into it. In short, I have not met with any bird in whom kind treatment would not give rise to tameness and affection.

April 8, 1333.

ON THE CELLULAR TISSUE OF PLANTS.

BY PROFESSOR LINK, OF BERLIN*.

THE tissue of cells in plants consists of small membranous vesicles, very variable in form. There is nothing of a fibrous nature perceptible in them; and M. Mirbel, (*Exposition de la Théorie*, p. 5859), and M. Sprengel (*Anleitung z. Kenntnis d. Gewächse*, Halle, 1802, t. i. p. 92), are right in rejecting the common opinion, that all is evolved from fibres that exist throughout. Such as are unprejudiced, will agree with these two naturalists in considering the membrane as the primordial substance of vegetables, and, I may add, of all organised bodies. These vesicles, which compose the tissue of

* Translated by Miss H. G——, Lee, Kent.

cells, are often separated from each other, sometimes quite combined, and sometimes partly so. I have found them entirely separated from each other in several parts, especially in fruits; the berries of the *Ligustrum*, and of the *Lantana aculeata*, furnish proofs of this. In the midst of the fruit stalks, the receptacles, and some other hollow parts, single cells are often seen. In order to examine the tissue of cells in this respect, it is necessary first to boil the part, because the cells are then easily detached from each other.

Fig. 1.

The oblong cells, taken from the exterior of a French bean, are shown in the figure. I have seen the same thing in the potato, when boiled; in the roots of parsley, &c.

We cannot separate the cells in the rind (*epidermis*) of plants, by this or any other method; for there they are entirely united. The cells that are found immediately under the rind, are also inseparable. No interval being discoverable between the cells of this kind, it is, therefore a tissue of cells, continued without any interruption.

In fine, there are cells which are not entirely united. The partitions united with each other in the middle, are separated towards the edge, and leave a little interval, similar to a vein. This structure is generally found in all succulent plants, in the pith, and, in general, in all the fleshy parts. Hedwig was acquainted with these little intervals, and called them *vasa revehentia* (*De Fibræ Animalis et Vegetabilis Ortu*, Lips. 1790, p. 23.) M. Sprengel pretends that Hedwig is mistaken, and that he has looked at the lower edge of the partition, by the transparent membranes, beside the upper edge, which causes the appearance of an interval, or vessel. He is right; one may easily be deceived in this; but on looking obliquely at the tissue of cells, we

may plainly distinguish the upper edge of the partition from the lower edge; and at the same time may be observed the little interval, which is usually filled with a dark matter, somewhat fluid. This is represented in the figure, (2) as taken from the stalk of the *Cacalia ficoides*.

Fig. 2.

M. Treviranus calls these intervals *meatus intercellulares*. They are found only between the edges of the partition; the rest of them exhibit only a simple membrane. I find also other intervals between these cells, which may be called *Ductus intercellulares*. They descend in a perpendicular direction; they have no visible communication with the intervals which I have just described, and they contain a juice which is less fluid than the sap, and issues sometimes in the form of small round corpuscles, and sometimes in the form of crystals. These canals are considerably larger than the *Meatus intercellulares*. These are represented in the figure (3), in a cross section

Fig. 3.

of the stalk of the *Cnicus oleraceus*, and in a longitudinal section of the same stalk. They are found in many plants, particularly if the tissue of cells is not very close, and they may be ranged among the reservoirs of the pulp.

In the ferns and mosses the intervals are so large, and so well united together, that they perfectly resemble vessels. They form a

net-work, of which the meshes are the cells. It is very probable that Hedwig, who has written much on the theory of the mosses, has suffered himself to be deceived by this same net-work, so as to believe it constitutes a separate species of vessels, which he called *vasa revehentia*. Such a net-work occurs in the scales (*strigæ*) of the *Scolopendrium vulgare*, and is remarkable because the intervals are of a different colour from those of the cells; and they furnish an undoubted proof of the existence of the intervals.

M. Mirbel compares the tissue of cells to froth produced by soap and water. This comparison is very exact. I do not know a better. But the author entirely forgets the double partitions, which do not agree with this comparison; for the froth of soap is composed of bubbles of air, separated originally from each other, so that each bubble is formed, as it were, of a separate membrane; and it is only by approaching, that these partitions are confounded together. It often happens that single bubbles rise to the surface of the froth, as we see single cells in the cavities of the stalks in the receptacle of flowers or of fruit. I even think that the cells have had the same origin as the bubbles: gas having developed itself in a viscous fluid, and reduced it to little vesicles, which have united together. As the vesicles of the tissue of cells have a more regular arrangement than soap bubbles, a particular attraction, necessary for the growth of the vegetable, must have set them in that order. According to M. Sprengel, the tissue of cells derives its origin from small grains, which are found in the cells of the seed, and several other parts. I have proved that these little bodies are usually grains of starch, sometimes grains of mucilage. They may be dissolved in warm water, and sometimes in cold, while on the contrary, the membrane resists all these solvents. It is therefore certain that these little grains are not cells. But it is very possible that these grains may be dissolved in the sap; and that they then form that viscous fluid, which gives rise to the production of new cells.

The cell appears to be perfectly closed, so that the sap, which doubtless passes through the tissue of cells, penetrates by imperceptible pores. There are examples, in which we distinctly see the juice pass through this kind of pore. If the flower cup of the lettuce be pressed ever so little, a small drop of milky fluid appears through the rind, where no pores are discernible, even with the aid of the most powerful microscope. M. Mirbel has, however, found pores, sur-

rounded by a little *gland* in the partitions of the cells. As the observations of this naturalist are so exact, I am in doubt on this subject. I have seen little points raised above the membrane: I have seen a clear transparent spot in the middle of these points, and have often believed I had found a real pore, but have always resumed my own opinion. These little points were sometimes so crowded on each other, that they may be taken for little grains fixed on the membrane, and transparent in the middle. This is my opinion. It is for others to decide on it.

There are many varieties of the tissue of plants, which may be distinguished in the following manner:—

1st. *Honey-comb Tissue*.—It consists of short cylindrical or prismatic cells; and is very common, especially in the pith, the exterior bark, &c., as is represented in the figure.

2d. *Extended Tissue*.—This differs from the preceding, in the cells being longer and narrower. They are found in the stamens, the pistils, and in some other extended parts, as in the pistil of the *Antirrhinum majus*.

3. *Globular Tissue*.—It is composed of cells, either spherical or nearly so, and fills up the interior of the leaves, of the flower stalks, and of the receptacle, &c.

4. *Vesicular Tissue*.—Composed, like the preceding, of spherical cells; but these cells are more detached from each other, and are often dispersed. This tissue is common in mushrooms, and several species of *Agarici*, of *Peziza*, and of *Phallus*, are constituted entirely of vesicles.

5. *Irregular Tissue*.—The partitions do not always form the same angle with the base; sometimes it is a right, sometimes an acute, and sometimes an obtuse angle. This tissue is found in the sheath of the

leaves, in the flower scales, the flower cups, &c., and especially where one part is attached to another, as in the flower scale of the *Scirpus maritimus*.

6. *Pulp Tissue*.—The cells are neither spherical, cylindrical, nor prismatic; but of an oval or oblong form. This tissue is common in the interior bark of trees, in the pulp, (for which reason I have called it the pulp tissue), and especially between the fibrous vessels, besides the air vessels, as in the interior bark of a root of the *Malva crispa*.

These six varieties of the cellular tissue admit of several varieties, and intermediate forms are often found, which seem to partake of two varieties. A seventh variety might be added, the compact tissue, which is found in some mushrooms, lichens, &c.; but this tissue is scarcely evolved, or rather it is so fine, that the structure of it cannot be distinguished.

The arrangement of cells is generally alternate, and the rows are parallel to the length of the part in which they are found. Sometimes these rows are arranged crosswise. I have found this arrangement in leaves when they are cut in a direction perpendicular to the surfaces, which it is very difficult to do, especially when the leaves are thin; but in the latter this arrangement is more distinct than in succulent leaves, where they are usually absent.

They are found in the young leaf just unfolded. These cross fibres are seen in the middle of the wood, and on the surface of the large roots of the *Malva crispa*. They are not found in the small roots, and I am sure that they are formed by the enlargement of the root, which spreads the bark, and draws aside the meshes of the net-work which forms the cells. Take a net made of thread, stretch it sideways, and you will see the meshes arrange themselves in horizontal rows in a manner similar to that which we have just described.

The cell increases in size with the rest of the plant. It is astonishing that a cell, surrounded by wood, should spread itself, notwithstanding the resistance which the latter opposes to it. All organised bodies evolve themselves and grow by a strong power, and the plant in its evolution breaks a strong thread which may be tied around it.

Each cell is a separate organ, destined to preserve and prepare the pulp which is destined to furnish the other parts. The superfluous part penetrates into the *Meatus intercellulares*, and somewhat resembles the fat of animals. The green matter by which plants are coloured is

always found in the cells. * It resists the action of water, but dissolves in spirits of wine. This solution is not precipitated by water like that of the resins. All the coloured matter of leaves, flowers, and fruits, are contained in the cells, as well as in the acid, astringent, saline, &c., juices. In short, we there find the farina which forms the seed, and the mucilage which sometimes forms little seeds, and sometimes small crystals, and sometimes is already fluid. Chemical anatomy has shown me remarkable varieties in the mucilage of plants.

MR. FAIRHOLME ON SCRIPTURE GEOLOGY*.

AT a period like the present, when many of the disciples of modern geology either boldly disclaim all belief in the Mosaical account of the creation, or consider it, at best, as a mere allegory; and when others, with a less daring, but not less dangerous scepticism, admit, with Moses, the broad, self-evident truth, that God did, at some time, and in some manner and form, call this world into being by his own immediate act, but deny that the time and mode are explicitly detailed in the sacred record he has bequeathed us; when both allow, that since the first creation it has obviously undergone a violent revolution, but contend that the history of the deluge is insufficient to account for it; and when a third party, professing its belief in the Mosaical history, tampers with its details, or distorts them to any meaning that may best suit some favourite hypothesis, extending days into ages, multiplying revolutions, and, in short, giving the sacred text any interpretation rather than the literal and true one; at such a period we hail the appearance of the work before us with unfeigned satisfaction. To relieve the mind of the anxious and sincere inquirer after truth from perplexity; to disengage it from error concerning the important subject of which it treats; and to demonstrate the essential connexion between scriptural and physical evidence, when we endeavour to explain the causes of the present state of the crust of the earth, by the sensible

* A General View of the Geology of Scripture, in which the unerring Truth of the inspired Narrative of the early Events in the World is exhibited and distinctly proved by the corroborative Testimony of physical Facts on every Part of the Earth's Surface. By G. FAIRHOLME, Esq. 8vo. London, 1833.

phenomena it presents to our inspection, are the objects of Mr. Fairholme, who seems to have a very extensive practical knowledge of geological facts, and exhibits a very amiable spirit in bringing these to bear against the theories of the mineral geologists. It will not suit the nature of this notice to go regularly over the same wide field of research which the estimable author has done; but this will be the less necessary, as most readers who feel interested in the subject will, we hope, procure the work itself, and those who wish to see an outline of the leading principles which he adopts, may find them in "Conversations on Geology," pp. 293—315, by the Editor of this Magazine. We shall, therefore, content ourselves with such extracts as will prove Mr. Fairholme to be a practical geologist, because those who pique themselves upon what they boastingly term science, which very usually at present in reality means absurd theory, are in the regular habit of taunting writers who take common sense and sound principle for their guides, with ignorance of facts and blind bigotry in religion. We give the following from Mr. Fairholme's personal observation.

"As one instance of the power with which rivers act, in filling up inland lakes, and in adding to the accumulations in the bed of the sea, the following example may serve to give an idea.

"The river Kander, a mountain torrent of no great size, rushes down the valley of Kanderthal, in the Canton of Berne, in Switzerland, and enters the lake of Thun, about four miles from the town so called. About a hundred years ago this stream did not flow into the lake, from which its course was cut off by a ridge of diluvial hills of several hundred feet in height, stretching along the south side of the lake, in a north-westerly direction. This diluvial ridge, extending more than ten miles in length, is entirely composed of rounded gravel, or pudding-stone.

"In consequence of the mischief done by the overflowing of the Kander, to a great extent of valuable meadow land, in its course to join the Aar, ten miles below Thun, which was its natural course, a spirited plan was proposed and adopted, for cutting a subterraneous passage for the river, through the above mentioned ridge, at a place where it approached the lake within about a mile, and thus admitting it into its bed. This passage was cut in the beginning of the last century, (about 1715). The descent was rapid, from the lake being considerably lower than the old course of the river. At this period, the depth of the lake was in proportion to the steep hills forming its shore. The Kander had not long followed its new subterraneous course, when it greatly enlarged the artificial tunnel, and hurried great quantities of gravel into the lake. The rapidity of the torrent in a few years enlarged its course, till at length the whole superstructure gave way, and fell in; so that there is now a most romantic wild glen, where, a century ago, there was smooth pasture and woodlands. The effects of the torrent soon became apparent in the lake, an immense quantity of gravel, and every species of rock, was carried in by the current, and lodged in its bed. In 1829, when I lived in that neighbourhood, the

bed formed of this *debris* was of not less extent than 300 acres ; the greater part was covered with thick woods, and this secondary formation is every year increasing in the same proportion ; so that, as the lake is not here of great breadth, there is every prospect of a rapid and most material change taking place in its form. I have sounded the lake at the *present* mouth of the Kander, and as I found no bottom with a line of about a hundred feet, we are certain that this mountain stream, has, in little more than one century, produced a secondary bed of mixed materials, of fully *three hundred acres*, and at least *one hundred feet in depth*.

“ One circumstance, however, is worthy of remark, with respect to such secondary formations in fresh water lakes ; and that is, that in consequence of the absence of tides and currents, and that constant *lateral* movement kept up in the bed of the sea, we never discover in them that *stratified* regularity so remarkable within the action of the tide. The mixture of mineral bodies carried into an inland lake, remains, therefore, exactly as deposited at first, and this must always be in great confusion. This difference of effect, may, perhaps, be safely taken as a guide, in judging of what some geologists have called *salt* and *fresh water formations* ; and if this be correct, we have an additional evidence against the extraordinary theories, of Cuvier, who supposed the well defined strata of the Paris Basin, to have been occasioned by the alternate occupation of that Basin by salt and fresh water. The rounded pebble and sand, found in lakes, are never formed in the lakes themselves, as they are in the bosom of the sea, but are carried into them by the rivers, nearly in the shape in which we find them.

“ It may, therefore, be safely assumed, that the regular strata of sand, of gravel, or of fine clay, found in mosses and shallow lakes, if quite distinct from other strata, must have been formed at the period of the Deluge, under the influence, and by the agency of the action of the sea.”—*Page 126, Note.*

To those who adopt the untenable theory, that the causes at present in operation are sufficient to account for all the appearances to be observed on the surface of the globe, the following fact seems to be somewhat unanswerable, even if we grant them thousands, or even millions of years.

“ There cannot exist a doubt,” says Mr. Fairholme, “ that, though England be now separated from France, by a distance of from twenty to forty miles, and that distance be now occupied by the sea, the whole intervening space, and a great extent of both countries, form one contiguous secondary formation of chalk, of which the *basins* of Paris, London, and the Isle of Wight, so well known to geologists, form a part. It is the opinion of some, whose ideas in geology are quite unfettered by history, as to time, that the two countries were once united, and that the separation has been effected by gradual decay, from the action of the sea upon a narrow isthmus. But *history* will not bear us out in this idea ; for we know from certain landmarks, which existed many centuries ago, such as the Roman part of Dover Castle, and other ancient buildings on the coast, that the decay of the cliffs, though constant and gradual, has not been such in the last 2,000 years as to warrant

any such conclusion, supposing the Deluge to have taken place, as we have reason to know it did, about 4,000 years ago."—Page 120, *Note*.

We have spoken above of the amiable manner in which Mr. Fairholme treats those whose theories he opposes and refutes, and we might prove this by a considerable number of quotations, but one will suffice. In a postscript to his introductory chapter, Mr. Fairholme says:—

"Since this work was completed, the 'Principles of Geology,' by Mr. Lyell, have appeared; a work of very great talent, and full of interesting research and information on the *secondary causes* in constant action upon the earth. This able writer, has, however, taken, in some respects, a new line of theory, and is as desirous of accounting for the phenomena on the surface of the earth, without the aid of any unusual or preternatural convulsion, as other geologists have been to press into their service a constant repetition of deluges and disasters. We find, that while Cuvier inculcates the doctrine of numerous deluges, alternately of salt and of fresh water, Mr. Lyell endeavours to account for all things without the aid of any general deluge, though he considers local deluges as amongst the ordinary occurrences of nature, and producing violent local effects. The Mosaic deluge appears to be looked upon either as a fable, or as a less general catastrophe than it is usually conceived to have been; and as a supporter of the Mosaic account of it, it is probable that I shall be classed among those '*physico-theological writers*,' who, in the early days of science, wrote, it is true, but little worthy of saving them from the contempt with which they are here treated.

"As it may be easily conceived of a theory where all things are to be accounted for by the slow and gradual march of natural secondary causes, Mr. Lyell's system requires an unlimited period of time for its completion; and in tracing the errors into which other philosophers have fallen, he thinks there can be no wonder if such should be the case, when *hundreds* of years are reckoned instead of *thousands*, and thousands instead of *millions*. Mr. Lyell accounts for the elevation of mountain ridges by successive up-heavings of volcanic force, small in degree, but of frequent repetition, and, having time at command, he finds no difficulty in this process.

"But notwithstanding this theoretical argument in the 'Principles of Geology,' so distinctly opposed by so many facts in nature, and with regard to at least *one deluge*, so totally opposed to history, and the traditions of all nations, Mr. Lyell has taken a very learned and extended view of *secondary causes*, and of *secondary formations*. On the evidences to be derived from the fossil remains of quadrupeds, however, he has encountered the same difficulties as Professor Buckland, without having succeeded in throwing any greater degree of light on the obscurities of that subject."—Page 32.

In conclusion, we strongly recommend the work to those who may have been led to adopt plausible theory for science, and to deduce hasty general conclusions from one or a few solitary facts. We trust that the

intelligent author may be induced to follow up his investigations at some future opportunity into more detail, as his resources are evidently good as well as abundant.

ON THE ORGANS OF SENSATION.

BY PROFESSOR RANZANI, OF BOLOGNA*.

As there are different kinds of sensations, the impressions which arise from them will also be various. Such impressions, then, must be made upon organs constructed in such a manner as to prove their effects, and, consequently, to awaken in the mind corresponding sensations. To these organs—of which every animal possesses a certain number—the name of *sensorium* has been given. The organs of sense are formed in different parts, and, with the exception of that of the touch, are exceedingly limited. Among the parts which compose an organ of sense, some serve to modify the impression, and others prove, in an especial manner, its effect, and transmit it to the seat of the mind. These ultimate parts of the *sensorium*, without which no reflex sensations can be experienced, are called nerves. The nerves are either visible or invisible; those of the most minute animals will never be evident to our eyes. When the nerves are perceptible, we recognise them by means of those which are known, or we do not recognise them. Poli, for example, in dissecting certain moluscous animals which inhabit the Mediterranean sea, saw their nerves, described them, and gave an exact figure of them; yet did not consider them as nerves, and therefore indicated them by a very different name†. Many nerves of our own body are well known to us. Their figure, colour, and structure, serve to guide us in judging of the nerves of other animals. If the nerves of the latter bear no resemblance to ours, we shall not regard them as nerves. Within these few years, the nerves of many animals have been discovered, and, except in the minutest class, which comprehends microscopic animals, they exist in every other animal whose nerves have been observed and acknowledged. There can be no doubt, then, that all animals have nerves, since all animals are

* Translated from the Italian by James Flewker, Esq. of the Theatre of Anatomy, Windmill-street.

† Testacea utriusque Siciliæ, &c.

capable of feeling ; nor, indeed, can there be sensations without such organs. Therefore, greatly do all those err, who impugn this assertion by declaring, that nerves do not exist in many animals, since they are imperceptible to us. Our not seeing and not recognising the nerves, unquestionably arises from the extreme minuteness of the animals, or from the excessive subtlety of the nerves themselves, or from their want of that resemblance to the nerves of our own body, which is required to render them distinct and palpable. They who formerly employed this argument would display gross ignorance to deny the existence of nerves in those animals in which modern anatomists, through their industry and diligence, have discovered them. But some one will perhaps remark, should we not deny the faculty of feeling to plants, because, as they have not been observed to possess nerves, we may judge that they have not any ? I have already replied, that it is not the want of nerves which leads men generally to suppose that plants have no feeling ; it is, indeed, their not seeing, in the motions of plants, any indications of sensation, which induces them to form such opinions ; which thing being certain, the other proof, deduced from not recognising nerves in them, acquires no little weight ; and which, independent of the former, would obtain no value. And in respect to less perfect animals, the reflection that they so move, demonstrates to us, that they have sensoria and sense, at least that of touch ; and they perform numerous actions in a manner similar to that in which other animals comport themselves, when they act voluntarily ; this, as I have observed in another place, is the strongest motive for reputed them animals, and therefore provided with nerves and all the other parts which appertain to sensations and voluntary motions. And if in some of them we are not able to discover nerves and muscles, we may easily persuade ourselves that it arises from a quite different cause, and perhaps from the total want of organs so constructed.

The nerves, which we observe and acknowledge in different animals, are soft whitish filaments, formed internally from medullary substance, and invested with a membrane denominated the neurilema. Whether these very subtle fibres are round or flattish-round—whether they have or have not an internal cavity—whether they are internally pervaded by a most active fluid, which deserves the name of nervous fluid—or whether they are destitute of such fluid, are researches which belong to the physiologist and anatomist, and in respect of which we have hitherto received no decisive evidence. In those animals in which the

nerves appear they are not isolated and dispersed, but communicating and united together, forming an assemblage, which is called the nervous system. This communication, and this re-union of the nerves should persuade us that those persons are in error who pretend that the nervous system in animals has no centre of this kind. It is not besides necessary that the centre, thus spoken of, should be a mere spot, and we have reason to believe that it has an extension, which it is not in our power to determine. Nor would it be reasonable in us to indicate with precision the situation of such a centre in the absence of those observations and those experiments which alone could establish the fact, and which, perhaps, we shall never be able to accomplish. The nervous system in different animals presents great differences, of which there are four principal, and the remainder may be considered as varieties.

In more perfect animals the nervous system is composed of a primary mass, called the brain, of a large trunk called the spinal marrow; then of filaments which ramify, and sometimes closely unite, to form those minor nervous masses which have obtained the name of nerve-knots or ganglia.

In other animals the nervous system is composed of scattered nervous masses, connected by filaments, one of which, situated above the gullet (*œsophagus*), is called the brain, and out of this proceeds a collar which surrounds the gullet. Other filaments which ramify and distribute themselves to the parts, issue as well from the brain as from the other nervous masses.

There are, besides, animals over the belly of which run two longitudinal nervous cords, which frequently swell out, and sometimes form nodes or ganglia, distributed in a regular row. Of such nodes, that which remains upon the gullet is denominated the brain. From the same part a collar which encompasses the gullet, and the nerves destined for the different parts, as well from this first node as from the subsequent ones, derive their origin.

Finally, in animals whose structure is tolerably simple, the nervous system consists of filaments without ganglia and without brain; one of these filaments surrounds the mouth, and from it again proceed others like rags, and ramify and distribute themselves to the different parts.

Such is the principal division which we are, at present, able to make of the different forms of the nervous system. It is not improbable that, as discoveries advance, we shall afterwards have occasion to

amend and correct it. The nervous system being formed of the principal organs which are subservient to the sensations, that is to say, to the most essential functions in animals, it is manifest that the consideration of such a system should create a deep interest in the zoologist.

ON CATCHING, TAMING, AND KEEPING NIGHTINGALES.

BY M. WICHTERICH, OF BONN*.

I HAVE been informed, that, in England, the greater number of Nightingales confined in cages die within a short time after they are caught, and rarely outlive the succeeding winter. This is so far from being the case with me, that I should be ashamed to say I had ever lost more Nightingales than of any of the other birds usually kept in cages; though M. Bechstein has also said, in his Natural History of Cage Birds, that all his Nightingales died within no very long time.

When I have a Nightingale newly caught, I put him in a cage of the form usually called a Nightingale's cage, cover it with a *white* handkerchief—because any darker colour would intercept the light—throwing in ten or twelve meal worms, previously pinching them on the head, to prevent their crawling away, and about a handful of fresh ants' eggs†. If it do not take to the ants' eggs at first, it will be sure to do so after a few trials, by throwing the meal worms over them. About half a dozen meal worms may be given every three or four hours, for a day or two, till it takes to the eggs; after six or eight weeks it will not be necessary, except for a treat, or as an occasional change of food.

As soon as it takes to feed well, it will begin to sing, which will take place at the longest in about eight days; and it will be important, unless the cage be kept covered with the *white* handkerchief, to let it remain in the same place, as change of place will often make a nightingale leave off singing. Ants' eggs, in the quantity of a hand-

* Translated from M. Wichterich's manuscript communication to the Editor, by Edward Rennie.

† The cocoons (not eggs) of the wood ant (*Formica rufa*), which are sold by measure in Germany, and are plentiful in our own woods.—ED.

ful, or more, daily, for each bird, ought to be the principal food, so long as the nightingale is in song; but when done singing, the composition, called German paste, may be given. It is made in the following manner, of much better quality than what is sold in the shops.

Take four fresh eggs, boiled very hard, a quarter of a pound of white pease meal, and about a table spoonful of good salad oil—if the least rancid, it will not do. The eggs must be grated down very fine, and mixed with the meal, and olive oil. The whole is then pressed through a tin cullender, to form it into grains, like small shot, then placed in a frying pan, set over a gentle fire, and gradually stirred with a broad knife, till it be partially roasted and dried, the test of which will be its fine yellowish brown colour.

All insect-eating birds will soon learn to eat this food, upon which they may be kept all the year; except when they appear drooping and unwell, or at moulting time, when they ought to have a few meal worms twice or thrice a day. While they are in song also, they ought always to have about a dozen or more meal-worms, in the course of every day, with ants' eggs, either fresh or dried. I have had several nightingales, however, which have sung when fed upon the paste alone, without meal-worms.

From the sort of food given by M. Bechstein, I am not at all surprised so many of his birds died when first confined. In order to make a fresh caught bird take to feed, he advises to dip it in water, and after it has shaken and dried itself, it will, he says, be rendered hungry, and will readily feed. By my method of giving meal-worms and ants' eggs, I never found a single bird refuse to feed, so that the cage be properly covered with a white handkerchief.

The net for catching nightingales which I recommend is made with a semicircular hoop of iron wire, about as thick a swan's quill, raised upon a cross stick like the common brick trap. Meal-worms are fixed upon the cross stick with pins or thorns, and when the bird pulls these the stick is deranged and the net falls.

There are two varieties of the nightingale, one which sings both in the night and in the day, and one which sings in the day only. I have found only one that sung in the night out of twenty or thirty caged nightingales. The night singers are considerably larger and darker coloured, that is, not so rusty red as the day singers, and they are, according to M. Bechstein, more partial to high ground, while the day singers frequent valleys and hollow ways. When it is particularly wished to have a night singing bird, the haunt of one must be dis-

covered about ten o'clock at night, and the bird-catcher must remain by it till daybreak, when, if his net is in readiness, he may be sure to take it. I had one night singer last spring, which struck up the fourth evening after he was caught.

Bonn on the Rhine.

ON THE DISCOVERY OF THE CIRCULATION OF THE FLUIDS IN INSECTS.

BY THE EDITOR.

IN INSECT TRANSFORMATIONS, published in 1830, I have said respecting certain alleged discoveries of the circulation of the blood, or the fluid similar to blood, in insects, that they "furnish no proof whatever of a general circulatory system, though they appear to indicate local movements;" and in the ALPHABET OF INSECTS published in 1832, I have said, "there is not, and *cannot be* any real or direct circulation of blood in insects." These are the result of as careful and cautious an investigation of the facts as it was possible for me to make, and my conclusion has not been in the least shaken by anything that has been, so far as I know, subsequently published; for though I have met with an alleged more recent discovery of the circulation in insects, this is decidedly nothing more than a repetition of what has been well known from the time of Lyonnet and Comparetti, and more lately from the works of Straus-Dürckheim, and Dr. Carus of Dresden. The opinion of Lyonnet is well known, and Bonnet has given a luminous abstract of it, and agrees with the author in a note to his *Contemplations de la Nature* (iii. 19). Comparetti, who in 1800 investigated the subject with great minuteness in the grubs of *Ephemera*, and numerous other insects, says, "the vascular system of the circulation begins from the pulsating dorsal trunk," [*cœur*, STRAUS; *grande artère*, LYONNET] "and proceeds by very minute branches through every external and internal part, of the abdomen, of the corselet, of the head, and of the members, flowing back to the greater non-pulsating trunks." He concludes that "the manner in which the fluid of the insect is conveyed to the pulsating organ, with the various properties of the vascular system, remain to be demonstrated*."

* I subjoin the original Italian of the passages which I have here translated.

Even before this, however, the illustrious discoverer of the circulation of the blood, says that "in bees, flies, and wasps, the heart could be distinguished by means of a magnifying glass*;" and M. Lesser also expressly says, "the fluids circulate in insects, and the arteries have a sort of pulsation, which consequently indicates a heart, or something similar†." Baker again speaks of the current of blood being remarkably visible in the legs of some small bugs, and he observed a green fluid passing through the vessels of the wings of grasshoppers.

The late Baron Cuvier, after trying all the usual modes of injecting the great dorsal vessel of insects, as Lyonnet had previously done ‡, could not discover the slightest trace of outlet or inlet thereto, than which nothing could be more decisive against a direct circulation; and M. Marcel de Serres, in 1819, in some experiments not very justifiable, succeeded in removing this dorsal vessel, without causing the death of the insect; but if it were a heart circulating blood, it is impossible that the insect could live without it.

In 1824, Dr. Carus of Dresden published an essay in which he lays claim to the discovery of a circulating system in insects, particularly in the grub of the common day fly (*Ephemera vulgata*), at the same time confessing (and this is an important point) that the circulation ceases in the adult insects, a circumstance for which he endeavours to account on a similar principle to the obliteration of the blood vessels in the bones and feathers of adult birds. Dr. Carus, however, is clearly of opinion that "the insect blood in its currents is not confined to vessels," like the blood of larger animals§.

In 1826, Messrs. Kirby and Spence, after examining the opinions of previous authors, with the exception of Lesser, Comparetti, and Bonnet, conclude very justly, as I still think, that "there is clearly no circulation." But one of these authors, Mr. Spence, writing from Dresden, 28th of August, 1829, admits the discovery of Carus. "The first

"Il sistema vascolare della circolazione, comincia dal tronco dorsale pulsante, e progredisce pe' rami li più fini per ogni parte esterna, ed interna, dell' addome, del torace, del capo, e de' membri, ricorrendo a' tronchi maggiore non pulsanti." "Resterrebbe dimostrato il modo, con cui il liquido dell' insetto si porti all' organo sante colla diversa qualità del sistema vascolare."—COMPARETTI, *Dinamica Animale*, 8vo, Padova, 1800, part i. pp 230 and 236.

* Harvieux, de Motu Cordis, c. 17.

† Theologie des Insectes, ii. p. 91, 8vo, à la Haye, 1742.

‡ Anatomie de Chenille, p. 427.

§ Carus, Entdeckung eines einfachen vom Herzen aus beschleunigter Blutkreislaufes in den Larven netzflughlicher Insecten. 4to, Leipzig, 1824.

insect," he says, " to which Dr. Carus directed my attention was the larva of *Ephemera vulgata* (or an allied species) in which near to the bronchiæ, and parallel with each side of the body, was very distinctly visible a constant current towards the tail, of oblong globules swimming in a transparent fluid, propelled with a regular pulsating motion ; and on cutting the body of the larva across near the tail, three globules were most plainly seen pushed out of the divided vessels in a distinct mass, which increased at each pulsation. I cannot express the pleasure which it gave me to see thus clearly this ocular demonstration of one of the most important physiological discoveries of modern times."

These are almost the very terms used in the Examiner newspaper, 14th April, 1833, respecting another alleged discovery of the circulation in insects, claimed for James Bowerbank, Esq. F. G. and Z. S., but who has not, so far as I am aware, made any such claim himself. The details of this *newest* discovery, however, amount to no more than those of Comparetti in 1800, of Carus in 1824, and of Straus-Dürkheim in 1829, and relate chiefly to the grub of an Ephemera, as do those of Comparetti and Carus. It is particularly worth remarking that Mr. Bowerbank expressly says that " the blood does not appear to be confined within any specific vessels," before it passes into the dorsal vessel ; which is unquestionably correct, as most naturalists have expressed the same opinion, from Lyonnet downwards ; but it at the same time proves that there cannot be any direct circulation.

It may be worth quoting from Goring and Pritchard's Natural History of Living Objects, published February, 1829, a passage respecting the circulation in the grub in question, particularly as it certainly contains a discovery, though this has not, I believe, been claimed as such.

" During the infant state," it is remarked, " of this larva's existence it is very transparent, exhibiting, under the microscope, in a most surprising manner, the circulation of the blood along the large arteries in the body, legs, and tail. While traversing the tail, the blood resembles a string of globules. The part which exhibits the most rapid circulation is the lower lip. The passage of the blood through the head has a very singular appearance. It runs through a vessel which passes quite round the body of the larva, constituting a band, which, incurving itself on the head, forms, as it were, a semicircular chain round the base of each antenna."

The celebrated Goethe has well remarked, that " the number of real discoveries is small, especially when one views them consecutively through a few centuries ; yet people are very busy in repeating what has been discovered by others." Viewing the alleged discovery above

referred to, under this point of view, I think I am fairly entitled to repeat from *INSECT TRANSFORMATIONS*, p. 403, that it “does not advance a step in demonstrating a circulation in insects similar to that of other classes of animals.”

I have given details at length from M. Straus-Dürckheim, in the *ALPHABET OF INSECTS*, with a figure of the heart of a cockchafer, together with the opinions of two of the most distinguished German physiologists, Meckel and Herold, showing that they were all well acquainted what is now claimed as a discovery.

Lee, Kent, 22d April, 1833.

CHAPTER OF VARIETIES.

HERMAPHRODITE BUTTERFLY.—In the autumn of last year, I had a butterfly sent me to make a drawing of it, being what is commonly termed a malformation or *lusus naturæ*. I herewith send you a duplicate—(pardon the rudeness of finish; self-taught labourers, with nothing but nature to follow, often work to a disadvantage). Should you be able to give any rational account of this, of the cause why it is thus bisexual, I shall, with others of your readers, feel much obliged. The insect was caught near Coventry in June. Similar specimens have been in the possession of the curious, and Captain Brown, in the book of butterflies, records five or six of them. We see the effect; but as all effects have a primitive cause, what, I may inquire, is that cause in the present instance?—*L. W. CLARKE, Sec. Birmingham Entomological Society.*

ADOPTION OF YOUNG LARKS BY A SPARROW.—In a place near the pagoda of Parunttee, I took a nest of young larks, two young ones nearly fledged, and placed them in a cage on a wall some distance off.

A male sparrow discovered them, and was extremely assiduous in supplying them with food, driving the real parents away whenever they attempted to approach. I removed them still nearer to the bazaar—the sparrow followed; at length I suspended them outside the verandah, and he paid the greatest attention to their wants, chirping and enjoying himself with the delightful task; at times he would indulge himself in calls very similar to those of a lark, and certainly far from being unmusical. He continued his care of them for about a week, when, as they were hanging out, a heavy storm came on suddenly, tore the cage off the nail, forcing it along the ground for forty or fifty yards, and killed them.—L. W. CLARKE, *Birmingham*.

CROWS.—In October, 1825, on the island of Calabah, while sitting one beautiful morning in a verandah, I observed a sparrow leading its young ones; a crow pounced upon it, held it between its claws, and instantly tore it to pieces, &c., as would a bird of prey. When the meal was completed, it began its cawing noise, and flew to the sea-side in search of further prey.

The audacity of crows is well known. At the Camp, near Poona, I saw three picking a bone; a vulture flew down to it and drove them from their prize. Though they dared not contend with him for mastery, one flew upon his back, another was endeavouring to steal the bone if he should allow it the opportunity, and the third, in sulky mood, sat upon a rugged rock, indifferent as to the result.—L. W. CLARKE, *Birmingham*.

HEDGEHOG.—In the autumn of 1817 I was taking a ramble in some fields adjoining Dosthill Spa, near Tamworth, when my dog discovered a nest of these animals. I had sufficient opportunity to examine it, and therefore could more readily vouch for the facts. In it were five young ones, and the mother giving them suck at the moment, and beneath it were about ten or twelve crab apples, as fine as ever I saw. The entrance to the nest was similar to some of those formed by the field mouse, in thickset hedges, for their winter habitation, being rather underneath on one side, with a covered way to it among the decayed sticks and leaves. To convince myself that the fruit had not fallen from any tree in the vicinity, I examined the hedge minutely, and the nearest one to the nest was at least twenty yards off. There was no appearance of bruises on them to justify the vulgar belief that the

animal rolls itself underneath the crab trees to cause the wind-fallen fruit to attach itself to their quills, and as this fruit could not possibly have been in the situation found without the conveyance of the creature itself, it is only reasonable to conclude that it had stored them there as food; whether to supply present wants, or as a provision for the future, when nothing of the kind could be procured, remains a question.

A few years before, I observed a gang of gipseys busily employed in roasting a hedgehog, and waiting to see them partake of it, which they assured me was very good, they invited me to the feast, but my stomach was too nice to accommodate itself to unknown luxuries.

I have repeatedly had them in my possession whilst a lad, and when we wanted to make them unroll themselves, we did not resort to the method mentioned of sprinkling *hot* water, replete with cruelty; ours was to put them in a pail of *cold*. They say it is not possible to save their skin unless they are starved to death, but I have had several dogs that would fetch them out of a river and kill them, and even destroy them by pressing on one end of them, and forcing their mouths into the part where their belly was concealed, despatching them in the course of a few minutes, without breaking their skin or causing them to bleed. In the parish where I was born, and passed my childhood, from a belief that they injure cattle by milking them or wounding their udders, the churchwarden would pay 8*d.* a head for old ones, and 4*d.* for young ones, out of the parish funds, when taken to him, by any one who chose to demand it.—L. W. CLARKE, *Birmingham*.

NATIVE BIRD-LIME.—The resinous substance on the buds of the horse chestnut acts like bird-lime on several small birds, particularly the gold crests, which are often caught by it, and the poor little things being unable to extricate themselves, are starved to death.—EDWARD BLYTH, *Tooting*.

TREE CREEPER'S SONG.—The creeper (*Certhia familiaris*), is usually represented in books to have no song; but this is a mistake, as it has a very pleasing song, executed in the high shrill key of the hedge sparrow. It may be described as intermediate between the song of the wren and that of the gold-crest.—EDWARD BLYTH, *Tooting*.

METHOD OF MAKING A STRANGE CAT REMAIN IN A HOUSE.—The popular manner of attaching a cat to a particular house is to anoint the feet with butter, confining her to a room till she free herself from

this (which of course she does not like) by licking. From her moving about the room, a small portion of the butter is left in her track, and it is supposed that the smell of this attracts her till she becomes familiar with the place.*—MR. HENRY BROWN.

M. LASSAIGNE'S EXPERIMENTS ON BUCK WHEAT.—On the second of April, M. Lassaigue placed fifteen grains of buck wheat (*Polygonum Fagopyrum*) in a platinum capsule containing some washed flowers of sulphur, which he had moistened with distilled water, recently prepared, and he then covered the whole with a glass bell, to the upper part of which was adapted a stop cock, which, by means of a glass tube curved like a siphon and terminating in a funnel, enabled him to pour water, from time to time, upon the sulphur. At the end of two or three days, the greater part of the seeds had germinated. They continued to be watered daily, and in the space of fifteen days they produced stems of about two inches long, which were covered with a great many leaves.

These, together with the seeds which had not germinated, were carefully collected and reduced to ashes in a platinum crucible. The ashes obtained from them weighed about three grains and one third. These, in 220 parts, contained 190 of the phosphate of lime, and five of silica.

Fifteen gains of the same seeds being incinerated, yielded the same quantity of ashes, which were composed precisely of the same ingredients.

It clearly follows from this experiment, which was repeated a second time with the same result, that after their development in distilled water, the young plants of buck wheat did not contain a greater quantity of alkaline salts than the seeds from which they were raised. Whence we may conclude, with Theodore de Saussure, that the alkalies and earths contained in vegetables have been absorbed and taken in from the soil.

APPEARANCE OF LEAVES IN THE MICROSCOPE.—The back side of a rose-tree leaf, but especially of a sweet briar leaf, looks diapered most excellently with silver. The back side of the leaf of English mercury (*Chenopodium Bonus Henricus*) looks as if rough cast with silver, and all the ribs are stuck full of round white transparent balls, like

* From an essay which obtained the prize offered by the editor of this Magazine to the members of the London Mechanics' Institution.

innumerable grapes or oak apples, or a bracelet of crystal ; and we could discover little footstalks in many of them, by which they were fastened to the ribs and fibres of the leaf, which is a very pleasant spectacle. A leaf of rue looks all full of holes like an honey-comb ; a sage leaf looks like a white rugge or shagge, full of knots tasselled all with white silver thrums, and one or two fine round crystal beads or pendants, as big as pease, fastened to every knot. Look at the back side of a nettle-leaf, and you shall see it all full of needles, or rather long sharp transparent pikes, and every needle hath a crystal pummel, so that it looks like a sword-cutler's shop, full of glittering drawn swords, tucks, and daggers ; so that here you may autoptically see the causes, as well as you have formerly felt the effects of their netling. Something like them appear the prickles of borrag leafs and stalks.—DR. HENRY POWER, 1664.

ON THE DIFFERENT DISPOSITIONS OF BIRDS, WITH ANECDOTES OF A GOLDFINCH AND A CANARY.—I am a great admirer of all the animal creation, and especially of remarking the habits of birds, many of which I have as pets. I am partial to them, inasmuch as they form one of the pages of that most interesting volume, the Book of Nature, to study which, in any way, is my greatest resource. Perhaps few persons are aware how much the tempers and dispositions of birds vary from each other, and some, who were not much acquainted with them, have smiled to hear me talk of *birds' tempers*. But nevertheless I am convinced, from long and repeated observation, that they differ as much in their tempers as the human race. We frequently see the children of the same family, though receiving the same education as the rest, differ extremely in their dispositions when they come to maturity, and just so is it with animals, in proof of which, the circumstance I am about to relate may, perhaps, possess some interest.

I have, among my other animals, a goldfinch, which was once a wild one, and a canary bird, which of course was hatched in a cage. The goldfinch, though originally wild, and full grown when made a prisoner, accustomed to wing his airy flight without controul ; to “perch at will on every spray” ; to roam as “free as air” far away from mankind, has become so exceedingly gentle and tame, as to render him quite a little wonder, and indeed I do not think it possible any wild creature ever was more entirely domesticated. He is not only so very sagacious as to know and distinguish me, who have had the sole care of him, from every one else, not allowing any other person to stroke or fondle him, but he

will, when placed in my hand, sit as if on a nest ; and after affectionately caressing me, will close his eyes, and fall asleep, evidently proving his extreme comfort. The canary bird, on the contrary, though for *three years* he has had precisely similar treatment, (I have only had the goldfinch two years,) cannot be rendered at all tame or docile, though he was hatched in our room, and though he has been fondled and petted to endeavour to make him amiable ; but all in vain has been every effort to subdue his cross nature ; he flies at my fingers if I touch the cage, and if food is offered to the little tyrant, he ruffles his feathers, and evinces by every possible sign that attentions are not acceptable to him. Now is it not singular that two such tiny creatures should possess such widely different tempers ? One cannot be tamed, and the good-nature of the other has triumphed over every disadvantage of wildness, and subsequent imprisonment, when in fact he might have been forgiven, had he pined for that liberty which he seems entirely to have forgotten. I know that many would think the above a trifling statement, and would reprove me for sending it to such a work as yours ; but I am of opinion that nothing is frivolous or trivial that portrays the manners or rather habits of animals, and that nothing concerning them is wholly uninteresting to the naturalist—to him who looks from “ Nature up to Nature’s God,” and who finds “ sermons in stones, and good in every thing.”—MISS HUNTER.

18, *Bicton Place, Exmouth, Devon.*

ON THE NUTHATCH AND OTHER BIRDS.—As I was passing through Kensington Gardens on the 5th of April, and listening to the notes of the tits, of which there are great numbers, particularly of the oxeye and tomtit, I was struck with the singular appearance of a bird which was hanging to the trunk of a tree, and which I at first mistook for an oxeye, but after noticing it for some time, on its turning round, I saw by its buff-coloured breast and grey back, that it was the nuthatch, which I had always understood to be rather scarce, and only to be met with in the secluded parts of the country. Upon finding this I concealed myself behind a tree, and observed its motions. It climbed up the tree in an odd shuffling manner, frequently passing round the trunk, and thrusting its bill into the crevices, while every now and then a large piece of bark fell. After some time it flew to another tree, and I then saw another nuthatch moving up the trees in a similar manner. It seldom descended ; but on reaching the top flew off to another tree. I did not hear either of them utter any sound.

On the 7th, I went to the gardens again, in consequence of hearing that the nightingale had been heard, and redstarts seen there. After some time I saw a male redstart; but it kept for the most part on the higher branches of the trees, and but once settled on the ground. It appeared very shy. I afterwards saw a small bird moving briskly sideways along a felled tree, and by advancing cautiously I got near it. It appeared of a mouse colour on the back, and seemed to have a white line through the eye. I have never seen the creeper alive; but judging from stuffed specimens, this bird agreed in form and size. I next proceeded to the spot where I had seen the nuthatches, and saw them again. I do not know whether you were aware of the existence of these birds in the gardens, if not, and such notices are worth insertion, I shall be very happy to communicate any other facts and observations which I may obtain in the environs of London, during the present and succeeding summers. I wish just to remark, that Mr. Blyth has been preceded by Dr. Leach in forming a new genus of the bearded tit. The name given by Dr. Leach is *Calamophilus*. I hope you will pardon any inaccuracies, as I am but a young observer.—W. HENRY.

London, April 17, 1833.

ON THE COLOURS OF FLOWERS.—I find that a purple columbine or a blue larkspur, held over a lighted match, changes first to pink and then to black. The usual varieties of these flowers are blues, reds, and whites. The yellows of other flowers all continue unchanged, and the same is true of the green colour of leaves. I tried the experiment on the primrose, the winter aconite, yellow crocus, furze blossom, and daffodil, all of which remained unchanged; but every other colour instantly disappeared. If a scarlet, crimson, or maroon dahlia be tried, the colour changes, not to white, but to yellow,—a fact known to gardeners, who in this way variegate their growing dahlias.—E. BLYTH.

Tooting.

HOW TO MAKE A SAFETY-BOX FOR COLLECTING INSECTS.—It often happens with the common sort of box which the insect collector carries with him into the fields, that while he is opening it to slip one insect in, another jumps out, and with no insects is this so frequently the case, as with the click-beetles (*Elateridæ*), grass-hoppers (*Achetidæ*, &c.), and plant-hoppers (*Tettigoniæ*). But to prevent the occurrence of this I would recommend a box of the following simple construction, which can be very easily made of a common chip or pill-

box, provided it be of a cylindrical form. Take a box of any convenient size, and cut a square or circular piece out of the upper side of the lid, and then clap the latter on the box again and fasten it on tightly, but in such a manner that it can be easily removed when the contents are to be taken out. Then having cut a corresponding hole in another lid which is of a larger size, put that over the other one and fasten it on by means of a central axis (a small screw will do for this purpose) upon which it can freely turn when required. When it is intended to slip a small insect in, by simply turning the outer lid round upon the under one, the size of the aperture for its ingress can be adjusted to the exact size of its body, without the least fear of those already within making their escape.—*SOLITARIUS.*

London, April, 1833.

PARTIALITY OF THE BLACKBIRD TO THE NEIGHBOURHOOD OF MAN.—For the last two years a couple of blackbirds built their nest in a holly-bush in a gentleman's garden, at Blackheath, and although he has a large family of children continually playing therein, yet that circumstance did not drive them from the spot. The bush grew close to the side of the garden-path, and the nest was about five feet from the ground, and when I saw it was not very artfully concealed. They built there during the previous year without their nest being found by the children, but last year their retreat was discovered and was soon plundered of its contents, consisting of four or five young ones. The circumstance of their building in such a situation, where there was the frequent noise of the children, instead of selecting a more secure and quiet place, as there were other holly-bushes in the neighbourhood, proves that this pair of birds preferred, as the rook does, the vicinity of noise and bustle.—*SOLITARIUS.*

London, April, 1833.

ON THE COLOURS OF FLOWERS.—I am inclined to think that the changing of the crimson colour of sweet-williams to white, as mentioned by Mr. Ballard, at p. 128 of your third Number, is not attributable to the absence of light; as I have frequently exposed a nosegay in a window to the full blaze of a summer sun; yet generally observed, that, after remaining a few days amongst the water, the blue, red, and purple blossoms, such as *Campanula rotundifolia*, *Myosotis palustris*, *Vicia sepium*, *Orobis tuberosus*, *Geranium dissectum*, *Dianthus barbatus*, &c., as their buds successively expanded,

generally become of a paler hue, and finally pure white. White-flowered varieties of plants, as *Scabiosa*, *succisa*, *Thymus Serpyllum*, *Prunella vulgaris*, *Pedicularis sylvatica*, &c., I have also most commonly found in damp and watery places, so that, in these cases, it is evident a superabundance of moisture effected the change of colour, either by absorbing or decomposing the colouring principle; or perhaps, more correctly speaking, by the transposition of the molecules of those fluids, which, by their different refraction of the rays of light, give rise to the different colours of flowers. In drying specimens of plants for my herbarium, I have likewise observed several peculiar changes of colour take place, as, for instance, the snowy white blossoms of *Asperula odorata*, became black; the yellow flowers of *Primulæ*, green; and the green leaves of *Mercurialis perennis*, blue. I heartily wish that some able chemist, who has leisure, would turn his attention to the subject of vegetable colours, and give it a thorough investigation.—WILLIAM GARDINER, JUN.

Dundee, April 5, 1833.

ON THE CHURCH-YARD BEETLE.—W. J. T.'s communication in your Number for March, on the "Moulting of the Cock-roach," brings to my recollection a similar case as regards the *white* appearance of the insect.

About two years ago, I caused a bin in my wine-cellar to be cleared of some dirty and decayed saw dust, among which I discovered a number of grubs of a dirty yellow colour, highly polished, varying in length from half an inch to an inch and a half. I placed a few of them with some of the dust in a bottle, such as is used for preserving gooseberries, when they instantly buried themselves, which they repeated as often as they were exposed to the light.

Being my own butler, I occasionally examined my prisoners, but found no change till after several months, when I at length found two or three had assumed a distant resemblance to a beetle, nearly shapeless, but *perfectly white*! After several weeks they became what I considered the church-yard beetle, (*Blaps Mortisaga*), though as yet of a dirty semi-transparent grey; they at length became of the true *Warren's jet*, as your correspondent says; one of them I added to my small collection.—G. W. B.

ON FLIES WALKING AGAINST GRAVITY.—I have an idea that neither Sir Everard Home's comparison of the foot to a *sucker*, nor the allegation of Dr. Power as to the flies *glucing* and *soldering* their feet

is correct. I would rather suggest that the foot is merely laid flat upon the level surface of the glass, while in the advancing position, and kept there by the atmospheric pressure ; just as two plates of glass, or two scraped bullets are kept together, the contract being completed by what Dr. P. calls a *viscous* liquor (*oily*, I should think, as mucus would dry and harden, and so annoy the creature); and that when the foot is directly under the body, the *tendo Achillis* (so to speak) begins to act, curling up the posterior edge of the cushion, and so removing the pressure.—T.

PECULIARITIES OF PLANTS.—All succulent plants, such as annuals, will be found to have the leaves erect. This I consider to be a wise contrivance of Providence, to supply them with the quantity of moisture they require, which is more than the roots can furnish ; as dews and light rain, which may be imbibed by the leaves, will scarcely ever be in sufficient quantity to penetrate to the roots.

On the other hand, all woody plants, such as trees and shrubs, except the willow, and some others, which require much water, have their leaves pendent. This is to act as so many drains, or gutters, to carry off the superfluity of moisture ; and it will be found, that as the wood is more or less solid, the stem is rugged and channeled, to carry off the wet to the root.

The bloom, or fine dust, discovered on plumbs, raspberries, grapes, and some other fruits, and on the leaves of cabbages, is evidently intended to shoot off the water, which, were it not for this contrivance, would enter the porous skin, and rot the fruit, or plant. The down of the peach appears intended for the same purpose.—E. G. BALLARD.

Islington.

THE GLOBE AMARANTHUS.—In this flower, which is what is called *everlasting*, the parts of fructification are inclosed in a thick down, like cotton wool, and the pericarp is provided with a thick and hard skin, impervious to moisture. This curious provision is essential, as from the varnished and parchment-like character of the calyx, it would act as a cup at its base, to retain the moisture, were it not absorbed by the down just mentioned. The pericarp is also further protected by a thick and impervious capsule.—E. G. BALLARD.

Islington.

HONEY IN FLOWERS.—It appears to be a doubt what use the honey of flowers is calculated to serve. Dr. Darwin has supposed, that the nectarious juice may be the food or nourishment of the pistillum and stamina. *Sketches of the Physiology of Vegetable Life*, p. 84. In this work the theory is embraced, but I think it may not be presumptuous to throw out a further conjecture on this curious subject; namely, that the nectarious juice may supply the pollen itself, as that substance is totally different from any other part of the plant, and may be produced by evaporation from the more solid parts of the honey, whilst the more glutinous and liquid may serve to produce that unctuous moisture which always pervades the stigma.

I think this curious fact might be ascertained by divesting the flower of the honey by perforating the nectarium with a needle, by which orifice the nectarious juice would exude, and the flower be less injured than by excision. It would then be discovered whether there was any pollen in the antheræ, or any moisture on the stigma. I should think this experiment ought to be performed immediately on the corolla, at which period the nectary begins to secrete its honey.

In support of the above theory, I performed the following dissection on a Canterbury Bell (*Campanula hortensis*.) Having divided the whole flower by a vertical section, I discovered a projecting rib on the outside of the nectary, running immediately from its bottom to the base of each filament, which I should conceive to be the vessel by which the farinaceous part of the honey is taken up and conveyed, by capillary attraction, through the filament to the antherca. Besides this, on dividing the pistil I discovered a number of white capillary vessels, filled with a quantity of glutinous, sweet, and colourless liquid. In the rib of the nectary which runs to the filament, a thin transparent line was clearly visible, which is probably the vessel which supplies the antherca.

From the circumstances it appears probable that the pollen of flowers is the finer parts of the honey, which, evaporating by the heat of the sun, is reduced to the state of farina.—E. G. BALLARD.

Islington, April 5th, 1833.

INSTANCE OF THE CARRION CROW PAIRING WITH THE HOODED CROW.—It seems to be an undecided question among naturalists, whether the carrion crow, (*Corvus corone*) and the hooded crow (*Corvus Ccornix*) ever pair together. For four successive years I had opportunities of witnessing the pairing of these two species, on some large beech trees which surrounded my house in Forfarshire. They never reoccupied

the old nest, nor did they always build their nest on the same tree ; nor was I positively certain that it was the same individuals who returned every year to these trees, though it is probable they were, for they were never molested. Knowing the predatory propensities of the carrion crow on hens' eggs, young chicks, and even Turkey poults, I would have shot them had they been a pair of carrion crows ; but I was anxious to watch the result of what appeared to me at the time, a remarkable union.

Judging from the manners of the two birds, the almost constant incubation, and carefulness exhibited, I should say that the hooded crow was the female, though the carrion crow did frequently sit on the eggs. After the young of the first year took wing, I perceived that the one was a carrion and the other a hooded crow, and this distinctive character was maintained in the young which were hatched every year, as long as I remained in that part of the country. I shot the first young pair, and ascertained that the hooded one was the female, and the carrion was the male, which confirmed me in my conjecture of the sexes of the parents. Ever after young and old were unmolested by me ; but notwithstanding the increase of number every year after the first one, only one pair came annually to build on these beech trees.*

Edinburgh, 22nd March, 1833.

H. S.

The following corrections are necessary in the article on preparing specimens for museums, which appeared in the last number :—

Page 175, 3d line from bottom, for " breast," read head.

176, 2d line from top, for " bone," read wire.

„ 3d do. do. erase the word principle.

„ 22d do. do. for " hence," read once.

„ 23d do. do. for " elastic," read inelastic.

177, 15th do. do. for " looped," read passed.

The accompanying sketch of a plaster head and wire skeleton, prepared for a small monkey, will illustrate the mode recommended for adoption in mounting mammalia.

* Did we feel at liberty to give the name of our highly respectable correspondent, our readers, we are certain, would feel no doubt of his accuracy.—EDITOR.

NATURAL HISTORY OF THE BIRDS OF AFRICA.

TRANSLATED FROM THE FRENCH OF LE VAILLANT.

THE CAFFER EAGLE (*Haliastur vulturinus*, SAVIGNY).

Le Caffre, *Le Vaill.* Ois. d'Afr. pl. 6. *Falco vulturinus*, *Latham*, Ind. Ornith. Sup. p. ii. Vulturine Eagle, *Lath.* Gen. Syn. Sup. ii. p. 15. *Id.* Gen. Hist. i. 141. Gypaëte, *Temminck*, Man. 2nd ed. p. xlviii.

THIS bird may be regarded as an intermediate species forming a link between the eagles and the vultures*. It has more resemblance to the latter in the form of its beak and in its talons, which are somewhat curved and blunt; but its head is not bare of feathers, an invariable character which systematists have assigned to the vultures. The feathers which cover the neck are not so tapering and lengthened as

* Although this savours of the fanciful language of the modern school, it does not appear, from the whole tenor of the author's writings, that he had any idea of an eagle passing into a vulture through this species.—J. R.

they usually are among the vultures. It is therefore a species which embarrasses all the systems hitherto proposed, and refuses to rank in the classifications adopted by many of our nomenclators, but which are disavowed by nature. The actual state of natural history so frequently exhibits nature making sport of the rigorously precise rules of our systems, that we ought to be well accustomed to her deviations therefrom; and should infer, that, in proportion as our knowledge is extended and a greater number of species discovered, our systems will appear more and more defective. The present species affords an example, being useful in an arrangement of a natural series, while on the other hand it is of small use in our precise systematic divisions.

The Caffer eagle is of the size of the royal or great eagle (*Aquila aurea*), but has the beak stronger, the claws short and less curved. The folded wings in this species, extend about eight inches beyond the tail, and have their tips worn-like and rubbed, because the bird frequenting rocks, and more frequently alighting on the ground than the eagle, damages them by the friction. The shank is covered with feathers as far as the toes: the tail is rounded, the outer quills being the shortest.

The whole plumage of the caffer eagle is a dull black, with the exception of some brownish reflections on the small wing coverts, towards the quills of the wing. The eye, which is very large, is placed deeply in the orbit; and the iris is of a chestnut brown. The beak is bluish at the base, and yellowish through the whole of the bend. The claws are black, and the toes of a tarnished yellow.

I have only met with this bird on the confines of Caffraria, and even there it is rare. I have seen altogether only five individuals, of which number I only succeeded in killing two, that came to pounce on the remains of a buffalo which I had caused to be scattered about expressly to lure them. On skinning them they exhaled from their body an insupportable odour, a circumstance which proves that they feed principally on carrion. Like the vultures they are obliged to walk some paces before they can raise themselves from the earth; but they do not congregate in great flocks, for I never saw but two together, apparently male and female. Having only killed two females, I cannot point out the difference between the sexes. I have been able to learn nothing of their habits or their laying, except that the savages assured me that they build in rocks; that they attack lambs, devour them upon the spot, and never, even when they have young, do they carry their prey in their talons. We know that the eagle carries her prey in this

manner to her eyrie in order to tear it up and part it amongst her eaglets. The vulture, on the contrary, always carries food to the young in her craw, whence she disgorges it when wanted. This, at least, is frequently observed in the species called by the colonists at the Cape *stront vogel* (dung bird) or *aas vogel* (carriage bird). It is probable that it holds good in all the vultures, for their talons are not adapted to clutch or to grasp strongly.

EXPERIMENTS ON THE RESUSCITATION AFTER DEATH OF THE WHEEL ANIMALCULES.

BY M. DUTROCHET, MEMBER OF THE INSTITUTE, PARIS*.

THE marvellous property of returning to life after a prolonged desiccation, has caused the wheel animalcule of Leeuwenhoeck, (*Ezechiellina Leeuwenhoeckii*, BORY,) to be much celebrated. I was accordingly anxious to ascertain whether my newly-discovered species were endowed with the same faculty. My first experiments in this respect were made upon the quadricircular wheel animalcule (*Rotifera quadricircularis*, DUTROCHET). Knowing that Leeuwenhoeck's animalcule only resuscitated when preserved from contact with the air by a certain portion of sand while it was drying, I was desirous of trying whether it would resuscitate when dried simply under its own envelope. I accordingly placed on a bit of glass a twig of the water-buttercup, (*Ranunculus aquaticus*), with a number of the wheel animalcules, which I left to dry. In about twenty-four hours I moistened these wheel animalcules with water, and observed attentively what took place. I had at first a glimmering of hope that I should see them resuscitate, upon perceiving a round body issue from each of the envelopes; but I soon ascertained that these bodies, which appeared of a violet colour, were only bubbles of air, which the water had impelled from the interior of the envelopes, and which remained adhering to them. The violet colour arose from the decomposition of the rays of light on the surface of the spherical bubble, an observation which may prevent those who repeat my experiments from being deceived by this optical illusion. I continued then to observe my animalcules; but although I preserved them for many days in water, I never saw them restored to life.

* Translated from the French by the Editor.

I was desirous of ascertaining if a drying, under the same circumstances, of shorter duration, would be followed by a return to life; but I have seen that complete desiccation for five minutes was enough to deprive them of life, which could not be restored; and if a privation of water for the shortest time did not kill them, it probably arose from a small portion of moisture being retained under the envelope.

Being thus convinced of the impossibility of their resuscitation when they have dried without any other protection than that of their own envelope, I was anxious to ascertain whether they would resuscitate when dried in a vase of the sand found at the bottom of the pond which they inhabited. I accordingly placed a number of these animalcules fixed on the same twig, in a watch-glass, and covered the whole with a vase, leaving them to dry. In about twenty-four hours, the whole appearing to be dry, I poured some water upon them, and when well soaked, I cautiously lifted up the twig with the animalcules, and placed it in some pure water in another watch-glass, in order to examine it with the microscope. I was not able, however, to perceive in this case any resuscitation, though I kept them during eight days in the water.

Astonished at these results, which deceived my strongest expectations, I began to imagine that the sand of the gutters imparted some peculiar virtue to the animalcules to enable them to resuscitate. I therefore took some of this sand, which swarmed with Leeuwenhoeck's wheel animalcule, (*Ezechielinea Müllerii*, Bory,) and dried in it a number of my wheel animalcules. When I examined it in about twenty-four hours afterwards, none of them showed any signs of life, although the same sand contained a number of Leeuwenhoeck's wheel animalcules and tile eels, (*Anguilles des Tuiles*,) which had resuscitated. I conclude, therefore, that the wheel animalcule of Leeuwenhoeck is the only one of the *rotiferæ* known, which is endowed with the faculty of resuscitation.

REMARKS ON THE RESUSCITATION OF THE WHEEL ANIMALCULES.

BY COLONEL BORY DE ST. VINCENT.

ALL the wheel animals live exclusively in water, drying speedily kills them, and it is difficult to imagine, on taking into account the complication of their organs, of their heart, and their respiratory gills,

(*bronchii*), that there can be any more possibility of revivifying them after death than any other animal to which respiration is an essential condition of life. Yet upon the faith of observations inaccurately made and inaccurately repeated, it has been promulgated for an age that the wheel animalcules, when long deprived of water, and remaining as if dead at the bottom of the places where they are preserved, revive as soon as they are moistened. There is no possible means which I have not tried to arrive at such a result ; but I have never succeeded. I have sometimes, upon moistening the tubes of caddis worms, (*Phryganeæ*), after long desiccation, or putting some water into vases filled with sediments of animalcules, which had been a long time amassing in my window, refound some wheel animalcules, but not resuscitated: they were only evolved like the *Daphniæ*, and other *Entomostraca*, whose eggs (*ovules*) remaining in the soil, are hatched when the rain supplies the fluid necessary for their evolution. For twenty years I have repeated this statement ; but it requires reiteration, because those who write on the microscope, copy the works of Spallanzani, contained in almost every library, whence we find passages literally transcribed in compiled books, unfortunately at present too much diffused.

ON THE BLACK PULP LEECH (*Planaria nigra*, MULLER).

BY J. G. DALZELL, ESQ. ADVOCATE, F. S. A., EDINBURGH *.

DURING the sunshine of summer, a small jet black velvet-skinned animal may be often seen crawling near the edge of fresh water ponds and ditches, with a lively, smooth, and gliding motion. This is the Black Pulp Leech, (*Planaria nigra*), which has been already characterised and described by different naturalists ; but, unfortunately for

* From " Observations on the Planariæ." Mr. Dalzell is understood to have a splendid work in preparation, comprehending these singular animals.

that accuracy which should mark the progress of science, their superficial observations concerning it have led to those numerous errors which darken the history of the whole genus.

Sometimes it is found in slow-running waters, and there of the largest size; but usually when they are almost stagnant, and, in particular, where aquatic plants abound. On these, numbers crowd together as the colder season advances, each contracting into an elliptical spot, and then affording the most favourable opportunity for many being taken with facility at a time; or they fix on the under surfaces of pieces of slate and smooth stones, and somewhat elevated above the mud. They live in numerous pacific societies, associating with every other species, and are so generally dispersed, that none has occurred to me of such frequency in Scotland.

An animal so well known as the Pulp Leech, (*Planaria*,) scarcely requires description; nor considering its external uniformity of appearance, does there seem much room for commentary. It is found of all different sizes, from extreme minuteness to above half an inch in length, and about an eighth of an inch in breadth. When very large, it has a dull and sluggish aspect, and is chiefly roused to action by light and heat. On the under part, or belly, are what naturalists have designated two ventral pores, one of which, perhaps both, is more conspicuous at certain seasons. The first is lower down than the middle of the body, and the second still nearer the extremity of the tail. The opacity of the animal precludes us from accurately distinguishing its internal organisation; nevertheless, enough may be discovered to infer that it is far from simple. Among Pulp Leeches, (*Planaria*,) some occasionally occur of the ordinary size, figure, and proportions; but, instead of the jetty colour proper to the species, they are of a dark grey. By interposing them between the eye and concentrated rays of light, the internal structure may be obscurely recognised in many vessels branching from about the middle of the body, and terminating in obtuse extremities near the margin. These are certainly analogous to the pinnate ramifications already described; and they bear much resemblance to the viscera of leeches. Facts do not warrant our concluding, that the Grey Pulp Leeches, (*Planariæ*,) are indubitably a different species, or that they are only varieties; their contour seems more ovate, indeed, and they are seldom, if ever, seen of the largest size. One taken in October was of light grey, and mottled or streaked with deeper transverse bands; it was very broad in proportion to its length. Yet it must be admitted that repletion always affects the colour of the leading species, which

regularly darkens according to the age and increment. Probably, from distension of vessels, shades of difference may prevail, which temporary causes render more prominent.

The Black Pulp Leech (*Planaria*) is endowed with wonderful tenacity of life, a property which materially aids the researches of the physiologist. This truth is forcibly demonstrated by the dreadful lacerations with which it appears in its natural element. Sometimes a large section from the neck is wanting, sometimes a semicircular wound almost divides the animal asunder, or one half the body has been torn from the other, and still it survives the mutilation.—This was a sufficient guide. The genus had been partitioned by nomenclators, according to the number of eyes, or their total absence; and a place from the latter was assigned to the Black Planaria. It was probable, however, if eyes were present, they should not be sought in the full-grown animal, which might be of equal opacity to themselves; or, in other words, they would more easily be detected in regenerating parts: and, if such lacerations as I had witnessed did not destroy the animals, neither would artificial separation of important organs be fatal. Several planariæ were therefore decapitated on the 10th of September; and, in nearly three weeks, the wounds of some being examined by a magnifier, appeared not only completely healed, but a conical reproduction of the defective parts protruded. The regenerated organs of all animals are light and colourless; and I thought that a row of minute marginal specks, such as are usually called eyes in the vermes and molluscæ, was discernible. This proved no illusion, for, on the 29th of the month, they were distinctly visible, of a jet black colour, seated in a pale ground. Other experiments corroborated the fact; whence, one characteristic of the species under discussion, is a row of numerous minute black specks or eyes, situate in the very margin of the anterior part. The same reserve in ascribing the faculty of vision to these specks, is as necessary in this instance as before; nor can we affirm, in denying them that peculiar province, that they are void of all analogy to spiracula, or organs connected with respiration. A subsequent examination of those planariæ just mentioned as a possible variety, showed that the head is sometimes so light as faintly to expose the site of the specks. Thus, if the genus is to be partitioned according to the presence or absence of eyes, the Black Planaria will be removed from the place hitherto assigned to it.

In the course of my earlier observations on this animal, many unsuc-

cessful experiments were made to discover its food, which seems chiefly derived from the under surface of aquatic plants in vigorous vegetation ; and animal substances are likewise voraciously consumed.

The sexual union takes place with the black planaria, though rarely to be witnessed ; nor had I completely conviction of the fact before August, 1812, notwithstanding preceding incidents had led to such an inference. Long anterior to that period, I knew that this species propagated by eggs, which, for the most part, are laid by those of larger size, and usually in the course of autumn ; but they may occasionally be found throughout the year, or obtained in winter by the more genial temperature of an apartment. No external characteristic distinguishes the male and female planaria, if there be actually a difference of sex between them : that which is represented here, produced an egg, which entitles it at least to the character of female ; and what I supposed the male, was probably not quite so large. The egg is imbued by a yellowish viscous matter, attaching it to any twig or straw selected for the deposit, or the side of the including vessel. It is of a perfect oval figure, of a dark-brown or chocolate colour, provided with a hard shell, and in every respect resembles a bird's egg in miniature. Those of the largest size, for great inequalities prevail, are about a tenth of an inch long ; and one of this description is seen, somewhat magnified. I cannot confidently affirm that more than a single egg is produced by each planaria, but each egg contains several young, of the palest grey, or almost white : their anatomical structure is then best disclosed, as they speedily darken by succeeding increment. Some, hatched in the second week of September, were deep grey on the fourth of October. The speck or eyes may be recognised at an early stage by a magnifier, Fig. c, which also exposes slight discrepancies in shape between the young and the adult animal. A considerable interval elapses before exclusion of the young planaria ; but observations on the period seldom coincide. By the most recent, four were detected in the very act of issuing from the egg, on the eleventh of April, twenty-five days after it was laid : all lively, the marginal specks very distinct, but not of equal number. An egg of the same species was at the same time hatched in twenty-one days : but a fortnight later, a third of the like age was still entire. Therefore, the period required for exclusion, is to be calculated at twenty-one days, or longer ; and it is certainly affected by the temperature of the atmosphere. The oviduct and relative organs appropriated for perpetuation of the species, are most likely situated in the second

ventral pore: neither this nor the first is conspicuous in all planaria; in many they are scarcely perceptible, and appear connected in some by a lighter line on the abdomen.

But, independent of propagating by eggs, the black planaria, from that indestructibility of life preserving it under mutilation, is privileged to multiply its species in proportion to the violence offered to its otherwise delicate frame. It may almost be called immortal under the edge of the knife. Innumerable sections of the body all become complete and perfect animals: if the head be cut off, a new one replaces it: if the tail be severed, a new tail is acquired: nay, if one half of the whole animal be longitudinally separated from the other, the defective portion is speedily repaired.

A grand and leading law of nature is invariably to fulfil her original object; whence we must conclude, that the performance of accidental lacerations, which we occasionally witness, results from some unknown condition opposing the progress of reproduction. In the artificial mutilations, where advances can be watched, the period of renewal is strictly commensurate with the temperature of the atmosphere. Regeneration is retarded, or altogether suspended, by the cold of winter, promoted by the heat of summer, and still farther accelerated by augmenting the natural warmth of the air. A number of planariæ mutilated on the twentieth of January, 1803, had become entire animals in the succeeding April: but all the new parts were of a lighter colour, which was long in approaching the sable hue of the old: and it may be questioned whether they ever grow equally dark as those regularly deepened by age. Thus we see a black head, with a light coloured tail; a dark body, with a white head; and one longitudinal half as black as jet, while its corresponding portion is of a clear grey. The elementary parts of all animals seem colourless: their future opacity is derived only from certain assimilations of extraneous substances, the atmospheric influence, or supervening rigidity of the parts. Pellucidity marks the rudiments of life: fishes are transparent on exclusion from the egg; insects are pale on leaving the chrysalis; their organs are infirm and their senses obtuse. But scarce have they experienced the genial effects of the air, when their members expand, strength is acquired, and instinct becomes active; all as the universal shade of the body darkens. Yet exposure to the atmosphere, unmixed with another fluid, is inevitable destruction to the pulp leech (*planaria*). If, chancing to wander beyond the confines of its native element, its endeavours to return be interrupted, it contracts and grows distorted, a kind of gluten issues from the whole

body, and death speedily ensues. Should it be hastily removed, it may recover, and then the gluten comes off like a sheath, or integument, investing the body; but the transition must be immediate. Whether this substance be provided by nature, to avert the baneful effects of unguarded exposure, or exudes in consequence of the sufferings of the animal, is uncertain.

In the natural state, the pulp leech (*planaria*) probably survives the cold of congelation; yet it perished during the course of an observation, where the thermometer stood at 26°, and where it was imbedded in a solid mass of ice. Perhaps the change was too sudden; for numerous societies dwell in shallow waters, affording an insecure retreat from the rigour of the atmosphere; nor are they diminished in succeeding seasons. The bodies of those which perish thus, are distorted, stiff, and invested by a very thick coating of gluten. In a few hours after solution of the ice, they become soft and relaxed, and are quickly decomposed.

Monstrosities sometimes occur in the black pulp leech (*planaria*), and frequent distortions from casual injury. In 1808 one was found with the tail bifid; a ventral pore appeared in each portion, both of which might be considered members of the same body. Accident may give birth to superfluous parts, as well as the skill of the experimentalist; but this species, perhaps from the energy of its reproductive powers, seems less adapted for acquiring them.

In addition to what has been said of varieties, we may observe, that a few are taken in places inhabited by the black planaria, of smaller size, the head rather more obtuse, and the tail suddenly drawing towards a point; whereas it ordinarily forms a regular elliptical outline, unless when produced to an acute angle by extreme extension. Possibly, however, the difference may centre in the progress of reproduction, whereof the commencement has not been seen. Very minute dark or light pulp leeches (*planariæ*) sometimes dwell along with the rest, of which the tail is more acute in proportion than that of the larger ones. Three of these, a line and a half long, being subjected to the microscope, traversed the glass slider with great rapidity, much exceeding the usual progression of the black planaria. A scanty row of very dark specks environed the anterior margin; and the internal organisation was sensibly exposed through the gelatinous texture of the body. But a series of experiments would be required to entitle us to deny their identity with the young of the common species; first, because the accelerated motion might be excited, from the susceptibility of a small

quantity of water of an increased atmospherical temperature; and, secondly, from its not being improbable that the number of marginal specks is augmented with age.

Superficial observation of such diversities only create embarrassment; for as the shades of distinction are fainter there is the more difficulty in condescending on or rejecting identity. The pulp leech, (*planaria*,) Proteus-like, incessantly assumes a variety of forms and appearances, which, without due and careful appreciation, will lead the naturalist farther and farther from the truth.

PROGNOSTICS OF THE WEATHER.

BY COLONEL CAPPER.

IT is often remarked, that the most extraordinary changes take place in the barometer during the two first and the two last months of the year; which is saying only, in other words, that these changes happen in the four coldest months of the year, from the beginning of November to the end of February. But in the annual table it appears that the mercury is highest in the warm months of June, July, and August; nevertheless, especially in high latitudes, the most violent and sudden variations will of course take place during a frost, with a north-east, or a north-west wind, and descend proportionably on the approach of a thaw with a southerly wind. When the barometer falls, and the thermometer rises, rain may be expected, especially in winter. In summer, during settled fair weather, both are high.

In winter, particularly in mild open weather, twenty-four or forty-eight hours preceding a fall of snow, the barometer will sometimes rise; but a few hours before it actually commences the mercury will suddenly fall again; descending daily as long as the snow continues. A severe frost in winter is always preceded by a great rise of the barometer, and a proportionable fall of the thermometer. When the barometer, in winter, or near the vernal, or autumnal equinox, is at or below $29^{\circ} 50$ or changeable, and suddenly descends two or three tenths, a gale of wind, and rain may be expected. When the same change takes place in summer, and early in autumn, it may precede either a gale of wind, or only a thunder storm. When the gale of wind subsides, and before it is quite past, the barometer will suddenly rise again. But after a thunder shower it will sometimes remain nearly stationary, or the rise will generally be moderate and gradual.

When the mercury in the tube is fluctuating, unsettled weather may be expected. A sudden rise in the barometer is no proof, at any time, of a continuance of fair weather; but in rainy and cloudy weather, when the mercury is convex and continues slowly and continually rising for two or three days successively, settled weather for nearly a week, at least, may be expected; or in fine weather, when the mercury, being near 30 degrees, and concave, continues gradually to descend for some days, rainy and stormy weather will soon follow.

A current of air from the north, inclining either eastward or westward, will produce a condensation of the atmosphere, and consequently cause a rise in the barometer, and usually dry, cold, or cool weather, according to the season. A southerly wind, either easterly or westerly, especially the latter, will generally make the mercury in the tube descend. A south-west wind seldom fails to produce rain when it continues twenty-four hours in that quarter.

In foggy weather, if the barometer remains stationary, and especially if convex, and inclined to rise, and the fog dissipates as the sun advances towards the meridan, fine weather will follow; but otherwise rain. A ground fog in the evening will almost always be followed by fine weather next day.

When the mercury in the barometer is concave, although it may have risen in the night in consequence of a hoar frost, if the clouds in the morning towards the east, about sunrise, are of a deep red colour, rain will almost certainly follow; and often in heavy showers in the course of the day.

If the wind is westerly, a rainbow in the morning indicates rain. The barometer will then certainly descend; and very often the thermometer will be higher than the usual temperature of the season.

But with the wind in the same quarter, especially when the western clouds have a bright tinge of red, a rainbow in the evening towards sunset, is almost a sure presage of fine weather the following day. Hence the old proverb, that a rainbow at night is a shepherd's delight, and a rainbow in the morning is a shepherd's warning.

When it rains early in the day, with an easterly wind, it almost always continues until towards noon; but rather in misty or drizzling rain than in heavy showers. If it does not then clear, it will not entirely cease before sunset.

The wind following the sun in his diurnal course, and a gentle breeze, is a presage of fine, and generally of settled, weather. But if it backs from the west towards the south, rain may be expected.

The barometer being concave, if the highest hills in the neighbourhood in the morning are at the same time cloud-capt, and remain so till afternoon, rain may be expected. But if the morning mist on the summit of the hills gradually disappears towards noon, fair weather will follow. Those who reside on plains, where there are no high hills in sight, may judge of the weather by the smoke of their chimneys. If it spreads abroad, and scarcely rises above the house, rain may be expected in the course of the day. When it immediately descends below the roof of the house, rain is almost certain ; but when the air is in a condensed state, the smoke will rise rapidly, and perpendicularly, if not immediately dispersed by the wind. It is sometimes unadvisedly said that the air is heavy, and drives down the smoke ; but the fact is precisely otherwise, for when the atmosphere is most condensed, it immediately absorbs the smoke, as it does all other vapours and exhalations. Whence a condensed state of the atmosphere, which raises the barometer, produces fair weather ; and the contrary high wind, and rain, or both.

It is recommended to every person who wishes to consult the barometer, to learn to read the height of the mercury by the degrees, and not by the words now engraved on the plate ; otherwise the instrument maker would do well to engrave the words on the plate according to the height of the place from the level of the sea, where the instrument is to be used ; for in situations very much elevated, the mercury will be much lower than in valleys, and, besides, it frequently rains from the causes above-mentioned, when the mercury, in common instruments, is at fair, and sometimes even near set fair ; and, on the contrary, the weather frequently continues settled, when the mercury remains stationary at changeable. The principles of the barometer being thus misunderstood, has greatly depreciated the value of this excellent instrument, and made many persons hastily pronounce it to be perfectly useless, as what is commonly called a weather-glass.

When the barometer rises as the tides increase, especially in summer, settled weather may be expected. When, on the contrary, at the same season, the barometer falls with the increase of the tides, wet or variable weather will soon follow. So likewise, when the mercury rises, and continues convex with the fall of the tide, settled weather may be expected ; but when the mercury is concave, and continues descending, on the decrease of the tide, rainy or squally weather will soon follow. As a general remark on the subject of the influence of the tides on the atmosphere it may once more be observed, that the principal changes

of the weather often do not take place on the days of the full and change of the moon, which is the middle of the springs; or on the quadratures, which are the middle of the neap tides. But two or three days before each of these periods, when the springs and the neaps actually commence, the character of the weather to be expected at these periods is very often indicated, both by the appearance the clouds themselves assume, and also by the motions of the mercury in the barometer. About sixty hours after the full and change, or as many after the quadratures in stormy or unsettled weather, the most violent wind and rain may be expected; and this crisis past, especially with an increasing moon, a favourable change very often takes place.

In summer a considerable descent of the thermometer, and consequently an unseasonable coldness in the air, is a certain presage of unsettled weather, and is often followed by rain. But in winter, a sudden rise of the thermometer above 40 degrees, attended by a descent in the barometer, is a certain indication of rainy and unsettled weather.

MR. SMITH ON THE BOTANY OF KENT*.

WE do not recollect to have ever met with a work like this of Mr. Smith's, full of notices strictly and sometimes profoundly scientific, interspersed at intervals with bursts of sentimental enthusiasm, exhibited in paragraphs as florid as a flower-garden, and proving that the author has not devoted himself at St. John's exclusively to the dry logic of Aristotle, and the still drier details of Linnæus, whose lifeless and marrowless catalogues did much to banish the beautiful study of natural history from the literary world. Although, however, we are by no means disposed to look upon the *brochure* before us as a faultless model, we think that the little sketches of pretty writing are calculated to attract many local readers who would be infallibly repelled by his dry Linnæan enumerations. "The paths pursued," he says, "lie as threads upon the map: but they led to many a rare and beautiful object, and were attended by discoveries un hoped for by so young a botanist, and unexpected within the circle of the metropolis of science, and in the

* Rare or remarkable phænogamous Plants collected in South Kent. By G. E. Smith, of St. John's College, Cambridge. 8vo. pp. 87, coloured plates.

footsteps of its first and most revered professors." The following is an example of the sentimentalism to which we have alluded :—

"The newly expanded flowers of this grass (*Anthoxanthum odoratum*), emit a very pleasant scent of sweet musk; when dried, its stem and leaves spread the well known perfume through hay. We seek in vain a purer emblem of virtue, which in youth breathes a grateful incense from the eye and the voice, and pleases still in age, when early beauty is faded, diffusing the sweets and senses of chaste society through every class and condition."—p. 2.

The following is still better :—

"The plant (*Silene nutans*) is humble without grace, and uses no display; when night has hidden the glories of the garden, it expands the narrow petals, and fills the whole air, and every breeze with most delicious fragrance. What in darkness the distant glimmering lamp, the glow-worm, the firefly, are to the eye; what, in still night, the sound of distant bells, of soft music, of flowing waters, is to the ear; what, in night's solitude, the trembling footstep, the hand, the lip of a friend, is to the sense of perception and touch, are flowers and fragrances, the tuberose, the orchis, and the catch-fly to the sense of smelling; and when the flowers of the day are faded, the stillness and secret influence of night render sense as well as imagination more vivid, and susceptible of agreeable as well as more acutely impatient, and conscious of displeasing or discordant impressions."—p. 27.

As an exemplification of one of the innumerable and wonderful contrivances of Providence, we shall quote what Mr. Smith says of the butterfly orchis (*Platanthera bifolia*, RICHARD):—

It is "characterised," he says, "by the anther lobes, whose foot rests upon a concave, glutinous, projecting scale, upon which scale the fertilisation of the stigma depends. Without these scales, the anther lobes must fall from the flower. The nectar is distilled in a tube, which opens immediately below the stigma. Early in the day the treasure is robbed :—

"Through the soft air the busy nations fly,
Cling to the bud, and with inserted tube
Suck its pure essence, its ethereal soul :"

but the eager insect, in thrusting forward its head, comes in contact with the scales, the lobes are withdrawn, and decorate the robber with no light appendage; his feet are applied to remove the incumbrance, and the pollen is brushed upon the stigma. This process, which compensates for the stolen nectar, is a beautiful instance of provision, distinct from the provision made in other cases of the same tribe, and may rank with the well known instances in the birthwort, the fig, and the barberry."—p. 48.

Mr. Smith has also given a very interesting account of the tassel pond-weed (*Ruppia maritima*), whose fructification is not a little singular :—

"At Dimchurch," says Mr. Smith, "the dyke was filled with the plant, and I was surprised to observe pollen scattered over the surface of the water, and small yellow spikes of flowers rising above its level; many of these had discharged their pollen; in a few the elevated anthers were still entire. Sir J. E. Smith and Dr. Hooker, therefore, are wrong in asserting that the impregnation takes place *beneath* the water, and within the sheath of the leaves, before the elongation of the flower stalks. On the contrary, these are universally elongated before the anthers burst, the contacts of atmospheric air being necessary to fecundation. The anthers are vesicular and buoyant: as they swell and become mature, the membranous sheath inclosing them is distended, and the whole is brought to the surface of the water. The flower stalks are rapidly lengthened; the flowers quit the sheath, which then becomes a bladder, and aids the elevation of the spike an inch above the water. Presently the anthers burst, the vesicle loses its buoyancy, and the flower stalk bearing the fertilised stigmas sinks within the bosom of the parent plant. The stigmas are rarely four only, usually four to six.

We need say no more to recommend this interesting work: the preceding extract alone will be sufficient for that purpose to every philosophical reader.

ON THE DIRECTION OF PLANTS.

BY PROFESSOR DE CANDOLLE, OF GENEVA.

THE roots of plants are lengthened out only by their extremity; the growing point of each root is then in a state of softness, which may be compared to semifluidity. The constant action of gravitation should therefore force it to descend; the energy with which each root will tend to direct itself towards the centre of the earth will be in proportion to the degree of softness of its growing extremities. The stems increase in a given time by the whole length of their shoot. But let us see what happens in a branch with an obliquity of any kind; when this is the case, it is manifest that a portion of the lymphatic and nutrient juices, as they pass through the intercellular passages, are drawn by gravity towards the inferior side of the branch, and that as a consequence this side receives a greater quantity of nutriment than the superior part. The proof of this assertion is, that the superior part of an oblique branch is always thicker than the inferior part, or, in other words, the medullary canal of an oblique branch is a little nearer the superior side, because its inferior layers are more grown. This disproportion between the increase of the superior and inferior layers will be the more strongly marked according as the branch is nearer a hori-

zontal, because the influence of gravity on the nutrient juices is then so much the more considerable. But if the inferior side of an oblique branch is nourished better than the superior one, the effect ought not to be limited to an enlargement of the layers, but it should also elongate the fibres, for these two results always take place simultaneously as long as a new shoot is capable of being elongated. The inferior side of the branch will tend then to lengthen itself more than the superior: if it could be made to grow separate, each of the sides would elongate itself in proportion as it was nourished, but they cannot be separated; the fibres of the side the worst nourished continue shorter than the others, and must draw them from their own side towards that part which is most flexible, that is, towards the summit. Thus the branch must always right itself in an upward direction, and this with so much the more energy as it approximates the horizontal position.

It is natural to conceive, that, if a stem or branch be compelled to right itself, whatever be the extent of its obliquity, nothing but straight branches would be found, or branches tending to become so. The exceptions to this law are, for the most part, more in appearance than in reality. In a certain number of plants the stem is so weak, that although its extremities are tending to rectify it, still the base sinks under its own weight. This is what happens in a variety of degrees to plants that are either procumbent or ascending, and the infirmity is so much the more striking as the stem is softer, or as its elongation has been the more rapidly effected.

In all this it is necessary to make our examination only into what takes place during the first year; it is then that the branch is lengthened, and when it comes to be hardened afterwards, it generally keeps the position which it had assumed during its development.

The branches of trees follow the same laws; at first the tendency is to raise themselves as they are elongated; then they direct themselves downwards towards the horizontal line for two reasons: 1st, the new branches which are formed above them shelter them from the light, and the inferior ones are warped laterally in order to have their share. 2ndly, the weight which they acquire when they become very long, acting constantly on the end of a lever, draws them towards the horizontal position.

MR. BLACKWALL'S RESEARCHES RESPECTING SPIDERS*.

It may be known to most of our readers, that Mr. Blackwall was the first to discover the mode in which the line of a spider can be thrown across brooks and other places inaccessible to the animal,—a subject upon which a great deal of error had been propagated, even by naturalists of high name. His experiments were extensively repeated and confirmed, as has been recorded in *Insect Architecture*, upon this point; and we have now to mention other researches of the same ingenious character respecting the economy of spiders. His remarks were chiefly made on *Clubiona atrox*, a very common species, whose web must have caught the attention of all who attend to these interesting animals.

“The favourite haunts,” says Mr. Blackwall, “of *Clubiona atrox* are the branches of trees and shrubs growing against buildings, crevices in old walls, and the corners of windows. In these and similar localities it fixes its residence and fabricates its snare. On the objects surrounding the spot selected for its retreat, it extends to a considerable distance, but without any apparent regularity of design, a number of fine shining lines intersecting each other at various angles, to which it attaches other lines, or rather fasciculi of threads of a more complicated structure, and of a pale blue tint, nearly approaching the colour of skimmed milk. These compound threads, or flocculi, which, in exposed situations, retain their delicate hue for a short period only, (old webs being generally of a dull or sullied white, not at all advantageous to their appearance,) are arranged on the first spun glossy lines, both in longitudinal and transverse directions. When recently produced, they adhere strongly to such insects as come in contact with them, and, though perfectly inelastic, may be drawn out into fibres of extreme tenuity. The communication between the snare of this spider and its retreat, is established by means of a funnel-shaped tube of a slight texture, whose smaller extremity is in immediate connection with the latter, and, indeed, sometimes constitutes the animal's abode. Not unfrequently two or more tubes occur in the same web, by one or other of which the spider usually effects its retreat when disturbed.

“If a new-formed flocculus be minutely examined under the microscope, with a pretty high magnifying power, it will be found to consist of six lines. Two of these filaments are straight and exceedingly attenuated; and upon each of them is disposed a tortuous white line inflected into short curves and loops, like a ravelled thread of fine silk. A pale blue band, thickly distributed on each of the inflected lines in numerous irregular curvatures, completes the flocculus. The flexures of the pale blue bands are more widely extended than those of the white tortuous lines on

* Notice of several recent Discoveries in the Structure and Economy of Spiders. By John Blackwall, Esq., F.L.S. Linn. Trans. vol. xvi.

which they occur, and to them the adhesive property of the snare is chiefly to be ascribed. In attempting to determine by experiment the cause of adhesion in the blue bands, I ascertained that bodies with highly-polished surfaces, such as the bulbs of thermometers and burnished metallic rods, if carefully applied to them, may be withdrawn without deranging their structure, though the viscid globules in the nests of geometric spiders adhere to the same bodies as soon as they are brought into contact with them. From this circumstance I was led to infer, that the blue bands are fibrous, although their structure is so exceedingly fine that I cannot detect it even with assistance of the microscope; and that the imperceptible filaments of which they are composed adhere to objects, not in consequence of being glutinous, but solely by attaching themselves to inequalities on their surface."—p. 473.

Several naturalists had remarked, that geometric spiders employ one sort of silk for the frame-work, or outside lines of their nets, and another sort for the part which is efficient as a snare; but by more minute attention to this, Mr. Blackwall thinks he has detected no fewer than three sorts.

"Not only," he says, "the garden spider, but every geometric species with which I am acquainted, employs *three* distinct kinds of silk, if a liquid gum can with propriety be termed silk, in the construction of its net. The boundary lines, radii, and first formed spiral line being unadhesive, and possessing only a moderate share of elasticity, are evidently composed of a different material from the last formed spiral line, which is exceedingly viscid, and elastic in a remarkable degree. Now the viscosity of the elastic spiral line may be shown to depend entirely upon the globules with which it is studded; for if they be removed by careful applications of the finger, a fine glossy line remains, which is highly elastic, but perfectly unadhesive. As the globules, therefore, and the line on which they are disposed, differ so essentially from each other, and from the rest of the snare, it is reasonable to infer that the physical constitution of these several portions of the net must be dissimilar.

"When exposed to the desiccating influence of the sun, and of air briskly agitated, the nets of geometric spiders speedily lose their adhesive property; but when formed in situations from which light is excluded, and where the atmosphere is not liable to be perceptibly disturbed, I have known them retain their viscosity for a long period. In a net of *Epeira diadema*, constructed in a glass jar, which was placed in a dark closet, where the temperature was not subject to great and sudden fluctuations, the globules preserved their adhesive property almost unimpaired, and the last-formed spiral line its elasticity for more than seven months."—p. 479.

Mr. Blackwall gives an interesting and original account of the manner in which *Clubiona atrox* makes what he terms the flocculus, a very different thing, as our readers may perceive by comparison, from the vague and unsatisfactory details given of similar processes from the time of Homberg to our own days.

"When the spider," he says, "purposes to form a flocculus, it presses its

spinners against one of the glossy lines composing the foundation of its snare, and emitting from them a small quantity of liquid gum, attaches to it several fine threads, drawn out by advancing the abdomen a little, and kept distinct by extending the mammulæ laterally. The foot of one of the hind legs is then applied to the superior part of the upper tarsal joint of the other hind-leg, a little above its articulation with the lower joint of the tarsus, and the curious apparatus of spines above described, is brought immediately beneath the spinners at right angles, with the line of the abdomen. By a slight extension of the joints of the hind-legs, the apparatus is forced backwards across the mammulæ, the diverging extremities of which it touches in its transit, and is restored to its former position by a corresponding degree of contraction in the joints. In proportion to the continuation of this process, (and it is not at all unusual for the spider to pass its spiny apparatus across the points of the mammulæ several hundred times in rapid succession,) the inflected lines of the flocculus are found to be produced, the spider making room for them as they accumulate, by elevating and at the same time advancing the abdomen in a small degree, which it effects by slightly extending the joints of the third pair of legs, and contracting those of the two anterior pair. As this operation is generally accomplished in the night, it can seldom be seen to advantage, unless artificial light be employed, some skill in the management of which is required, in order to avoid disturbing the spider. The *modus operandi*, as nearly as I can ascertain it by the most diligent observation, appears to be this: The points of the lower row of spines are protruded between those of the upper row, and in passing across the extremities of the mammulæ comb out the tortuous lines, which run into numerous flexures in consequence of not being kept fully extended. The purpose subserved by the upper row of spines seems to be the extrication of the tortuous lines from the spines of the lower row, by a slight motion outwards, which disengages their points. Now, were the blue bands glutinous, this mode of proceeding would be quite unavailing; it is only on the supposition, therefore, that they have a fibrous structure, that their adhesive property can be satisfactorily explained. When a sufficient quantity of the inflected filaments is produced, the spider again applies its spinners to one of the glossy lines, and attaches the flocculus to it. In this manner it proceeds with its labours, occasionally employing the combing apparatus of both hind-legs, till the web is completed. Should any of the flocculi be destroyed, or rendered almost useless, by having their adhesive property impaired, new ones are constantly added to the snare.”—p. 475.

Another interesting portion of Mr. Blackwall’s paper consists in an arithmetical computation of the number of viscid globules on the spiral lines of the geometric spiders, which we shall now give:—

“An estimate,” he says, “of the number of viscid globules distributed on the elastic spiral line in a net of *Epeira apoclista* of a medium size, will convey some idea of the elaborate operations performed by the geometric spiders in the construction of their snares. The mean distance between two contiguous radii in a net of this species, is about seven-tenths of an inch; if, therefore, the number 7 be multiplied by 20, the mean number of viscid globules which occur on one tenth of an inch of the elastic spiral line at the ordinary degree of tension, the product will be 140, the mean number of viscid globules deposited on seven-tenths of an inch

of the elastic spiral line; this product multiplied by 24, the mean number of circunvolutions formed by the elastic spiral line, gives 3360, the mean number of globules contained between two radii, and produces 17,360, the total number of viscid globules in a finished net of average dimensions. A large net, fourteen or sixteen inches in diameter, I have found, by a similar calculation, to contain upwards of 120,000 viscid globules, and yet *Epeira apoclis*a will complete its snare in about forty minutes on an average, if it meet with no interruption. Astonishingly great as this number of globules is, each is separated from those adjacent to it by a sensible space; indeed the material of which they are composed is so fluid, that they run together the moment they are brought into contact. The globules and the intervals between them may be distinctly seen with the assistance of a magnifier of the power of ten."—p. 478.

It appears that these globules had been observed by Dr. Hooke, who says in his *Micrographia*:—

"I observed further that the radiating chords of the web were much bigger and smoother than those that were woven round, which seemed smaller and all over knotted or pearly with small transparent globules, not unlike small crystal beads or seed pearls, thin strung on a clew of silk; which, whether they were so spun by the spider, or by the adventitious moisture of a fog (which I have observed to cover all these filaments with such crystalline beads) I will not now dispute."—p. 202.

Connected with their mode of spinning, the claws of spiders are important, and have been taken notice of by most naturalists who have written on the subject; but Mr. Blackwall, with his usual originality, has extended these observations to several important minutiae:—

"Naturalists," he says, "appear to concur in the opinion that the tarsi of spiders are armed at their extremities with three claws, which occupy the upper and anterior portion of the foot. That this is the case with some species cannot be denied; other species, however, belonging to various genera, *Mygale avicularia*, *Drassus melanogaster*, and *Salticus scenicus*, for example, have only two claws on each foot; and if the tarsi of the larger geometric spiders indigenous to Great Britain, such as *Epeira cicatrosa*, *Epeira diadema*, and *Epeira apoclis*a, be examined under the microscope with a high magnifying power, it will be distinctly perceived that the inferior part of their feet is provided with several claws, which have a considerable degree of curvature, are finely pointed, and are furnished with tooth-like processes on the under side; and should the investigation be extended to other retinary spiders, the feet of many species which construct complicated snares will likewise be found to exhibit a similar organisation. As the best means of guarding against errors, to which the inspection of limbs defective in structure might conduce, it is advisable to select the legs of vigorous individuals which have recently moulted, whenever such can be procured.

"The supernumerary claws were first observed by me, in examining the feet of *Epeira apoclis*a; and on every instance I counted as many as five, which, with the three upper ones previously known, give a total of eight claws on the same foot, distinguishable at a glance from the coarse setaceous bristles in their vicinity.

There is also a strong moveable spine inserted near the termination of the tarsus of each posterior leg on the under side, which curves upwards at its extremity, and exhibits a slight irregularity of outline at its superior surface. The function performed by these spines is an important one. By the contraction of their flexor muscles they are drawn towards the foot, and are thus brought in immediate opposition to the claws, by which means the animal is enabled to hold with a firm grasp such lines as it designs to attach itself to. Now, as the spines and the spinning apparatus are the most efficient instruments employed by the geometric spiders for the purpose of suspension, it is obvious why they usually direct their heads downwards when they occupy the centre of their nest.

"As several difficulties presented themselves in the prosecution of these researches, occasioned chiefly by the impracticability of comprising all the claws in one distinct view; and as I have not yet succeeded in procuring instruments of sufficient delicacy to enable me to accomplish the dissection of exceedingly minute objects under the microscope, I cannot completely satisfy myself at present, whether the number and arrangement of the additional claws are uniformly the same on the feet of such spiders as I have ascertained to be supplied with them; though as regards the larger species I am thoroughly convinced that this is the case, and I have reason to think that it will ultimately prove to be so with the rest."—p. 477.

ON THE BRITISH TITS.

BY EDWARD BLYTH.

I KNOW of no small birds, whose general manners are more amusing than those of the various Tits (*Parus*): their restless activity, the neatness of their form and plumage, the lightness and rapidity of their movements, and the grotesque and beautiful attitudes which they so constantly assume, cannot but arrest the attention of every lover of nature, and must be familiar to all who have ever resided in the country. Bold and fearless in the winter season, they approach our dwellings, gleaning a few morsels from the various refuse of the house: troops of them are seen in every hedge, and their notes are heard enlivening every tree; the different kinds congregate together, and their various calls and sprightly manners tend much to break the monotony of a winter scene. Familiar, however, to every body, as are the habits of these pretty little birds when wild, there are comparatively but very few who have had the curiosity to keep them in confinement, and perhaps a short description of their manners in the cage will not here be considered uninteresting.

First, however, let me specify what birds I mean by the different species of *Parus*; for the Bearded Tit, (*Calamophilus biarmicus*,

LEACH,) has been very incongruously classed among these birds, and the Bottle Tit also, (*P. caudatus*, RAY,) differs too essentially, I consider, to be retained under the generic appellation *Parus*. The genus then, with these restrictions, will contain five British species; one of which, the beautiful Crested Tit (*P. cristatus*), is a rare inhabitant of some of the Scottish forests, and will probably never be found in South Britain. The other four abound throughout the country, and are well known to all who have paid the least attention to birds: these are, the Blue Tit, or *Tomtit*, as it is generally called (*P. cæruleus*); the Great Tit, *Ox-eye*, or *Joe Bent* (*P. major*); the Marsh Tit, or *Lesser Blackcap*, as I have heard it called (*P. palustris*); and the Cole Tit (*P. ater*).

Several of the old genera of birds, as for example the Woodpeckers, (*Picus*), the Parrots (*Psittacus*), and the Pigeons (*Columba*), it has been found convenient to divide into small groups on account of their great multiplicity of species; and although there is undoubtedly a very strong general resemblance to be observed throughout all the various members of those genera, still they exhibit also a considerable diversity of habit, and of course a corresponding modification in their structure; sufficient to allow of their being formed into several very natural divisions. The genus *Parus* also, as here restricted to the species which builds in holes, still presents considerable modifications of form, and of habit: the Marsh Tit, Crested Tit, and Cole Tit, for example, have perhaps as much right to be separated from the Great Tit (*P. major*), and its immediate congeners, as the genera *Chrysopilus* and *Dendrocopus* have from *Picus* among the woodpeckers as now divided. The common Blue Tit also, might illustrate another form among the Tits, differing considerably from the other British species, both in manners and in make. The species of *Parus*, however, are not, as in the above-mentioned genera, so remarkably numerous as to perplex and confuse the naturalist when all arranged together under one generic appellation, and it would, therefore, in this instance, be unnecessary to add to the long catalogue of generic names, by forming the Tits into several genera instead of one. The Bottle Tit, however, should be separate from *Parus*, and also the continental *P. pendulinus*.

The resemblance which these little birds bear to the jays (*Garrulus*), is curious, and has often been noticed. "Form, habits, even the peculiar looseness of texture of the plumage, all," says C. Bonaparte, "are similar in these genera, hitherto estimated so widely different. This resemblance extends even to colour in some species; it may even be asked, what else, in fact, is the Canada Jay (*G. Canadensis*), than a

large Titmouse, and what the 'American' Crested Titmouse (*P. bicolor*), but a small Jay?" The latter, however, seems to be pushing the resemblance almost too far; the different nidification of the two birds, independent of size and habits, being quite sufficient to point out the proper situation of each.

The habit which the Tits have in common with the various *Corvidæ*, of always placing their foot upon their food, has also been instanced as another point of resemblance between these two genera. A Tit, however, that wished to break a seed, would hold it firm between its two feet, and hammer it with repeated and amazingly forcible strokes of its bill; but if a jay wants to crack a nut, it usually fixes it fast in some crevice, and breaks it while held firm in that situation. All the *Corvidæ* are remarkably fond of carrying away any small shining substance, such as a trinket, a piece of metal, &c. This I have never observed in the Tits, though I have several times thrown into their cage a small clipping of tin, for the sake of observing whether they would take notice of it. They have, however, one curious habit of the jays, that has, I believe, never yet been noticed; the instinct of concealing the remainder of a meal to supply the wants of a future occasion. I have frequently seen a Cole Tit, that I have long kept in confinement, hide the remainder of an almond that he had been picking; often in a corner at the back of his cage, where, the drawer for sand not exactly fitting, a crevice is formed very convenient for his purpose. It is amusing to notice how he watches his opportunity when the other birds are not looking, how stealthily he drops from his perch with a large almond in his bill, and with what circumspection he lets it drop into his favourite corner: and it was equally amusing to observe a Marsh Tit, late one of his companions, who, without appearing to take the least notice of the Cole Tit's proceedings, would often descend and make off with the prize the moment the Cole Tit had left it. The Marsh Tit used generally to deposit the remainder of the almond, or piece of suet that he had been pecking, into the seed-glass attached to the cage, and not unfrequently would let it drop into the water. In this he was no doubt actuated by the same motive of concealment as the Cole Tit, but he certainly could not well have fixed upon a worse hiding-place than the latter, as when once in the water he had no means whatever of getting it out again. Sometimes the Cole Tit, after having been thus robbed once or twice of his hoard, was under the necessity of finding a new place of concealment; and I have seen the little fellow, when hungry, return to his treasure, and draw it forth with much apparent satisfaction.

I cannot say from actual observation, whether the Large and Blue

Tits ever conceal their food in the manner thus detailed of the two other species; I have little doubt but that they occasionally may, but they certainly are not in the constant habit of doing so, as the Cole and Marsh Tits are. The two latter are usually of a much tamer and more familiar disposition than the others, and I have consequently been enabled to obtain a more perfect insight into their habits. Nothing can exceed the familiarity of the Cole and Marsh Tits that I have kept in confinement; their sagacity is astonishing in such little creatures, and their manners are highly interesting and amusing.

The Marsh Tit, in confinement, is in constant motion the whole day; he is extremely fond of flying loose about the room, but generally returns to his cage in a few minutes; his curiosity seems unbounded, and is extremely remarkable: the Cole Tit, also, never fails to take notice of any thing new, but he is by no means so curious and prying as the Marsh Tit. The wings of the Cole Tit are considerably shorter, and more rounded, than those of the Marsh Tit, and he is accordingly much quicker in his movements; so nimble indeed at times as even to elude the eye; but then he cannot so well sustain a protracted flight, nor is he so restlessly active as the other, and after a few minutes' play, he is always obliged to rest himself a little: at such times sooner than move, he will even allow himself to be pushed along with the hand, opening his bill at the aggressor, but rarely attempting to peck. They seem both extremely fond of taking food from the hand, and at the approach of any person, both would generally cling to the wires of their cage, in hopes that something would be given to them. If the finger and thumb were held to the Marsh Tit, and he was disappointed at finding nothing, he generally took care to signify his displeasure by giving two or three hard pecks. All the species in confinement are very partial to bathing, and the Marsh Tit, which I have been describing, was at all times extremely anxious that his companions should all be as beautifully clean as himself. If he perceived a piece of dirt adhering to the feet of any of them, he picked it off; and if one of them, by staying too much at the bottom of the cage, chanced to become a trifle taller, he instantly removed the nuisance in a most adroit and clever manner. It would, in short, require a volume to detail all the curious habits and ways of these two little birds; indeed, one can hardly ever look at them without observing some curious trait that had previously escaped notice. But it is not so with the Great and the Blue Tits; I have kept several of each, but they have always been too watchful, too suspicious when being beheld, to permit of my acquiring any very

intimate knowledge of their manners: this, indeed, is the more remarkable, as the Large and the Blue Tits are, I think, generally rather the most familiar when wild. It is, however, worthy of remark, that most of those birds, which when at liberty are tame and familiar, and partial to the vicinity of man, are, of all others, when placed in a cage, the wildest and most untractable; of this, the robin-red-breast and the common house-sparrow may be adduced as striking examples. None of the tits, however, are at all shy when at liberty, and perhaps the reason that the Blue and Great Tits appear more familiar than the other species when wild, is, that they usually frequent the neighbourhood of dwelling-houses more than the Marsh and the Cole Tits commonly do. The large and the blue species ought, perhaps, for confinement, to be brought up from the nest, and then, possibly, they may become tame and familiar in the cage.

Much has been said respecting the carnivorous, or rather predacious propensities of the Tits: I think, however, I may confidently assert that the Cole and Marsh Tits are innocent of the charge; although Wilson, speaking of the American Black Cap Tit (*P. atricapillus*, a species very closely resembling our Marsh Tit), says, "These birds sometimes fight violently with each other, and are known to attack young and sickly birds, that are incapable of resistance, always directing their blows against the skull." Birds of almost every kind are very pugnacious at the breeding season, and none more so than the minute gold-crested *Regulus*, as I lately had an opportunity of witnessing; Bottle Tits also fight desperately in the spring, but I have never noticed any of the four species which form the subject of this paper, to be particularly quarrelsome at any season of the year. With respect to the Ox-eye (*P. major*), I have known some individuals to live in the greatest harmony with other birds; one I kept for many months in a cage full of warblers, without his ever showing the least indication of hostility; but I have, nevertheless, known others of this same species to be complete birds of prey, killing and devouring even their own kind, and plucking off the feathers of their victim before devouring it, in the manner of a regular predacious bird. Mr. Selby, also, has seen *P. major* eat young birds. I have never known the Blue Tit evince these sanguinary propensities; but if the cruel experiment of M. Hebert (of placing a robin in a cage containing several Ox-eyes), were to be tried on the Blue Tits, substituting of course some smaller bird for a victim, I think it not improbable that some individual out of the number would be found to show a similar ferocity. Mr. Selby, indeed,

expressly says, that "like the greater Titmouse, it will also attack other small birds, sometimes killing them in a similar manner." This unaccountable diversity, in the nature of different animals of the same species, shows how cautious we should be in drawing conclusions from the observation of a single individual.

Few persons are aware that the Tits ever attempt to sing. The Marsh Tit is, I think, the most musical, and I have heard some notes from this species which were exceedingly soft and pleasing: he usually commences with a long squeaking preamble, and finishes with a few remarkably sweet and musical notes; I have heard a very similar song from the robin: sometimes he begins with *tsep, tsep, tsep*, repeated several times in rapid succession, and concludes with a mellow soft song. The common chirp of the Marsh Tit may be expressed by the sound *tiss-yip*; and sometimes a very loud *hweet* is uttered nine or ten times in quick succession. He has also a loud and remarkable note of alarm, beginning shrill, and ending like the chatter of a magpie: this he utters whenever he perceives an owl, a cat, a weasel, or any other object of distrust; and it is amazing how quick all the Tits are in spying out an enemy. I have often heard the various Tits that I have kept together in confinement, all set up their alarm notes when I have been for some time quite at a loss to find out the cause; and at length, perhaps, discovered that a cat was quietly sitting on the top of some distant house: the appearance of a boy with a monkey, at the distance of at least fifty yards, once caused them all to utter their notes of alarm; and at another time, when my attention was aroused by their repeated cries, I could perceive nothing but one outstretched paw of a sleeping cat, about an inch of which only was visible. I have heard the Cole Tit make some very tolerable attempts at song, and this species will sometimes sit for half an hour together, uttering a shrill monotonous *sree, sree, sree*, more like the noise of some insect than the note of a bird. The common call-note of the Cole Tit may be expressed by *peet-chy, peet-chy, peet-chy-wee*, sometimes pronounced quick, and sometimes very slowly. *Peet-chy* is often repeated a dozen times in succession, and always very distinct. It has also a call resembling *churwee, churwee, churwee*. The Cole Tit has a greater variety of notes than the Marsh Tit, and one of them is not unlike the sharp *veet, veet* of the chaffinch. The Blue Tit's song is monotonous, but very musical and soft; it resembles the tingling ringing note of the Bottle Tit: this species also has a considerable variety of calls, many of which are very similar to those of the Ox-eye; like that bird and the Cole Tit,

it occasionally utters the chaffinch's *veet, veet*; but the notes of this bird are too well known to every body to require a minute description. The Ox-eye has an endless-variety of calls, some of which are harsh and grating, others soft and pleasing: this species and the Cole Tit sometimes utter a note resembling *pee wi, wi, wi, wi, wi*, so very similar as to deceive even the birds themselves, as I have once or twice witnessed. The usual call notes of the three Black-headed Tits have been very appositely likened to the whetting of a scythe; but they may be easily distinguished: the Cole Tit's is *peet-chy, peet-chy*; the Marsh Tit's *tis-yipp, tis-yipp*, and that of the large species is sometimes, *chee turchee, turchee, turchee*; sometimes *pincher, pincher*, or *winkly, winkly*, &c., but always louder and more harsh than the calls of the two others. I have never known the Ox-eye to attempt a continuous song, but I have heard him vary his calls in a very pleasing and agreeable manner; he usually, however, wearies the ear by an unvaried repetition of the same note for half an hour together. I have been thus minute in describing the notes of these birds, because several of the species of *Parus* closely resemble each other in plumage and appearance, and because much assistance is often thus afforded in the discriminating of assimulant species. There would not have existed such confusion and uncertainty respecting the *Sylvia Hippolais*, &c. of M. Temminck, had that ornithologist described occasionally the *notes* of his birds, when the species were difficult to be distinguished. It would be an endless task, however, to commit to paper all the various call-notes of our English Tits, but I have endeavoured to write down some of the most common notes of each species; and I think, by a little attention to the sounds as they are here expressed, the four common kinds may very easily be discriminated.

The Cole Tit has generally been described as a rarer species than either of the others; and it has also been said, that this bird does not usually haunt the vicinity of houses in the winter so much as the three others, keeping more to woods and forests throughout the year. This does not altogether accord with my observation, for the Cole Tit literally abounds in my garden during the winter months; indeed, I think the four species are about equally abundant. Their haunts are different, and each, in its own respective habitat, may generally be found more plentiful than any of the others. In the immediate vicinity of houses the Blue Tit predominates; in low, damp situations, and among willows, the Marsh Tit is the most abundant species; the Cole Tit may always be found plentiful in the neighbourhood of firs, and among oak-trees;

on a common, also, wherever a few trees are scattered, the Cole Tit is generally to be heard; and in inclosed situations, where a few oaks or elms grow out of the hedge, there the Ox-eye is generally abundant. Neither, however, are by any means confined to the above situations; these are merely their most favourite respective haunts; and if a specimen of either kind were wanted, it might always, with a tolerable degree of certainty, be procured in the above-mentioned localities.

In gardens, as soon as the sunflower seeds begin to ripen, the three Black-headed Tits always make their appearance in great numbers; I have never known the blue species to touch the seeds of the sunflower, but the three others are extremely partial to them: this is the best time to catch them for confinement, which may be very easily done in almost any sort of trap, baited with a meal-worm or insect of any kind. The young Cole and Marsh Tits of the year become quite familiar almost immediately after they are caught, and may be fed on hempseed, or sunflower seeds; the Marsh Tit is also fond of canary seeds, which the other species do not touch. The Blue Tit will not feed on any of these seeds, but requires the same kind of food as is usually given to the warblers, and other soft-billed birds. All the species are fond of pieces of almond and hazelnut; and also of suet, but should not have much of the latter given to them, lest they become sickly. In the wild state the large species feed much upon corn, swallowing it whole; but they will seldom touch this food in confinement, unless very hungry. It is amusing to observe two or three of the Black-headed Tits when they are hammering their hempseed in confinement; a person that did not see them would imagine, from the noise they make, that they heard a number of carpenters at work. The autumn also is, I think, the best time to procure these birds in fine plumage for stuffing; they have then just completed their annual change of plumage, and may at that time occasionally be met with beautifully clean; the plumage of the Tits being generally, when wild, very much soiled with dirt, as is the case with the treecreeper, woodpeckers, nuthatch, and most other birds which creep or clamber much about the dirty branches of trees. The Ox-eye, however, is an exception; the plumage of that species being, generally, remarkably clean and unworn; the very reverse of the three others, which are sometimes, during the winter months, so disfigured with dirt, that their markings are hardly discernible.

Tooting, Surrey, May 18, 1833.

ON THE IRREGULARITY IN THE APPEARANCE OF INSECTS, AND ON THE UTILITY OF CALENDARS.

BY SOLITARIUS.

EXPERIENCE soon teaches the young naturalist, that what in one county, or even in one village, may be the usual time of an insect's appearance, is at variance with the usual time in another. Though we have much to learn before we can positively assert the causes of these irregularities, yet when we consider the influence all created things have upon one another, and how the life of one being depends upon the existence of another, sufficient grounds present themselves upon which we may at least attempt an explanation. In my present paper I express my opinion that the time at which an insect shall appear in its perfect state, depends primarily upon the adaptability of the soil which is to nourish the plant upon which the young feeds. We know that if the soil fails, the plant thrives not, and then the growth and transformation of the caterpillar which feeds thereon is retarded by the scantiness, or the unwholesomeness of the food, and consequently the perfect insect makes a late appearance. But, on the contrary, should the plant grow in a very favourable soil, it thrives well, and the insect eggs, or other embryos, deposited in that soil, partaking of the warmth, are hatched before their usual times, the caterpillar comes forth, feeds upon the leaves, and soon assumes its perfect state. In both these cases, we see that the soil is the main cause of both the late and early appearance. It would, however, be hasty to conclude, that soil exerted the only influence over the periodical appearance of insects; for there are certainly other causes, such as the prevalence of rain, frost, or sunshine. Besides the irregularity in the primary appearance of an insect in its perfect state, there is also another circumstance to be observed, which is, that when an insect makes its appearance, whether it be before or after the usual time, it is rarely a general one all over the country. In explanation of this let me suppose what is in point of fact the real cause, the unequal distribution of temperature over the surface of the country. The suburbs of London, for instance, during this month, may be visited by rain or frost, which would retard the transformation of embryos; while, during the same time, the warm rays of the sun may be throwing an exciting warmth over Bath, or any other place, and accelerate their evolution. There being so many causes instrumental in producing these anomalies, it renders it exceedingly difficult to form a calendar of insects free from inaccuracies, though it may, in most

cases, pretty accurately indicate the regular time of appearance. Every naturalist I think must find it desirable to possess some calendar, to point out to him the times at which he may expect to find the objects of his research ; but when he finds in it so many inaccuracies, it is more calculated to mislead than to assist him, and, consequently, the only method which remains is for him to compile a calendar expressly for his own neighbourhood, founded upon a series of accurate observations made therein. He will find, however, that even in his own neighbourhood irregularities occur, thus, perhaps, he may know that a species of insect is found in one field long before it appears in another. Should this be the case, he must search for the causes, and perhaps he will find that the one field is damp and the other dry, or its aspect is shaded, while the other is exposed to the sun, or more probably that the soil of the one differs from that of the other. Whatever observations he may make, and to whatever conclusions he may arrive as explanatory of the causes, he should duly register in his note-book, and having a map of all the fields round his neighbourhood, each of which is numbered thereon, the differences observable in their soils, &c., may be also numbered so as to correspond to them, and better to impress them upon his own memory. Such a plan of proceeding will not only be serviceable in explaining these irregularities, but will often be useful in pointing out certain insects which may naturally frequent particular soils. Having done this I would next advise him to bring from each field samples of the soil, and to experiment upon their warmth and adaptation for evolving and perfecting insect embryos. Such samples might be emptied separately into flower-pots, placed at the side of one another, and all in the same situation equally exposed to the open air, and in these embryos of the same species being buried equally deep on the same day, by carefully watching for the time of the insect coming forth, calculations could be easily made upon the time one soil took to hatch them to what another did, and consequently he might expect with greater certainty every succeeding year, when to find his insects in those fields from which he took his samples of soil. To illustrate this more clearly, let us suppose that he experiments upon the soil of three different fields, and places them separately in the same number of flower-pots, the first of which contains a chalky soil, the second common earth mixed with manure, the third damp marshy earth. Having adopted the manner of experimenting as above laid down, each pot we will suppose to contain chrysalides of the same age and species, and covered over with a piece of coarse gauze to prevent the escape of the perfect insects when they

come forth. He perhaps finds that the earth in the first pot develops the insect sooner than the earth in the other two ; that the earth in the second takes three or four more days more than the former, and lastly, that the third requires several days more than the latter to effect the required transformation. With such insect embryos as are naturally deposited in damp soils, the results of the experiment would be the contrary. But, whatever results he might obtain, they could not fail to furnish him with more accurate data from which he might expect at certain periods the appearance of an insect. Having investigated in the above manner the causes of the irregularities of insect development, the entomologist will now pursue his researches with greater success, and build his expectations upon better foundations ; but still other causes will exist which it is not so easy to take into calculation, and to make allowances accordingly. There will be rain, drought, sunshine, &c., the degree of influence exercised by either of which upon the embryos we cannot accurately determine, unless it be by examining by dissection or otherwise, how the transformation of an embryo belonging to any species is progressing to its perfect state in those fields in which the naturalist is in the constant habit of pursuing his researches.

London, March, 1833.

FIELD SKETCHES.

BY RURICOLA.

IN my grounds this month, within a few yards of each other, have been two yellow buntings' nests : yellow yowleys, as they are commonly called in this country, where the English vernacular name of yellow-hammer is little known. One of these nests was built on the ground, on a slight slope, in the midst of a tussock of dry withered grass, sheltered by the branch of a young spruce fir and by a low furze bush. The other was situated in a white-thorn hedge, at about 18 inches from the ground. Some withered grass rose about this nest also ; but the situation of it is unquestionably in the hedge, where it rests in a fork formed by the stem and one of the branches, at the height already mentioned above the ground. I trouble you with this statement, as affording within a short space examples of the two situations for building chosen by this bird, as noticed in the second edition of Colonel Montagu's Ornithological Dictionary. Colonel Montagu says, that " the

nest is generally placed near the ground, in some low bush or hedge : " whereas the editor of the late edition of his work observes,—“ Among several hundreds of these nests, with which I have been acquainted, I have rarely indeed seen one ‘ placed in a low bush or hedge,’ but almost uniformly on the ground in a tuft of grass, or under the brow of a ditch-bank.” This example, therefore, especially as a casual occurrence, which is the case, may not be impertinent. By the way, I remark, that Colonel Montagu says of the yellow-hammer, that “ it does not breed till late in the spring.” In the examples, already spoken of, both broods were hatched several days before the date of this letter (April 29). From some cause, which is not apparent, the brood belonging to the nest on the ground had been forsaken by the dam, and were found dead two or three days ago under and in the nest: whilst those in the hedge are going on well at this time, being of such a size and so nearly fledged, as to make it probable that in a few days they will have flown. On turning to Syme’s “ British Song Birds,” I find it stated, that “ the yellow bunting rarely builds on the ground, preferring a low bush, or among reeds in moist places.” Syme states also, that “ it generally builds in May.”

With reference to the engraving of the “ oak in the hyacinth glass,” taken from the drawing which I sent you from Bath, and given in your number for April, permit me to direct your attention to an error of the artist, who has in the first place represented the acorn with the cup on, which is of no great moment, and has also exhibited the plant as germinating from the wrong end of the acorn: in fact, as if the plant made its way through the cup. While on this subject, I may add, that on one of the trees, spoken of in that letter, has been since discovered, what the discoverer supposes to be, the caterpillar of the *Tortrix viridana*, or *small green oak moth*, noticed in “ Insect Architecture,” p. 162. At the risk of losing a future seventy-four for His Majesty’s navy, the little animal is allowed to live in the cottony habitation he has spun for himself, and to come in and out to feed, when he pleases. My informant inquires, “ Is not this rather a curiosity? Where can the moth have laid the egg, and when? Can it have been in the acorn, and have been then nurtured through the process of vegetation? The moths are out in June, and can hardly have deposited it at the time the leaves were formed, which I imagine to be usual.”

In an inclosure on the outside of my garden is a small heap of manure, the materials of which came partly from the stable, and partly from the

sea-shore. In a little hollow on the side of this heap, under a sort of pent-house formed by a lock of the sea-weed, a redbreast has built her nest and hatched her young, unmolested by the gardeners and other persons who are continually passing by, for her situation is almost close to the garden-door; and to all appearance insensible of any inconvenience from the manure heap having been recently dug away within a couple of feet of her nest, which she goes in and out of with little scruple, in the presence of any one who happens to be near. The fact is, perhaps, not unworthy of notice, both on account of the substance in which the bird has chosen to establish herself, and of the public and much frequented situation.

A twelvemonth ago I observed another redbreast's nest very pleasantly situated in a window of a house at that time my residence, which stood in a garden. The house was almost covered with ivy: and round some of the windows was a light trellis, with which roses and other flowering plants were interwoven. On the sill of one of the windows, and in a snug recess within the trellis, the redbreast took up her abode, where she might be continually seen from the parlour, to which the window belonged, during the whole process of incubation, till in due time she carried off her young brood in safety. She was much the object of observation to different members of the family, and often would have escaped notice, as she sat patiently on her nest, but for the bright sparkling of her eye, which seemed to speculate on the observers as curiously as theirs did on her. But the window never being opened, and care being taken not to disturb her, she arrived prosperously at the termination of her maternal cares. The recollection of this occurrence has given occasion to the following lines, which are at your service, if you think them suited to the purposes of your Magazine.

TO A REDBREAST, WHICH BUILT HER NEST ON THE WINDOW SILL
OF A PARLOUR IN THE AUTHOR'S RESIDENCE.

YES, 'mid the dark-green ivy-twine,
Couch'd in the trellis'd eglantine,
We mark'd that tiny form of thine,
The spring's sweet tide;
We mark'd thee weave thy mossy nest,
And in its hair-lined covert rest
Thy russet wings and ruddy breast,
Our home beside.

Close didst thou sit ; but we might spy
The sparkle of thy quick dark eye,
As if some reckless foe were by,

That mischief stirr'd :—

Sit on ! away we would not bear
Those freckled balls, thy anxious care ;
Nor of thy plumes a feather mar,
Thou social bird !

Sit on, and keep thy leafy bed,
Secure in thy secluded shed,
Till forth thy spotted brood be led

Yon shrubs among :

When autumn chills the silent day,
Perch'd on the hawthorn's leafless spray,
They shall their guardian's care repay
With a sweet song.

Sweet is thy song from vernal tree,
Though noticed less amid the glee,
Which swells in general harmony

Each tuneful throat :

More valued, when its warbles cheer
The gloom of the departing year,
And pour into the pensive ear
Their lonely note.

That lonely note may wisdom preach !—
To the 'lorn mourner it may teach,
'Mid saddest scenes within our reach

Some joys remain ;

A pledge no less, though winter's wing
Obscure our path, another spring
Shall come, and all things laugh and sing
With mirth again.

Then welcome to my window-sill,
Garden, or roothouse, as thy will
May lead thee, social warbler, still

By man belov'd !

Home in my homestead mayst thou find ;
And give in turn thy greeting kind,
Sweet to the ear, and by the mind
Not unimprov'd !

Holywood, Ireland, May 11, 1833.

RECENT EXPERIMENTAL RESEARCHES ON THE PROCESS OF RUMINATION OR CHEWING THE CUD.

HAVING been led, while composing the "Alphabet of Zoology," now in the press, to investigate minutely the process of digestion in different animals, I think it will be interesting to state here in brief the results of the recent investigation by M. Flourens, of the curious process of chewing the cud or rumination, which quite upsets all previous explanations. This process is always connected, excepting in individual instances, as in man and the kangaroo, with a complicated stomach, there being four, or at least four, distinct chambers whose structure is very different.

The first, similar to the crop or craw of birds, is termed the paunch, and serves, by its heat and somewhat scanty moisture, to prepare the herbage for farther change. It is situated on the left side, and lined with a rough membrane studded with small flat projections. It is inferred to have a rotatory motion, from the round masses of hair, called bezoar stones, frequently found in it, arising from the union of hairs licked off, from time to time, by the animal when cleaning itself, and said, without proof, to be miraculously medicinal. In the chamois, the bezoar stones appear to consist of vegetable matter.

The second is termed the honey-comb bag, king's hood, or bonnet, is much smaller than the paunch, and is situated on the right of the lower end of the gullet, which opens in common into it and into the paunch. On the inside a number of shallow cells, like those of a honey-comb, are formed by projecting membrane, and the whole is lined with a rough scarf skin continuous with that of the gullet and paunch:

The third is the smallest of the four, and is named the many-plies, because the inner surface rises up into a great many folds, one above the other, amounting to about forty in the sheep, and about one hundred in the ox, and covered with a rough scarf skin. Some of these folds project farther than others, there being first two long ones on each side, and within these two shorter, and so on. The smallest of them, between the opening from the honeycomb bag, are puckered, so as to act as a valve between this third chamber and the fourth.

The fourth, which is exclusively the digestive stomach, according to Dr. Carus, is called the rennet bag, or red. Here, as in the simple stomachs of beasts of prey, we find no lining of scarf skin, which goes

no farther than the many-plies ; but a soft mucous membrane, which has the property of curdling milk, and that of the calf is used for this purpose in cheese-making.

It is important to observe, that, from the inlet of the paunch or first stomach, from the termination of the gullet, near the junction of the second and third stomachs, there runs to the third stomach a groove, which I shall call the cud-duct, with the first stomach on its left, and the second on its right. This cud-duct has thick prominent margins, which can be brought to meet so as to form a tube, and constitute a continuation of the gullet across the second into the third stomach. This duct was ascertained by M. Flourens to remain always open, even when the gullet inlet of the first stomach was closed.

The process of chewing the cud has recently been explained with great minuteness by M. Flourens, of Paris, who killed a number of sheep while in the act, for the purpose of investigating the facts, which have not been well understood by Aristotle, Perronet, Daubenton, Camper, Haller, Chabert, Foggia, and Bourgelat, and we may say the same of Grew, Monro, John Hunter, Blumenbach, and Carus.

When an ox or a sheep first swallows grass or other herbage, it passes chiefly into the paunch, but both partly, *immediately and successively*, into the second stomach ; but in the instance of liquids, such as broth, a portion always passes into each of the four stomachs *immediately* ; the only opening into the third stomach being very strait, and capable, also, of being quite closed, so as to prevent the passage of anything coarse. The reason why liquids pass into the third and fourth stomachs is, that unless the gullet-inlet into the first stomach is expanded by a morsel of solid food, the cud-duct is more open to receive the liquid, and for the same reason, the cud-duct is prevented, by the expansion of the gullet-inlet, from admitting solid food.

In the process of common vomiting, the contents of the stomach are, by the action of the midribs and the muscles of the belly, ejected in a mass ; but in chewing the cud, there is only a small rounded pellet brought up into the mouth, so that the process is in this very different from vomiting. Bourgelat denied the existence of the pellet, and Daubenton says it is formed by the second stomach. M. Flourens ascertained, beyond all question, that the pellet or cud, (which is only a different way of spelling *quid*,) is detached from the mass of aliment in the paunch, by the latter contracting and pressing the mass upwards towards the adjacent inlets of the paunch, the many-plies, and the

cud-duct, which seize and detach from it a portion about an inch in diameter. The space, also, which these several adjacent inlets enclose, being round, and its walls in motion, the pellet is thereby rounded, and at length pushed up into the gullet, and returned to the mouth.

It is very remarkable, that, during the formation of the pellet, a very copious flow of spittle takes place from the mouth down the gullet, without which the pellet, which is rather dry at first, could not easily be brought up. The second stomach also, has, by its contraction, the opposite open cells brought into contact, so as to form a series of shut cells; an admirable provision for preventing the fluids, always more or less present here, from being brought up along with the pellet.

The pellet, when returned to the mouth is minutely chewed and reduced to a half fluid pulp, which, on being swallowed, is not solid enough to force open the always shut inlet of the paunch, and consequently enters the always open inlet of the cud-duct, and passes to the third stomach, from which it is forwarded to the fourth. The account of this process by Blumenbach, adopted by our British physiologists, is grossly erroneous.

In consequence of this complicated process, animals which chew the cud can digest more effectually than those which do not, such as the horse, it being common for the latter to pass corn quite undigested, a circumstance that rarely happens with horned cattle; and hence it is well known to graziers, that one third less will be enough for an ox than for a horse or an ass. According, however, to the recent experiments of De Dombaslea and Biot, this will depend, in the case, at least, of roots, such as carrots or potatoes, upon boiling, so as to break the globular crust enveloping the nutrient matter, which the stomach cannot well effect. This matter, formerly termed *Amidine*, from its occurring in starch, has been termed by M. Biot, *Dextrine*, from its polarising the rays of light towards the right,—a singular property, by which the nutritive qualities of vegetables may be, M. Biot thinks, determined by optical experiments. If this be proved by farther research, it will furnish a triumphant answer to those who are disposed to ridicule minute and recondite inquiries, because they appear to be of no use. When the polarity of light was discovered, it certainly could never have been anticipated that it might become a test for the nutritive qualities of food.

Lee, Kent, May 22nd.

ON THE HOODED CROW.

BY EDWARD BLYTH.

I AM informed that, in some parts of the north of Scotland, nothing is more common than to see the hooded crow (*Corvus cornix*, LINN.) paired with a black crow. The gardener of Mr. ———, of Merton, a very intelligent naturalist and accurate observer, tells me that, when residing in Inverness, he, for several successive years, observed five or six crows' nests, the owners of each of which, in every instance, were one black crow and one hooded crow, which consequently he always considered to be merely the male and female of the same species. In the south of England, the hooded crow is only seen during the winter months; and in the few instances which have come under my observation, I have noticed, that about an equal number of black crows have always been interspersed among them. Some naturalists have even said that there is no specific difference between the hooded crow (*C. cornix*) and the carrion crow (*C. corone*); the latter, however, is a stationary species in the south of England, while the former is as constantly migratory; an obvious fact, by no means corroborative of their identity. Mr. Selby, in his description of the hooded crow, remarks, that "sometimes this bird varies in colour, and is found entirely white or black:" M. Temminck, also, makes the same observation, "Now are these black crows *varieties*, or is the difference merely sexual?" As to their being of the carrion crow species, (*C. corone*), I cannot for a moment suppose it: several of the crow genus approximate most closely in size and appearance, but are nevertheless most decidedly distinct. The North American crow, for example, is so very similar in appearance to our carrion crow, that, on the most careful and scrupulous comparison, C. L. Bonaparte was not able to perceive the least difference between them; yet, nobody I should imagine, who has read Wilson's admirable description of the habits of the American bird, could suppose it to be identical with the common carrion crow of Europe. Is one sex of the *Corvus cornix* always black? or are the black individuals of this species mere varieties?

Tooting, Surrey, May 18th.

CHAPTER OF VARIETIES.

SUMMER BIRDS OF PASSAGE.—A few days ago, being five hundred miles from the coast of Portugal, four hundred from that of Africa, &c., we were agreeably surprised by the appearance of a few swallows (*Hirundo urbica*, and *rustica*). This, however extraordinary, might have been explained by an easterly gale, which might have cut off a migrating band from the main to Madeira, only two hundred miles distant from us; but what was my surprise in observing several small warblers hopping about the deck and riggings. These poor little strangers, exhausted as they were, were soon caught and brought to me. The following is a list of the species:—1. *Sylvia trochilus*. 2. *Sylvia erithacus*, LATH. (*Tithys*, TEMM.). 3. *Sylvia suecica*, or rather a similar species which I have already received from Egypt and Barbary. 4. A species new to Europe, and perhaps even a nondescript, having the plumage of an anthus, and which I think belongs (as *Sylvia cisticola*, and others,) to the hitherto African genus, *Malurus*. This, however, must rest undecided, my specimen having lost its tail, which had been pulled off by the sailor who caught the bird.—CHARLES LUCIEN BONAPARTE*.

On Board the Delaware, near Gibraltar, March 20, 1828.

FURZE BRANCHES FOR CAGE BIRDS.—I have placed branches of furze in my two large cages, and it is surprising to see how the birds enjoy it. The twite and the siskin feed upon the seminal parts of the flowers, and have stripped the branch that is in their cage of every blossom bud. The twite remains upon the furze almost the whole day, sings upon it, and at night roosts upon it. The warblers, also, are extremely fond of threading the interstices, and concealing themselves amongst it, as they do in their wild state.—EDWARD BLYTH.

Tooting.

TORPIDITY OF SNAILS.—In February, 1832, I had some snails out of the country to feed a blackbird with; one of them escaped and travelled to the ceiling, where I found him next morning; a date was

* From the Linn. Trans. xvi.—P. 754.

written near him, and he was left to himself. In March, 1833, I took it down and put it in water, when it was found to be alive.

It is very singular, but I found it had none of that fluid that so resembles saliva, although its shell was broken three or four times, which, had it not been previously torpid, it would have put forth in large effusions.—B. B. CORNEY.

THE WORMEGAY OAK.—This celebrated oak, denominated the Great Oak, which grew in Wormegay Park, in Norfolk, has not, that I am aware of, been noticed by any writer; and, having long attracted visitors from all parts of the county, to gaze upon its gigantic form, is now a shattered veteran, dry, prostrate, dead:—

. Thou hast outlived
Thy popularity, and art become
(Unless verse rescue thee awhile) a thing
Forgotten, as the foliage of thy youth.

The history of celebrated trees is generally involved in obscurity, because no particular attention is excited towards them until age or size, decline or decay, renders them objects of curiosity. Such is the case with the Wormegay Oak. All the information respecting it that can be obtained from the peasantry is, that during fifty years previous to its downfall, it had been propped with oak spars, that the oldest inhabitant in the village does not remember the slightest show of vegetation on it, and that about fifty years ago its hollow trunk was converted into a stowage for calves. I visited the tree in 1832, when so much of it was standing, that I was enabled to ascertain its circumference. Near the ground, where there were no projecting spurs, its circumference was fifty-one feet; its height twenty feet. At this point, short stumps of branches were visible, but not a vestige of bark was left on its bleached surface.

M. Bosc is of opinion, that an oak of a century's growth does not measure more than a foot in diameter. The growth of the oak must depend upon soil and situation; and I think it probable, with great respect to the opinion quoted, that the diameter of an oak of a century's growth, under favourable circumstances, would measure double that stated as the opinion of M. Bosc. If an oak were to increase only a foot in diameter each century of its growth, the Wormegay Oak, whose diameter was eight feet, had maintained vigorous growth eight centuries. If the maximum of growth be taken at one foot each century, during three centuries, the tree in question had never attained the

diameter here stated. Assuming that the Wormegay Oak increased in diameter one foot each century during the lapse of eight centuries, and allowing that the lapse of three centuries be necessary to complete the total destruction of an oak, provided that decay had commenced—under these circumstances, the Wormegay Oak had an existence of eleven hundred years, which, I think, cannot be implicitly credited; although Gilpin, in his *Forest Scenery*, notices “a few venerable oaks in the New Forest, that chronicle upon their furrowed trunks ages before the conquest.” There remain, however, very imperfect accounts of the progress of growth, and possible duration of the oak; the axe, with little exception, prevents its dying a natural death.

It may be imagined, that the soil which fed this “woody patriarch” was rich in those substances, affording, in a high degree, food suited to its healthy growth. It was situated on a patch of high land, between two valleys of moor-soil, and, although they have the advantage of irrigation, their surfaces are swampy and interspersed with hassocks of coarse grass. The surface-soil, on which the tree grew, is a moist dark mould, in which appears to be mixed a quantity of finely-divided vegetable matter. This stratum of earth is about two feet thick, and rests on one of cohesive whitish clay, which, being tested with an acid, afforded copious effervescence. The water of the soil, tested with tincture of galls, afforded a slight purple tinge, but no sensible precipitate was produced, after having stood ten hours.

The species of oak enumerated by Linnæus, Humboldt, Martyn, and others, are principally natives of America. The *Quercus Sessiliflora* is supposed to have been introduced into England two centuries ago, therefore the Wormegay Oak cannot be classed with this. The common oak (*Quercus robur*), being a native of Britain; and, it is assumed, the only kind of oak known in Britain at the time the tree under review was a seedling; the Wormegay Oak will take rank with that species which furnished the hardy seamen of these islands with materials for the construction of their war-ships before Cæsar’s invasion. Cæsar’s account runs thus:—“The body of the vessel was entirely of oak, to stand the shocks and assaults of the tempestuous ocean. The benches of the rowers were made of strong beams of wood, of about a foot in breadth, and fastened with iron nails an inch thick. Instead of cables, they secured their anchors with chains of iron, and made use of skins, and a sort of thin pliant leather, by way of sails, either because they wanted canvass, and were ignorant of the art of sail-making, or, which is more probable, because they imagined that canvass sails were not so proper

to bear the violence of tempests, the rage and fury of the winds, and to govern ships of that bulk and burden."—R. T. C.

Shouldham, April 25, 1833.

SCARCE BIRDS IN SCOTLAND.—Last month I observed the Bearded Tit, (*Laniellus Biarmicus*, BLYTH,) at Paisley Water Mouth in a marsh among the reeds. I could not obtain a specimen, (being Sunday,) but I can specially speak to their identity, as I was within a few yards of the tribe when feeding. A pair of black caps were shot in Sir John Maxwell's garden last week; I have stuffed them, and would be proud indeed to have the liberty of submitting them for your inspection. The spotted fly-catcher and redstart, of rare appearance, are now to be found in our walled gardens. It is generally remarked by old people, that the winters are not so severe, nor the summers so hot here, as in some years past, and that, in fact, a complete change has taken place in the atmosphere, therefore I cannot account for the presence of such birds here, (though merely birds of passage,) at so uncongenial a season. The spring weather has been most boisterous. I wish you would account for this change, because, on the same principle, I may be wrong. I think the nightingale and nuthatch will pay us a visit soon.

I am very fond of birds' eggs, but I do not agree with Captain Brown in his mode of clearing, who opens them at the ends. I make two small holes on the *one side*, and, consequently when exhibited in the cabinet they appear entire.—HENRY JOHNSON.

84, Queen-street, Glasgow, May 8th.

USE OF THE LONG HIND CLAWS IN LARKS.—There is an opinion that larks have long claws, in order that they may remove their eggs from place to place, when disturbed by mowers. This seems to me very unsatisfactory. Perhaps some of your correspondents might help me to a better explanation of the fact.—T.

ON AN UNKNOWN BIRD, AND A BRAMBLING'S NEST.—Last Saturday I walked from the high rocks through Waterdown Forest, and particularly remarked two birds which flew pretty high above my head in a wide circuit, several times, uttering a strange and, to me, an unknown and distressing cry: one was very vociferous, but I *think* both called. They were about the size of a crow, or rather smaller; short throat, flattish head—all the upper part of the body and wings black, except a white bar across the tail, which was short—all the under parts

white: the wings were exceedingly broad for their length, and had a waving motion during flight. After some time they settled on some high trees, at some distance. They appeared to me to answer exactly to the description of the black-billed auk, but was not the situation extraordinary? I have little doubt in my own mind, also, that two bramblings which, I believe, are not known to breed in this country, are now building in a large patch of furze in Hurst Wood. I watched them so long, and observed them so accurately, that I hardly think I could have been mistaken; I saw the nest also, but they had not begun to lay, and I was obliged to leave the neighbourhood.—WM. SMITH.

Enfield, May 4.

AGE OF BUTTERFLIES, MOTHS, AND BEETLES.—It has been said of our butterflies, that the natural length of their existence amounts to a whole year, because occasionally during the winter or spring, a specimen is met with many months after the usual time of their first appearance. None of those species which I have ever read of as being captured so many months after their transformation into the perfect state, I will venture to assert do naturally enjoy so long an existence. I have seen it stated, as a positive fact, that the 'brimstone butterfly (*Gonepteryx Rhamni*) naturally lives a twelvemonth, and how frequently do we read of the capture of other species, which it would seem have existed five or six months longer than their usual time. Such instances are not in accordance with their general habits, but arise from accidental causes, such as the insect not having been able to meet with a male and propagate its kind, which is one of the commonest causes of the prolongation of life among insects, when nature supports them seemingly with the hope that they may yet succeed in finding one. Let any one who is desirous of being better informed upon this head, take a male and female of the same species of butterfly, and place them in a gauze-box, and in another box confine a virgin by herself. He will find that the couple in the former box will breed, eggs will be laid, and both will die at their natural time, but not so with the virgin—she will live for months after, and this, by the way, it may be remarked, is generally the case as regards other animals. It is from the results of similar experiments, that I am warranted in so positively contradicting the assertion, that some species naturally live through the winter and spring, until they have spun out a twelvemonth's existence.

SOLITARIUS.

[I know of no instance of butterflies breeding in confinement as here stated. EDITOR.]

NATURAL HISTORY OF THE BIRDS OF AFRICA.

TRANSLATED FROM THE FRENCH OF LE VAILLANT.

THE SHORT-TAILED EAGLE.

Le Bateleur, *Le Vaillant*, Ois. d'Afrique, i., p. 31, Plates 7 and 8; *Falco ecaudatus*, *Latham*, Index Orn. Sup., p. iv.; *Daudin*, Orn. ii. 54; *Shaw*, Gen. Zool. vii. 98; Short-tailed Falcon, *Latham*, Gen. Synops. Sup. ii. 21; Gen. Hist. i. 171.

AMONG all the birds of prey at present known, there is not one that can be compared, or that seems related, to the short-tailed eagle. Its singularly short tail at once particularly distinguishes and characterises it, scarcely extending beyond the tail coverts, which conceal more than half of it. Its whole length, indeed, does not exceed six inches, contrasting badly with its long wings, whose extent appears more on account of the shortness of the tail, and both together rendering its flight peculiar. When I saw this bird fly, for the first time, I was of opinion that it had lost its tail by accident, a supposition strengthened by the singularity of its mode of flight—for the tails of birds of prey, acting as a rudder, serve to give them much agility and gracefulness in the air. My subsequent observations, however, proved that the short tail

is a constant characteristic of this species ; while its manner of flying is a sort of play which both the sexes practice in responsive turns.

The short-tailed eagle hovers by sailing round, and utters, from time to time, two very hoarse sounds, one an octave higher than the other. Frequently it stops short, and descends a certain distance, beating the air with its wings, so as to make one believe it has been winged, and is ready to fall to the ground. The female in such cases never fails to repeat the same manœuvre. The flapping of their wings can be heard at a great distance ; and I can compare it to nothing more appropriate than the flapping of a sail which has been slackened at one corner during a gale.

I have named this bird *Le Bateleur*, from its flapping in this manner in the air, and which might be said to be displays of tumbling for the amusement of spectators. These birds are very common throughout the Auteniqua country, and along the coast of Natal, as far as Caffraria ; and during the time that I traversed this charming region, I rarely passed a day without seeing more than one pair. The male and the female are always in company, and one is very rarely seen without the other.

The short tail of this species distinguishes it from all other birds of prey, and the strongly marked colours assist in preventing it from being confounded with any other to which it may have a resemblance. It is of a middle size, between the common eagle and the osprey. Its beak and claws are black ; the base of the beak is yellowish ; the legs are of a yellowish brown, covered with broad scales ; the head, the neck, the fore and the under parts of the body, are of a beautiful pale black, sharply terminated by the deep rust red of the back and of the tail ; the scapularies are blackish, and in certain lights showing a tinge of bluish grey ; all the small coverts of the wings are of a fawn colour ; all the quills of the wings are black on their inner barbs, embroidered exteriorly with silver grey, in such a manner that when folded they appear all of this colour. The eye is deep brown. The female is a fourth larger than the male, and her colours are in general of a paler tint.

The short-tailed eagle builds its nest upon trees ; the female laying three or four eggs entirely white ; at least, such is the information I received from the colonists, never having myself seen the eggs. I have shot several of the young whose colours are very different from those of the adult bird, so much so that if I had not shot them when the parent birds were giving them food, and if in dissecting them I had not ascer-

tained them to be young, I should have most certainly taken them for another species, particularly as they were as large as the adults. When I observed the birds, they were six in number, all perched on a very large tree, where the eyrie was, and where the four young had no doubt been hatched. I first brought down the two old birds, and afterwards three of the young ones, but the fourth escaped into the wood. Among the three young, there were one male and two females, and it is probable that the one which escaped was a second male. The three young ones were all exactly coloured as the one represented in my eighth plate, which is a female. Some months after, I shot other young birds of the same species, but more advanced in age, and already showing some red feathers on the rump, while the head and under parts of the body had a number of black feathers. It hence appears, it is not till the third moult that this species takes its beautiful colours, as represented in my seventh plate.

The young has the base of the beak bluish, the beak of a horn colour, and the feet yellowish; the general colour being a uniform brown, more clear on the head and neck, and more deep on the rest of the body; yet all the feathers are edged with a paler and clearer tint.

The short-tailed eagle, like the vultures, feeds on all sorts of garbage; yet it frequently attacks the young antelopes. It prowls about houses, where it tries to surprise lambs or sickly sheep; and the young ostriches, while little, become also its prey, particularly when they chance to be separated from their parents. The colonists of Auteniqua call the bird the mountain cock (*berg-haan*), a name, indeed, which they apply to all large birds of prey, and particularly to eagles.

A single glance at this bird will convince any one that it has not the characteristics ascribed to the eagles: its claws not being so strongly curved, and its beak comparatively less powerful. It is, therefore, one of the doubtful species, as much resembling the vultures as the eagles, and ought to occupy, by the side of the Caffer eagle, a place between the eagles and the vultures.

The district in which I most commonly met with the short-tailed eagle was upon the confines of the Queur Boom, where I pitched my camp, near Lagoa Bay. They do not fly in troops, and many of them are never seen together, except when a concourse of other birds of prey has attracted all those of the district to some piece of carrion. In that case alone they flock together, but after feeding each pair takes a different route to their respective haunts in the neighbouring mountains or forests.

I have also remarked, that these birds carry in their crops the food they take to their young, to which they seem much attached ; for I have seen them constantly providing food for young ones as full grown, and apparently as capable of foraging, as themselves.

ON THE PHILOSOPHY OF FINAL CAUSES.

BY M. GEOFFROY ST. HILAIRE, PROFESSOR OF NATURAL HISTORY, PARIS*.

WE have recourse every day to the philosophy of final causes for explaining every thing, and we fail not to affirm, with regard to the teeth, that they are evidently made for dividing and grinding the food. We wish not to confine ourselves to say exactly that which is,—to specify merely that they are very well fitted for such an office ;—it is doubtless more marvellous to explain the facts in this manner. But why, I ask, are not pangolins, ant-eaters, tortoises, birds, &c., furnished with teeth ? “ Is this,” it is replied, “ of any consequence ? These creatures are doubtless provided with other cutting instruments ? ”

This remark was suggested to me by a monstrous calf exhibited alive at Paris, as an interesting rarity of which we now possess the skeleton at the Jardin du Roi. Its monstrosity consisted in a second deformed (*informé*) jaw, grafted (*entée*) upon the extremity of the under jaw, which was in other respects regular. The grinders of the grafted jaw occupied its sides, and were consequently directed outwards. The animal showed much dexterity in using these as a cleaning instrument either upon the right or the left side ; and it was in fact said, from the great ease with which this calf managed this supplemental organisation, that it was provided with two combs skilfully combined, and marvellously adapted for its use.

The possessors of this curious monstrosity turned this dexterously to account, in increasing the proceeds of their speculation. They knew, or at least they said, that one organ being wanting, it was wondrously supplied with another. They fed it solely with milk, but with great difficulty, being obliged to pour it into the gullet by means of a bottle with a long neck ; yet, said they, by how many other advantages is this slight inconvenience redeemed ? The animal, however, left to itself,

* Translated from the French work “ *Système Dentaire*,” by the Editor, as a specimen of the wild theories now prevalent, and which, to any plain man, must carry with them their own refutation.

would not have lived two days, while the cupidity and devotion of its attendants, in fact, provided for the state of its organs. They managed to get it well through its period of lactation, and even beyond, continuing its existence as a lactivorous animal. It finally died.

Now, following the example of these avaricious speculators, would you allow yourself to be prejudiced in favour of the philosophy of final causes? You may, like them, be inclined to say, that nature, in endowing this creature, had acted as a good mother, since, with a view to a singular predilection, she had furnished a compensation, as if to balance the irregularity of the other parts. But this would show a wish to penetrate into the secret of causes, and might lead to strange aberrations. At this part of our enquiry let us abide by the sentiment of admiration, and let us not indiscreetly give up our mind to that which, like all our first notions, is and will be eternally above our feeble intelligence. As naturalists, let us abandon audacious thoughts: let us be contented with the manifestations accorded to us, and let us remain the historians of that only which is accessible to our senses.

But you still insist that "this knife, for example, is made to cut." Notwithstanding, to abide by the strict observation of fact, I prefer holding to this reply:—*The knife is susceptible of cutting; it may—it will, no doubt, be employed in cutting.* "But," you add, "the workman did, in fact, expressly make it for cutting." *Who told you so?* I reply. The workman, it is true, has rendered it fit to cut; but if this circumstance interprets his intention, why may I not also believe that he formed it to create something productive; in a word—to be sold? The knife has in fact been fabricated for various purposes, and you will only admit of one, and you will maintain, without knowing the matter, that this one purpose prevails over every other that may be opposed to you.

But would any one be justified in confidently speaking in this manner? This raises another question. There are without doubt high manifestations which attest the designs of Providence: let the minister of the altars, inspired by religion, propose them to our faith; he thereby fulfils his pious duties: but the naturalist, being in another situation, passes, or ought to pass, from the observation of facts to its only and immediate consequences*.

* When a theorist goes so far as to maintain, or at least hint, that a knife is not made for cutting, it appears to be hopeless to set him right by facts or reasoning. The concluding remark is very objectionable.—EDITOR.

ON THE GENUS PHENICURA AND THE BLUE-BREAST,

(*Motacilla Suecica*, LINNÆUS.)

BY EDWARD BLYTH.

THE term *Phœnicura* (signifying, literally, red-tail), is now usually employed to designate that genus of birds, to which the common redstart and robin, of this country, belong: the name, however, is certainly not very applicable to the robin, one of its most distinguished members, but it is one which is, nevertheless, passable, it being, perhaps, impossible to devise a perfectly unexceptionable term. The three described European species of this genus have each a curious and very remarkable motion of the tail: the common redstart's tail (*Ph. ruticilla*,) shakes—not horizontally, as it has been represented—but as if it were nearly detached from the body; as if loose, and ready to fall off: being almost constantly moving in this remarkable manner it gives the bird a most singular appearance. The redstart never alights on a spray without giving its tail one of these curious shakes, consisting of three or four quick oscillations, each less than the preceding, and the last hardly perceptible. The black redstart, (*Ph. Tethys*,) also, shakes its tail, but in a different manner from the *Ph. ruticilla*. The black redstart's tail is not in such continual motion as that of the common redstart, but whenever he alights on a bough, he always gives it, (I hardly know how to express it better,) four or five slight wags in quick succession; the motion not ceasing gradually, as in the common redstart, but each successive shake or wag being equal to the first. The robin-redbreast, (*Ph. rubicula*,) has a strange tremulous motion of the tail, which has, I believe, never yet been noticed: indeed, it can be observed only in tame caged birds, it being so small and quick, as to be imperceptible at the distance of a yard; I have, however, many times observed it.

The common redstart is a very expert fly-catcher; a tame one that I once kept in confinement would, if turned loose into a room, in a very short time rid it of every fly; flying first to the windows, and catching all that he could see there; then examining the walls and ceiling, hovering all the time in a very curious manner, and at length, after having seized every fly that he could see settled, he would take his stand on a picture-frame, and dart after those which were flying about, catching them in the manner of a fly-catcher, (*Muscicapa*,)

with a loud snap of his bill. The black redstart, also, has much the habits of a fly-catcher, but I have never seen the redbreast dart into the air after an insect, though this species will sometimes seize flies when settled on a wall in a very adroit manner.

The blue-breast, (*Motacilla Suecica*, LINN.) has always been classed with these birds. Latham placed it in his extensive genus *Sylvia*; and Temminck also makes it a *Sylvia*, placing it between the robin and the redstarts; and in the continuation to Shaw's Zoology, where the term *Sylvia* is, strangely enough, restricted to the redstart genus, the blue-breast is termed *Sylvia Suecica*; in Mr. Gould's beautiful illustrations of European birds, it is called *Phænicura Suecica*, being still arranged with the redstarts and robin. This beautiful bird has lately been added to our list of accidental stragglers, and it is probable that, during their autumnal migration, some are annually compelled by easterly winds to take shelter on the British shores when attempting to cross from the southern point of Norway. When first I saw the blue-breast *alive*, in Mr. Rennie's aviary at Lee, I was not a little surprised to perceive, that the bird which has been placed by every writer in the same genus with the redstarts and the robin, belonged most obviously to a very different group, to the wagtails (*Motacillana*). Nothing can more strongly show the difficulty of arranging birds from mere cabinet specimens, and the necessity of studying living nature, than this placing of the blue-breast in the genera *Sylvia* and *Phænicura*: I think I may confidently assert, that no naturalist who has thus arranged it had ever seen the living bird. The tail of the blue-breast is partly red, but, with the exception of this very trivial particular, there is no resemblance whatever between this bird and the redstarts. Even in a stuffed specimen, the form of the head will show its proper situation. The blue-breast does not hop, like the redstarts, but *runs* about in the manner of the wagtails and pipits; it has a remarkable habit of continually spreading its tail, and should there not be already a genus of foreign birds, in which this beautiful species could be placed, the term *Pandicilla* (expressive of the peculiarity) might be given to it for a generic designation.

Tooting, Surrey.

[I am sorry to say, that the living specimen above alluded to, was killed by creeping between a cage and the wall on which it hung. He was exceedingly tame, and would, on the wing, take an insect from the hand.—EDITOR.]

ON THE ANTENNÆ OF INSECTS AS ORGANS OF HEARING.

BY PROFESSOR BONSODORF, OF ABO IN FINLAND *.

I SHALL here offer some observations on the use of the antennæ of insects, a subject which has been considered difficult of explanation. Nature is always provident of advantages, while much skill is displayed in the construction of instruments for effecting peculiar purposes, though the mode in which these act is not always so obvious, and sometimes leads inquirers to form various, or even opposite conclusions.

Some who are disposed to ascribe every thing to beauty, maintain that the antennæ of insects are intended only as an elegant ornament for the head; while others, from their analogous form and position to the horns of larger animals, imagine that, like these, they are meant to assist insects in attack or defence. The latter forgot that antennæ are slender and movable, while horns are strong and firmly fixed. I think this, therefore, is erroneous. Nor am I inclined to think very differently of the explanation which Swammerdam gives, unworthy of his acute and well-practised genius in investigating the economy of insects; when describing the antennæ of bees, he supposes from their very free motion, that they can assist the sight and defend the eyes from external injury; for the entire disposition and action of the antennæ prevent them from performing the functions of eye-lids and eye-brows, since we perceive them joining the lowest membrane of the eye with such hardness and remarkable tenacity, that without any certain peculiar covering or other defence, they can preserve their safety without injury.

But whoever takes delight in examining with care the action of the antennæ, will find, that being constantly extended, they are seized with a sudden trembling as if struck by lightning, as often as they are unexpectedly affected by the more violent motions of external objects. He, I say, who has carefully examined all these circumstances, must be justly dissatisfied with the opinion formed by Pliny (book xi. ch. 28), who says, that the little horns extended before the eyes defend them as if covered by a tent, and asserts that a certain sense resides in the antennæ, for which purpose these instruments have been constructed.

* Translated from the Latin, by John Sharp, Esq., Bannockburn, near Stirling.

In describing, however truly, the properties of a sensation, they have committed such mistakes, that I know not whether they have not attempted to twist their experiments into crude conjectures and opinions, as often as, on account of their desire of light in a matter so involved in obscurity, they have thought it worth while to grapple with the difficulties presented. For what can be farther removed from common judgment and understanding than to suppose that the sense of touch, taste, smell, or hearing, resides, where no traces are found of fingers, of tongue, or of the organs of smell or hearing. In place of these, organs of a very different structure may serve as substitutes, contributing to form, in a few instances, the same sensations. It may be considered, therefore, more as a conjecture to assert it as probable that the antennæ are the organs of one of the senses.

They are either wholly ignorant, or have given erroneous descriptions of the nature of the sense of touch, and the delicate sensibility that organ exercises in ascertaining the external properties of bodies, who suppose that the antennæ are organs of touch, because, being erect, insects sometimes *seem* to act by feeling gently with them. The antennæ being sheathed with a crusty shell, are on this account more unfit for feeling; for it is evident, that the nervous papillæ cannot be easily affected by bodies in contact with them, unless they are covered with a very fine skin like the human hand. Nevertheless, the internal structure of the antennæ has that lower degree of sensibility which is common to all the softer parts of animals; and hence they may not only admit, but even, perhaps, afford the means of discovering the properties of external bodies, since the membranes of the joints, in some measure, compensate for the hardness of the exterior crust; by the aid of which, it is far from doubtful that they may be able, on account of the greater or less stiffness and resistance of bodies,—by striking or otherwise touching them,—to distinguish solid from hollow substances; moist from dry, heavy from light, hard from soft, and also such as penetrate strongly and subtly; for example, a great degree of heat and cold, or substances of an irritating nature, and, among these, concentrated acids,—by all of which the joints of the antennæ may be penetrated and affected with a disagreeable sensation.

For a like reason, it is not doubtful that the sense of taste cannot be referred to the antennæ, because they are distant from the mouth, and without the moisture so necessary for dissolving the minute particles of bodies requisite for exciting taste. But to set the matter in a clearer point of view to the mind of every one, that no sensible impressions are

made on the antennæ by such substances as come in contact with them, I shall now inquire, whether the odorous effluvia of bodies, or whether sounds are perceived by the antennæ. The conjecture of the distinguished C. Clerck, delivered in his inaugural discourse in the year 1764, before the Royal Academy of Sciences at Stockholm, concerning what is remarkable in insects, first maintained, with confidence, that the antennæ are organs of smell. He was, he says, led to this, by observing that certain beetles, (*Melolontha aurata* and *M. fasciata*,) when alighting on flowers which are grateful to them, open the plates of their antennæ in the same way as horses after a hard gallop are observed to expand their nostrils to the cool air. Indeed!—Yet our most acute M. Tobern Bergmann adopted Clerck's opinion, and mentioned that he himself had often seen the ichneumon jaculator prying with its antennæ into the holes which contained the grubs of sphex figuli, as if to smell them out, in the manner pursued by many other animals. This argument, however, has no great weight, although we may, in some measure, give our assent to the fact recorded. We need no more be surprised at seeing beetles incited by rapid motion, at one time open, and at another shut the plates of their antennæ, than when we observe horses, or any other animals, when fatigued from labour or swift flight move their ears: nay, even the whole body, in such cases, may be seen to tremble.

Insects undoubtedly perceive at a distance their prey, and substances agreeable to them by smell, or some other sense; whence it appears that the effort of smelling is quite unnecessary, in the instance of flowers upon which they may alight. Nor does the history of the ichneumon appear to me sufficient to establish this opinion, since I think it very credible that the presence of grubs living in the bottom of their nest holes can be more probably detected from their rolling and creeping motions, and in a place too so narrow, by the organs of hearing, than by the organs recognising smells applied to the exhalations, especially when in the coldest blooded animals the insipid evaporations of bodies are slower and less frequent. These holes besides are seldom dug to so great a depth, that the antennæ extended in their whole length could not reach the grubs; since I have frequently observed, that they not only thrust in their antennæ, but their whole head, and even the half of the trunk into the little holes, so that it seems doubtful whether, in such cases, the true use of the antennæ be any thing more than that of touching.

Nothing therefore remains but to inquire whether the antennæ may

and ought to be accounted as organs contributing to the sense of hearing, which inquiry, indeed, all the other external senses being out of the question, requires careful consideration. The exact question arising in this case is twofold; first, whether insects really hear; and next, whether sounds, at least the more acute, or any noise whatever, may produce a certain motion or remarkable change in the antennæ. As to the first question, certain writers deny altogether the sense of hearing to insects, among whom are Linnæus, Bergmann, and a great many others. A few, among whom is Swammerdam, pronounced with modesty, that it is a matter of doubt and obscurity; and fewer still, among whom I am rejoiced to mention the celebrated Lyonet, assert that it is not only probable, but beyond all doubt.

Although, therefore, in a difference of opinion so great among philosophers so distinguished, to remove and settle the controversy will require no ordinary share of ability and experience; yet the various affections of insects which may be brought forward, appear sufficient to me to establish the opinion here stated.

There are none who know not that there exist many kinds of insects which can produce sounds variously modulated, and sometimes acute buzzing noises, for exciting which they are furnished with proper instruments, which will be explained more fully (if it please God), on another opportunity.

We ought not surely then to represent as useless to the insects themselves, the voice at one time fierce, at another the pure messenger of joy, heard whilst we enter the woods and groves, or walk through the meadows, resounding at one time with the shrilling of gnats, and at another with the various nuptial songs of grasshoppers and crickets.

The more attentive observers and describers of the economy of the honey-bees, mention differences in their sounds, such as a humming early in the morning when the working bees go out upon their flower-choosing excursions; another, whilst they return to a peaceful rest in the evening; another, while they call forth the whole hive in defence of the state against the attacks of enemies; another, while they clean their hives from filth; and another, whilst the queen-bee leads forth a swarm to seek new settlements. Now I ask those who deny hearing to insects, what can be the use of sounds so variously modulated, unless the bees can by hearing discriminate those sounds?

Ælian affirms, that lobsters send forth music from their lurking places, and though we reckon this amongst the fabulous stories of the

ancients, our opponents may explain why those who take pleasure in the study of insects remain so unaccountably silent if it be so.

Not once, but a hundred times, I have tried by experiment the acuteness of hearing in insects, as often as I have delighted my mind with contemplating the beauties of nature in study during the summer nights, destined otherwise for the purpose of recruiting exhausted strength. In such cases, how much attention is requisite to avoid disturbing the roaming moths, and how rapid is their flight on the least noise being made, even before I could have imagined that the noise could have reached their ears.

Unless, therefore, every circumstance misleads me, the inference is correct, that there is a constant relation between the power of expressing various sounds and the power of perceiving the same; and this is strengthened the more as it is more clearly seen and proved by sad experience in the case of a man born deaf and dumb, which appears to prove that hearing is the inseparable companion of the power of uttering sound.

Some, however, object to this opinion, and I am very much surprised to find Linnæus among the number. Though convinced by arguments and circumstances of so much weight and authority, yet they are anxious to maintain the opinion they have once adopted,—namely, that insects perceive noises and louder sounds equally with fishes, but evidently in another manner than by hearing, which they think cannot be conceived without ears, no more than sight without eyes.

I cannot clearly see the utility of referring the perception of sounds in insects to a certain spirit or other diffused through their bodies, as alleged by Franzius, and obeying by its tremors the agitation of the air. Ardern asserts something similar with respect to fishes, and in the same way we see timorous men tremble at terrific and unexpected sounds; but for exciting such tumultuary feelings, the slender voices of insects are hardly sufficient, and murmurs uttered by a feeble voice, especially when that explication supposes a very sensitive constitution of the nerves might, were this true, be exceedingly inconvenient to insects. They, indeed, persuade themselves on slight grounds, that all the senses have organs of peculiar form as mutually dependent as the sense of hearing is on the ear, and as feeling on the power of perception; and they think that the sensation is necessarily changed with the change of the instrument, as creating on that account a new, and as to its nature, an incomprehensible kind of sensation, neither to be com-

pared with our senses, nor to be confounded with any organ of insects different from ours. This is the same as to maintain that the Divine Artificer of the world is bound by definite laws, and that the model of works in the universal series of animals is necessarily so uniform, that with the dissimilar receptacles of equal impressions, similar effects could never be produced; a thing incompatible with the divine perfections, and with the innumerable testimonies of varieties occurring in the whole of nature.

When these authors therefore admit the perception of sounds, and yet deny the organ of hearing, they appear to me to stand in the same predicament as if they had said that insects indeed hear, but yet they do not hear truly; than which nothing could be conceived or expressed more absurd: and the same may be said of fishes and many other animals, the sense of hearing in which has been altogether denied by Pliny, Ardern, Linnæus, and many others, while Nollet has expressed himself doubtfully; but Allein, Boyle, Bradley, Pejer, Uffenbach, and Bergman, give strong proofs and arguments against it, although the organs are accurately described by Camper, and are often visible externally, though not always. A very difficult question occurs here, namely, whether the situation of the ears thus denied to insects can be filled by the antennæ, which though a conjecture new and hitherto unheard of, seems to me very probable. The form itself and hollow structure of the antennæ, accurately observed, differs indeed very much from the inner structure of the ears of other animals, but seems to approach as near as possible to the form of the semicircular canals, which always exist not only in the inmost recesses of the ear of quadrupeds and birds, without any exception according to Perault, Senac, and other zootomists; but likewise in the obscure organs of amphibious animals and of fishes, in which frequently there is not even the least trace of the bones of the drum or of an external ear. Duvernay, Richter, and Geoffroy bear testimony that they are to be found, with a very few exceptions, so constantly, that they seem as it were indispensable in the parts belonging to the ear; wherefore it is said by many, and particularly Haller, not improperly to form the seat of hearing, or receptacle of the impression of sounds. Nor in that comparison does any thing displease me, unless that the antennæ and the joints, for the purpose of exciting motion, are placed where the bony semicircular canals are concealed between the bones of the temples: which variety however cannot prevent the nerves destined for the sense of hearing from being disposed generally, as to its layers, equally in each kind of hollow, although the

very great minuteness of these renders it difficult for us to perceive them.

There remains only one doubt, which the diligence of an after age may remove, namely, what openings the tremulous waves of sound may have reserved for them in the inmost recesses of the antennæ, since these organs are terminated by no open mouth; or whether these pores and openings between the joints be concealed, by which the very tender members connecting the joints alternately may be struck, for which use these holes invisible to the naked eye seem clearly to be arranged, and fitted equally for hearing, as the smallest bones of the semicircular canals in the larger animals.

Nothing more therefore is requisite in this case for confirming this opinion, than to show that the antennæ are active and watchful whenever they are exposed to hostile and sudden sounds.

I have examined by many and various experiments for several years insects of different kinds, in which the size of the antennæ was different, and such experiments, provided due care and attention are employed, cannot be performed without the most striking results. In proportion also; as the summer season was agreeable and the weather mild and serene, my success was greater and more delightful. As all my observations agreed in this one circumstance, I omit to enumerate them; for the antennæ being erect as soon as they were put on the alert, they were moved hither and thither by means of loud sounds, for they disregarded such as were very small. These they may be said to have drunk in; and if alarmed by new sounds they rejoiced when they could effect their escape as soon as possible, and preserve life and safety by the most rapid flight. So I have observed very frequently when the antennæ were folded up in the *Lepturæ*, *Elatères*, *Curculiones*, *Papiliones*, *Apes*; nay, even the housefly, as soon as they were moved and excited by irregular sounds or noise, would erect their antennæ and betake themselves to flight without any other excitement. The *Sphinxes* again, and *Phalænæ*, during the night, fly about the flowers of the marragon and other lily plants, emitting an agreeable smell; during the night, scarcely could a voice be raised than they would turn round very swiftly, and the antennæ appear to be, as it were, convulsed.

I must not pass over in silence, however, that no evidence more clear could be desired of the sensibility of the antennæ to quick sounds, than what occurred to me last summer in my garden. I observed in a morning walk, undertaken for the purpose of catching insects on the hazels, that while standing in the shade a nut weevil was sitting quietly at a

distance upon a leaf, with the antennæ hanging down as if they were asleep, on which account I directed a pocket-telescope to the spot, which was above five feet distant, and therefore convenient for viewing the insect. The point of view being thus determined, I made a loud sound, and I was delighted with the opportunity of seeing the weevil not only roused, but the antennæ which had been hanging down became elongated, and being full of joints struck by the undulations of sound they extended themselves and remained on the alert till alarmed again by a fresh sound. The insects fell down on the ground, as is the habit of those and other weevils. I have never attended to any proof of hearing in spiders, among which the want of antennæ is supplied by acute sight and smell; but all these proofs weighed together and separately, seem to add strength to the probability of our conjecture, namely, that the antennæ are given to insects for the purpose of perceiving and recognising sounds, in a similar manner as the sails of a ship serve to convert the wind to the use of the sailor; from which analogy and comparison, I suppose that this name has been assigned to these organs of insects.

ON THE COLOURS OF THE FEATHERS OF BIRDS.

BY L. P. VIEILLOT, MEMBER OF THE INSTITUTE, PARIS*.

THE American Indians give the humming birds a name which signifies sun-beam, expressive of their splendour and rapidity of motion, in some species producing an effect similar to that of the fires which flash through the upper air in the fine nights of summer, popularly termed falling stars. Upon the arrival of the Spaniards in Peru, the conquerors beheld with admiration the pictures composed by the Indians with the feathers of the colibris. All travellers agree in acknowledging the beauty and delicacy of these pictures; and in fact, it requires no great stretch of imagination to fancy their brilliancy and freshness.

The plumage of the humming birds, sparkles not only with the liveliest colours, but these colours possess the property of varying their shades according to the direction in which the light falls upon them.

* Translated from the splendid French work "Oiseaux Dorés" by Miss H. G——, Lee, Kent.

It may here be proper to examine these feathers, and to search for the cause of their brilliancy. To do this successfully we should compare them with the feathers of different kinds of birds.

The colours which usually adorn birds may be divided into several classes: they are dull or brilliant, changeable or metallic.

The dull colours are those which are not susceptible of change from the different directions of the rays of light: the plumelets of the feathers which are thus coloured have the quill furnished on each side from the base to the extremity with very fine and slender loose beards. (Page 305, fig. 1.) These colours predominate most in the birds of our own country.

Brilliant colours are those which, without having the property of changing their shades, possess nevertheless a brilliancy similar to that of polished bodies. This brightness is owing to the peculiar form of the beards. A great number of birds have very brilliant colours; such as the red feathers of the woodpeckers, the yellow and red feathers of the cassiques, those of the manakins, guit-guits, &c. The beards of these feathers (fig. 2) have only fringes at their base, the rest is bare, cylindrical, smooth and highly polished; but this cylindrical form is not complete; when seen from beneath, these beards are hollowed longitudinally in channels (thus [o]), which represents a section of one of these beards. This smooth part is a continuation of the quill, and differs from it only in being double the thickness, as if the quantity of matter which composes the fringes were here reunited to increase the bulk of the quill. This supposition is not altogether without foundation. If we examine one of the feathers taken from the head of our own king-fisher, or the little tufted king-fisher of Africa, we shall find that this feather, which is black from the base to the extremity, is varied by a spot of very brilliant light blue; and it may be remarked that the quills of each beard (fig. 3) are furnished with fringes at the base and extremity, while the middle part is thicker, cylindrical and destitute of beards, or at least they are so small, as to be perceptible only by the aid of a strong magnifying glass.

We find the beards of brilliant feathers furnished also with fringes; but the latter are very short. The European jay has feathers in the wings of a very lively blue; the beards of these feathers (fig. 4) have a long *quill stalk* which is thick, very shining, and coloured alternately white, blue, and black; this quill is furnished throughout with fringes; but they are short and black, and are only perceptible when the beard is separated from those that are near it. It is the same with the blue

feathers of the jay of Carolina, I have made the same observation on the green feathers of parrots, but in these the stalks of the beards (fig. 5) are separated, and show the fringes with which they are furnished; sometimes the latter are coloured, but the colour is so dull that, instead of adding to the splendour of the quill, it serves only to qualify it.

Thus, the brilliancy of the shining feathers is owing to the hardness and polish of the stalks of their beards, and this lustre is greater, in proportion to the shortness of the fringes which accompany them. That of the guit-guit is much brighter than that of the parrots, because the beards on the feathers of this bird are absolutely bare and similar to prickles, while the beards of the parrot's feathers are furnished with fringes which are rather long, and often of a dark colour.

Those feathers of which the colour varies, shine not only with a high polish, but they have also the property of changing their shades according to the angle described by the ray of light which falls upon them. The green violet-breasted cotinga (*Ampelis Cazana*) appears of a sea green when the eye being situated between the bird and the light, the luminous ray describes an acute angle; but it becomes blue as the angle approaches the obtuse. However the beards of the feathers of this cotinga have no appearance which can be regarded as the cause of this change; they are like all shining feathers, barbed at the base, and smooth and cylindrical along the remainder.

It cannot be supposed that the surface of these beards is charged with roughness, or projecting particles, of which one side is blue and the other green; if it were thus, these two shades might be perceived on turning the bird round without change of place; but, on the contrary, in both positions the feathers are constantly blue or green.

According to Newton's theory, this change of colour is produced by the fringes being scarcely more dense than the surrounding air; the rays, in passing through this medium to the thin plates or laminae, which we suppose are situated on the side face of the body, diverge but little; and as, according to this theory, the colour of a body depends on the degree of tenuity in these thin plates, it follows that if the rays *a, b, c*, (fig. 6) fall perpendicularly on the plate *d, e*, the space *b, c*, which it traverses in this plate, being much less considerable than that traversed by the oblique ray *f, b, g*, the eye moving from the point *a*, will experience different sensations as it approaches the point *f*. Thus, according to Newton, the changeable colours of feathers are

the result of their density, which is found to be nearly equal to that of the surrounding medium.

However, it is as well to observe, that if the green cotinga were plunged into a much denser medium, as water, the effect would be absolutely the same as in the air.

Metallic colours have a brilliancy exactly similar to that of metals. All the beards of the feathers thus coloured which I have observed are furnished with fringes, which have the appearance of hardness. These fringes are equally wide the whole length, and appear lopped at the extremity; when seen through a microscope we observe on their surface a row of very luminous spots which appear hollow; for they are the more brilliant as the light falls perpendicularly; and become darker as it approaches horizontally. On the copper coloured starling of Africa, the barbs of the feathers (fig. 7) have fringes entirely black on the outer side, along two-thirds of the quill, parting at the base. The fringes of the interior side are longer, and black towards the stock; but the two-thirds towards the extremity are of a very dark blue colour. These beards are imbricated with respect to each other so that the black part of the beards is entirely hid.

The golden cuckoo of Africa has golden feathers on the back which are very brilliant; the beards of these feathers (fig. 8) have also fringes which are entirely coloured. The beards of the peacock's feathers are deeply coloured, of a golden green; but in this the fringes are convex so that the quill appears sunk (fig. 9 and *a* which represents the section of this beard). In the jacamar the beards (fig. 10) are perfectly flat; the light however plays on these beards, so that in certain positions the quill appears to be raised, in others on the contrary it appears to be depressed. But this is only an illusion; the truth will be evident on cutting the beard. On the *Cæreba flaveola* the golden feathers are at first black, coloured only at the extremity. The beards of these feathers are furnished with very thick fringes of unequal length and strongly marked with depressed or concave spots.

But however brilliant the colours which adorn the birds of which we have just spoken, they are far inferior to that on the breast of the *Trochilus mosquitos*. Let us examine in detail a feather of this bird (fig. 12), and we shall soon discover the cause of that dazzling brilliancy which distinguishes the colibri and the humming-birds. To the naked eye this feather is two lines and a half in length; we first remark the quill, which is white at the base, and dark at the extremity;

it is the same with the stalks of the beards, which are of two sorts: those at the base of the feather are black, slender, terminating in a point, and furnished the whole length with long and very fine fringes. Those of the other half are also furnished with fringes on the part adjoining the quill, but they are of the finest gold colour at the extremity. This coloured portion is much extended on the intermediate beards; it is much less so on those at the sides, which, at the same time are very long, this causes the edge of the extremity of these feathers to describe a perfect half circle, and makes them when imbricated over each other resemble the scales of a fish. If we detach one of these beards (fig. 13), we shall see, that, like the entire feather, it consists of a long quill, and that the little fringes of the first half are long and similar to very loose hair; but the coloured part of this beard is very different: at first the fringes of it are much larger, the material extremely dense, and, consequently, the surface of an extremely fine polish. I have weighed the feathers of this species, and have found that a feather from the breast weighs as much as three feathers of a dull colour and of equal size. But the principal cause of the extreme brilliancy of these feathers consists in the coloured part of each beard being deeply hollowed in channels, and presenting to the light a concave surface similar to that of a reverberator. Hence it follows, that if the ray of light fall horizontally on the beard (fig. 14), which represents the section of it, there can be no reflection, consequently, the throat of the bird will be dark: if it fall diagonally (fig. 15), the part *a b* will be enlightened, and the plumage will shine; and if it fall perpendicularly (fig. 16), the light will be divided into a thousand rays in this kind of focus, and reflect a dazzling light. This form of the feathers in the *Trochilus mosquitos*, and the play of light which is the result of it, explains very clearly in my opinion why, with the least movement, the throat of this bird changes in an instant from dark to the most dazzling brilliancy. If the beard of these feathers (fig. 17), be examined through a microscope, we shall see four or five very brilliant spots; they appeared to me to be of a golden red in the middle, and of a golden green at the edges: they are, as I said before, concave, and form so many little reverberators; the intervals between them are also sprinkled with very brilliant spots. The throat of this species, however, does not shine in every position which permits the light to reach the interior of the channel formed by the beards of its feathers. If the eye be placed between the light and the bird, so that

the beak may be seen fore-shortened, the breast will shine with the greatest brilliancy; if, on the contrary, the bird be placed with the breast uppermost, between the eye and the light, it will not shine at all. This appears to me to be caused by the fringes being imbricated (fig. 18), as may be seen with the aid of a microscope; if the light comes from *a*, it will fall on the barb *b*, and will be reflected; and if from *c*, finding no resistance, it will be absorbed in *d*, and there will be no reflection. There is another remarkable character in the golden feathers of the colibri; their beards are deeply crenate at their extremity, because the end of the quill is devoid of beards (fig. 13). This extremity of the quill resembles a very loose hair, and is terminated by a little swelling like the antennæ of butterflies.

This cause of the resplendency of the *Trochilus mosquitos* is found in all feathers of extreme brilliancy, such as those on the throat of the *Trochilus auratus*, *T. pella*, *T. mango*, &c. But some of these feathers have not the beards crenate at the extremity. Those of the *T. pella*, for example (fig. 19), are terminated in the form of a spear; at their extremity is a beard which exceeds the others in length; those of the female (fig. 20), are also terminated in the form of a spear, but the beards at the extremity are white, which contributes much to lessen the brilliancy of this bird's breast.

The metallic feathers of the humming birds do not all shine with the radiance of which we have just spoken; the beards of the feathers on the back of these birds (fig. 21) are not channeled, but flat, and terminate in a point, the lesser fringes being black at the base and extremity, the middle only is coloured; from this cause the beards have a longitudinal line of gold on each side of the quill: the feathers on the back and breast are less brilliant in proportion as these lines are narrower.

From what has been said, it is evident that the metallic feathers owe their brilliancy to their density, to the polish of their surface, and to the great number of little concave mirrors which are perceptible on the fringes; that the very brilliant feathers of the humming birds differ from other golden feathers only in having their barbs hollowed longitudinally, which produces an effect similar to that of a reverberator.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 13.

Figs. 14,

15,

16.

Fig. 17.

Fig. 18.

Fig. 19.

Fig. 20.

Fig. 21.

ON THE BRITISH FRUIT-EATING WARBLERS.

BY EDWARD BLYTH.

THERE is not, throughout the whole range of British ornithology, a group of birds more easy to be divided into natural and well marked genera than the warblers (*Sylviana*), if a little attention only be paid to the habits and structure of the living birds; and yet there is hardly a single group that has been at all times so incongruously and unnaturally arranged. The huge genus *Sylvia*, as adopted by M. Temminck, in which the aquatic warblers, the nightingales, the sylvan warblers, the robin and redstart, the bluebreast (a bird which moves by walking, like the pipits and wagtails), the willow-wrens, the gold-crests, the wrens, and a host of equally dissimilar foreign groups were all lumped together under one generic name, is now, I believe with almost universal consent, set aside, or limited very properly to a real sylvan group, the birds commonly, though unmeaningly, called "willow-wrens;" but still, though our systematists have, in most instances, abandoned the old superficial system of classification, and have endeavoured to comprise, under the same generic name, those creatures only which assimilate in habits and structure, as well as in a few trivial and arbitrary characters, they have again confused, in subdividing the old genus *Sylvia*, three distinct and very natural groups under the one name *Curruca*.

All who have minutely studied the form, habits, and general economy of this interesting group of birds, or who have kept the different species in confinement, must allow, that if the willow-wrens (*Sylvia*) are to constitute a separate genus from the other warblers, if the field-wagtails (*Budytes*) are to be separated from the water-wagtails (*Motacilla*), or if the goldfinches and siskins (*Carduelis*) are to bear a different generic name from the linnets (*Linaria*), by the same rule, the aquatic warblers, the sylvan warblers, and the nightingales should be distinguished from each other by diverse generic appellations. "I cannot," says the Hon. and Rev. W. Herbert, in one of his amusing notes to the late edition of White's Selborne, "close this note without protesting against the injudicious manner in which the genus *Sylvia* has been subdivided in the supplement of Shaw's Zoology. What can be said in favour of a system that confines the name *Sylvia* to the redbreast, the bluebreast, and two European redstarts, which have no sylvan habits, and lumps the nightingale and all the aquatic warblers with the fruit-eating-birds, under the name *Curruca*? There is a

broad line of distinction which no ornithologist has noticed, separating the fruit-eating *Sylvia* (*Currucæ*, BECHSTEIN) from the aquatic warblers and the nightingale. In all the true *Currucæ*, which live mainly on vegetable food, the inside of the mouth and throat is of a fine red *; in the others it is of a yellow-orange. Show me a nest of *Sylviadæ*, just hatched, and by that feature I shall instantly determine to which family they belong. I have seen no engravings or descriptions of birds, in which due attention has been paid to the aperture of the bill. In the true *Currucæ*, or fruit-eating birds, it descends with a curvature below the eye: in the wrens (I do not mean the troglodyte or common wren), and in the aquatic warblers or sedge-birds, it is straight and anterior to the eye, the bill being in the 'willow'-wrens, slender and weak, in the sedge-birds, of which I should make a genus *Schoenia*, strong and dilated at the base. The incomparable nightingale has a very peculiar bill, and I suspect that its two species, the larger and lesser (*Philomela magna* and *Ph. luscinia*, BLYTH), form a genus by themselves, unless the little known *Sylvia sericea* (TEM.) belongs to them," &c.

The accuracy of these observations will be at once perceived by any person who has ever examined living or recently killed specimens of our various warblers; as to the distorted hideous-looking caricatures of nature which we so generally see in museums, they are often more likely to mislead a naturalist, than to assist him in tracing the generic resemblances of these birds. The collection of native warblers, for example, in the British Museum, is a disgrace to the institution, and so far from aiding the endeavours of a student to acquire a knowledge of British ornithology (the proper object of such a collection), it requires a very considerable previous acquaintance with the living birds to enable a person to recognise many of the species in the disguised forms which they have been there made to assume. The attitudes of most of the warblers are peculiar and characteristic, and without a due attention to the proper and natural positions of each species, no stuffed specimens can ever be made to have the appearance of life, even if otherwise well mounted.

It is, indeed, the wretched manner in which these birds have usually been stuffed, that has been a principal cause of their having been so badly and unnaturally arranged; their generic resemblances having

* In the garden warbler (*Sylvia hortensis*, Tem.), the inside of the mouth and throat is of an orange yellow.—E. B.

been too often deduced from an examination of dry distorted skins, rather than from the study of the living animals; though even in that case it might have been supposed that the great difference in the make of the bill, and even in the formation of the head, together with the invariably wedge-shaped tails of the aquatic warblers, would certainly have indicated the propriety of separating them from the fruit-eating birds, whenever it was thought necessary to distinguish by different generic appellations the various groups comprised under the old name *Sylvia*. Subdivisions, however, have been made, although it would be difficult in some instances to discover the characters upon which they were founded: thus we find in Dr. Fleming's generally useful catalogue of British animals, the wood-wren (*Sylvia sibilatrix*) arranged among the fruit-eating warblers; while the willow-wren (*S. trochilus*) and the cliffchaff (*S. loquax*, HERBERT), though so closely resembling it, placed in the genus *Regulus* among the gold-crests. Few birds are more similar in their structure and general habits than the whitethroat and the Dartford or furze warbler; yet, in the Supplement to Shaw's Zoology, the latter is made a distinct genus, while the former is arranged, together with the nightingales and the aquatic warblers, in *Curruca*.

I have already stated *, in detail, my reasons for making a distinct genus of the nightingales, which I have designated by the name *Philomela*. The British nightingale, indeed, differs so very considerably from our other warblers, in form, in manners, and in habits, that it requires but a single glance at the living birds to perceive at once that such a division is absolutely necessary, if our generic appellations are to be confined to those species only whose structure and habits assimilate. The best and most appropriate name that has hitherto been applied to the fruit-eating birds, is the term *Ficedula* of Aldrovandus. The appellation *Curruca* (derived from the Latin word *curro*, to run), cannot with propriety be affixed to any genus of warblers, inasmuch as they all move forward by hopping; it would therefore, I think, be better to reject altogether the term *Curruca*, as objectionable and inappropriate, and to consider the sylvan or fruit-warblers as constituting a genus *Ficedula*. It would also, perhaps, be as well to observe here, that the expressions "fruit-eating" and "sylvan warblers," which have occurred in the course of the foregoing remarks, are by no means so definite and exclusively applicable to this particular

* See *Field Naturalist's Magazine* for May, 1833.

group of birds, as might have been wished. In the common acceptance of the term, the nightingales, the willow-wrens, and even the thrushes might, perhaps, with equal propriety be termed "sylvan warblers;" but if we describe a warble to be that soft continuous flow of pleasing melody with which the *Ficedulæ* so frequently charm the ear, the term "warbler" is undoubtedly more peculiarly applicable to the birds of this genus than to any other European group whatever.

The epithet "sylvan" I have employed, merely because it has been so often used before to distinguish these birds from the aquatic warblers, and because they are most generally known by that name. The garden-warbler and the blackcap inhabit woods, and so does the babillard or lesser whitethroat occasionally, but all three are more abundant in orchards and gardens; the latter is most frequently observed in hedges, out of which a few tall trees (especially elms) grow; and this species and also the blackcap may sometimes be heard on commons, but only where there are trees. The favourite haunts of the whitethroat are thick tangled hedges, the outskirts of woods, and among the brambles and furze on commons; often in the most exposed situations, if there are but a few low bushes to give it shelter. In the midst of thick woods they are rarely, if ever found, and it is only during the fruit season that they occasionally venture into gardens. The Dartford warbler is rarely seen but amongst the very thickest furze; I have, however, once or twice observed it amongst the lavender fields at Mitcham. Its habits are precisely similar to those of the whitethroat, except that, like the babillard, it is much quicker in all its motions. This species, though it ranks among the *sylvan* warblers, is never seen in a wood.

The term "fruit-eating" warbler, also, is no less vague than "sylvan." The aquatic warblers are, in confinement, as fond of fruit, or nearly so, as some of the *Ficedulæ*; but I have not as yet been able to detect either of our two common species (the reed and sedge warblers), as I have the willow-wrens, in the act of pilfering the fruit when wild. The willow-wrens are partial to some kinds of fruit, but they will not touch cherries, although they are very commonly known in many parts of Kent and Surrey by the provincial name *cherry-choppers*; a mistake originating in the very striking and singular resemblance which the young garden-warblers (*Ficedula hortensis*) bear to these birds. All the willow-wrens, however, are fond of soft pears, and, in confinement, of a roasted apple. The nightingales I have never observed to touch fruit of any kind, either in confinement, or when wild; nor does the arbour bird, or green nightingale (*Sylvia polyglotta*,

RANZANI, *Horticola polyglotta*, BLYTH), a bird which, in the make of its bill, very much resembles the nightingales. None of the above-mentioned birds, however, attack indiscriminately all kinds of fruit in the voracious and determined manner which may be observed in the blackcap, the garden-warbler, and the babillard. During the fruit season, the two former of these birds hardly touch any other kind of food; indeed, from the time of their arrival (and the blackcap often visits us as early as the latter end of March) to the period of their departure, they subsist very largely on vegetable food; ivy and privet berries, and the like, supplying the place of garden fruit during the spring. The whitethroat also is a keen devourer of raspberries, currants, and the other smaller fruits; and I have been informed of an instance of the Dartford or furze warbler being taken with a limed fishing-rod, while regaling itself on some mealy soft pears, in a garden, by the side of a common: in confinement, the furze-warbler is as fond of all kinds of fruit as its congener the whitethroat is. As these birds are, therefore, more decidedly fructivorous than any of the other European *Sylvianæ*, the term "fruit-eating" warbler is, perhaps, a better designation for them than "sylvan;" though neither name is quite as definite and exclusive as could be wished. It would, perhaps, be better to restrict entirely the appellation "warbler" to the birds of this genus, and to call the aquatic species by the general name of "sedge-birds."

The genus *Ficedula* will contain five British species, and in all probability a sixth; though the latter (named by the Hon. and Rev. W. Herbert, the East Woodhay warbler, *Curruca bidehensis*) has never yet been obtained for examination. Four of the others, namely, the garden-warbler (*Ficedula hortensis*), the blackcap (*F. atricapilla*), the babillard (*F. garrula*), and the whitethroat (*F. cinerea*), are to be found, I believe, more or less common throughout the country. Of these, the blackcap and the whitethroat are abundant every where; the two others are less common; but in no part of the south of England can they, I think, be considered rare birds; excepting, perhaps, in Cornwall, and the west of Devonshire, a district which many of the summer birds of passage do not visit at all. In some places near the metropolis I have observed these four species to be about equally abundant. The Dartford or furze warbler (*Curruca provincialis* and *Dartfordiensis* of authors), but which, as it is neither confined to Dartford nor to Provence, to England nor to France, I should prefer naming from its habits (*Ficedula ulicicola*), is an extremely local species, to be found, sparingly, on many of the commons near London, and very abundantly on some similar situations in several of the

southern counties: generally speaking, however, this certainly is not a common bird, though it is by no means so rare as it seems usually to be considered. A few pairs breed annually on Wimbledon Common, but a person might traverse that common for months without seeing one, unless he should chance to alight on that particular patch of furze, in which, only, I believe, they are to be found.

Dr. Fleming divides the sylvan warblers into two sections: those which have the tail of a uniform colour, and those with parti-coloured tails. These sections, to judge from the extremes, are natural enough, the difference being by no means confined to the trivial dissimilarity in their tails; they differ in the form of the bill slightly, and also in their general habits. To the first of these sections belong the garden warbler, the blackcap, and also, I suspect, the bird figured from memory by the Hon. and Rev. W. Herbert; in the latter section the babillard, the whitethroat, and the furze warbler are comprised. The division, however, is unnecessary, and of little or no practical use, the characters of each section being so intimately blended in the babillard, the *Sylvia sarda*, of TEMMINCK, of southern Europe, and several other intermediate species. The three British kinds with parti-coloured tails erect almost constantly the feathers on the crown of the head and throat, a habit which is not observed in the blackcap and garden warbler, which occasionally, but not often, erect the feathers on the crown of the head only. In the three former birds the iris of the eye is of a light colour, being in the whitethroat and furze-warbler of a bright orange yellow, and in the old babillard of a very beautiful pearly white; in the garden-warbler and blackcap it is of an extremely dark hazel, appearing black unless closely examined. The bill, in the two last-mentioned birds, is stronger made than in the whitethroat and furze-warbler, and better adapted for feeding upon fruit: in the babillard it is of an intermediate form, and the bird is accordingly more voracious after fruit than the whitethroat and the furze-warbler, and less so than the garden-warbler and the blackcap. I have never observed the blackcap to sing whilst flying; the garden-warbler often begins to sing before he alights on a tree, and, like the common wren, continues his song when perched; the babillard does the same, and often repeats his loud *note of defiance* as he wings his way across a field; the whitethroat and the furze-warbler frequently mount a considerable height in the air, with a peculiar vacillating flight, singing all the time, and continuing their song without stopping after they have alighted; these two birds often sing perched on the topmost twig of a bush, a habit which I have never

observed in any of the others. The babillard has the same vacillating butterfly-like manner of flying as the whitethroat, but never mounts singing into the air, like that bird and the furze-warbler. The habits of the babillard closely resemble those of the blackcap, only it is much more active and restless. Unlike the whitethroat (of which bird some say it is only a variety!) it spends most of its time on trees, and may not unfrequently be heard on the tops of the highest elms—to one babillard that may be heard singing in a bush, at least twenty or thirty may be heard on trees; the reverse is the case with the whitethroat, which, though so very common a bird, is seldom heard from any great height on a tree. The whitethroat and babillard are, in confinement, of a much tamer and more familiar nature than the garden-warbler and the blackcap. The Dartford warblers, also, which I have seen in confinement, were extremely familiar and tame. The whitethroat and babillard will generally, a day or two after they are caught, take insect food from the hand; but it will often require months before the blackcap and garden-warbler can be rendered sufficiently familiar, and when at length they do, it is usually fruit and not insects which entices them. The two latter birds will almost always leave insect food for fruit; the babillard and whitethroat will leave fruit to feed upon insects: some blackcaps and garden-warblers, indeed, seem quite indifferent to insect food; I had once a garden warbler which would readily take fruit from the hand, but which I never knew to take an insect that was thus offered to it.

As but few persons are aware of the existence of the East Woodhay warbler, as it has been termed, it would not be amiss here to give a slight description of the bird, that the species might be recognised if obtained. I have myself but very little doubt of its existence, though my endeavours to procure it have been hitherto ineffectual; its discoverers, Mr. Sweet and the Hon. and Rev. W. Herbert, are too close observers of nature, and manifest in their writings much too thorough a knowledge of the British *Sylvianæ* to be mistaken easily in this particular. Mr. Sweet mentions having seen several one summer attacking the fruit in a garden near Bristol, and he adds that he never saw any of them but in that one season. The Hon. Mr. Herbert observed a pair of them in the parish of East Woodhay, in Hampshire; and he describes them as being “formed much like a whitethroat, but as large as a nightingale; the upper part rufous, with a dark line over the eye, the under parts of a glossy silver colour, which shone very conspicuously in the sun. My attention,” he continues, “was at first attracted at a considerable dis-

tance by one of these birds sitting on a low branch of the hedge with its breast towards me. It did not stir till I came close to it, when I perceived that there were a pair, exactly alike in colour and size. They were not in the least shy, but sat very still, either on a low branch of an oak tree, or on some part of the fence, and were quite mute. I remained examining them about a quarter of an hour, being at times very close to them. It was in the month of May, at which time the foliage was very thin on the hedges, and very little on the oaks. They were undoubtedly breeding in the neighbourhood, but I left the country the next morning and could not investigate their habits any further. There were gardens at a very short distance from the spot where I saw them." I cannot but remark, that very much of the above description would apply to the common spotted grey fly-catcher (*Muscicapa grisola*), whose silvery white breast is often very conspicuous as he sits in the sunshine on some bare branch or paling; the rufous colour of the upper parts, however, shows evidently that it cannot be that bird, and also the circumstance of their having been seen feeding upon fruit by Mr. Sweet, whose description of the warbler perfectly accords with that by the Hon and Rev. Mr. Herbert. I can hardly imagine that the species is destitute of song, all its congeners being so very musical; and I think the specific name, *Bidehensis*, which Mr. Herbert has affixed to the bird, might be advantageously exchanged for some term expressive of its habits or plumage; such names being appropriate only when a species is altogether confined to a particular district.

The garden-warbler (*Ficedula hortensis*), though decidedly a very common bird in many parts of Britain, and though a most exquisite and delightful songster, was nevertheless quite overlooked by our earlier naturalists, and was discovered for the first time in England by Sir Ashton Lever, who transmitted it to Dr. Latham, from Lancashire. In many places near the metropolis it literally abounds, and I well remember, when a boy, the great difficulty I had in learning the name of this charming little bird, which was as familiar to me as the common sparrow, but which nobody seemed to know. On its first arrival in the spring, (which in the older birds is often about the third week in April, though they do not become common until the first or second week in May), its presence is immediately announced by the torrent of melody which it pours forth from the top of some tall pear-tree, or if not in a garden, generally from amid the branches of an elm. The song of the garden-warbler has often been well and accurately described. In the spring he commences usually with some low twitter-

ing notes, not unlike the song of the swallow, and raising his voice by degrees, through a series of charming and most delightful modulations, many of which closely resemble parts of the nightingale's song, he ends with the full rich whistle of the blackbird, but delivered in a more hurried cadence. This species certainly possesses several of the nightingale's notes, but those of the blackbird predominate; the song is nevertheless perfectly original, and is uttered in a more lively and animated manner than the songs of either of those birds. He continues singing usually about three or four minutes, when he stops as if to take breath, and almost immediately commences again; deep, rich, and mellow, his lovely warble is heard nearly throughout the day, and occasionally even after sunset; singing nearly throughout the summer, and often both beginning and ending with the same loud blackbird notes. As in all other birds, some individuals are much finer songsters than others.

The blackcap (*F. atricapilla*) is another charming warbler, commoner, and also better known than the preceding bird. His powers of melody, however, are appreciated by very few, being generally placed to the credit of some other bird; by many the blackcap's notes are confounded with the "livelier summer song" of the redbreast; others, and not a few, actually consider them to proceed from the blackbird. The summer song of the redbreast, however, though undoubtedly more lively than its winter notes, is by no means so sprightly and animated as that of the blackcap; there is always a plaintiveness in its ditty, by which it may be at once distinguished from the latter bird. "The note of the blackcap," says Mr. White, "has such a wild sweetness, that it always brings to my mind those lines in a song in 'As You Like It,'

" ' And tune his merry throat
Unto the wild bird's note.'

SHAKESPEARE."

And indeed if the idea which is conveyed by that simple and pretty couplet be embodied ever in a "wild bird's note," it is, I think, that of the blackcap only which does it justice. The same author correctly observes, in another place, that "the blackcap, has, in common, a full, sweet, deep, loud, and wild pipe; yet that strain is of short continuance, and his motions are desultory; but when that bird sits calmly and engages in song in earnest, he pours forth very sweet, but inward melody, and expresses a great variety of soft and gentle modulations, superior, perhaps, to those of any of our warblers, the nightingale excepted." These charming and delicate warblings of the blackcap are

heard to very great advantage in a room, but the cheering, animated notes with which he usually finishes his song are almost too loud and stunning when heard in doors, though so exquisitely beautiful in the open air. The notes of two of these birds which I have long kept in confinement are extremely different, so that I can always with ease tell which of the two is singing; yet no person who knows the song of the blackcap could ever possibly mistake the voice of either of them, for that of another species, though so different from each other. One of them sings part of the garden-warbler's song, and the other intermixes a number of the nightingale's notes, though both of them were old birds when caught. A few weeks since, when a nightingale that I also have in confinement was singing, in his finest style, I observed one of the blackcaps to listen with great attention, and when the nightingale had ceased, the latter repeated several of his notes very correctly, but I have never observed him to attempt them since. The blackcap is known in some parts of England by the name of mock-nightingale: I once heard a wild individual repeat the notes of the song so correctly as to deceive me, until he broke out into his usual loud clear notes, which latter are, in fact, a challenge and defiance to others of his kind.

The warble of the babillard or lesser whitethroat (*F. garrula*) is pretty and lively, but its song is rendered monotonous, in the spring and summer, by the constant repetition of its loud note of defiance, analogous to the clear lively note with which the blackcap generally concludes: this may be expressed by the monosyllable *see*, repeated nine or ten times in quick succession, and at times very loudly: it is a note which, though agreeable enough when only heard occasionally, becomes tiresome when continually reiterated. This species, however, can warble very sweetly if it please, and in confinement, during the first months of the year, its song is heard to great advantage in a room; it then rarely repeats its loud *see, see, see*, and when at that time the above mentioned note is uttered, it forms, indeed, an agreeable variety. The song of the babillard is formed by a number of soft chirping notes, many of which are extremely sweet and musical, and though at times tolerably loud, yet they are generally delivered in a very low tone, scarcely audible at a little distance. The male is almost perpetually singing, erecting his crest and the feathers of his throat in the manner of a whitethroat, and like that species of the furze warbler, he is in constant motion the whole time, throwing himself into a variety of odd gesticulations. The song of this bird is very superior to that of many white-throats, but not to all; he has none of those harsh sounding notes which

so often disfigure the whitethroat's song. He seems also to be always in such high spirits as not to know how to contain himself, taking frequently a long circuitous flight from tree to tree, and back again a dozen times, seemingly for no other purpose than mere exercise ; but he never mounts singing into the air, like the whitethroat. There are yet many persons, I believe, who consider this species to be "a mere variety" of the whitethroat ; and Mr. Mudie, who had evidently never seen the bird, observes in the *British Naturalist*, when speaking of the sylvan warblers, that "a *diminutive* of the whitethroat has also been mentioned, but this will probably turn out to be only a mere *variety* of that bird." These two species differ from each other in size, in make, in colour, in their manners, their habits, their song, in the structure of their nest, and in the markings of their eggs ; and surely "if all these circumstances" (as Wilson observes, after making similar remarks on two American birds, one of which had been considered a "bastard" production of the other,) "be not sufficient to designate this" (the babillard) "as a distinct species, by what criterion, I would ask, are we to discriminate between a *variety* and an *original species*, or to assure ourselves, that the great horned owl is not in fact, a *bastard* goose, or the carrion crow a mere variety of the humming bird." In its general habits, the babillard resembles the blackcap more than it does the whitethroat, and it utters precisely the same *check* (resembling the sound produced by tapping two small pebbles together,) as the blackcap, but its manners lean more to those of the whitethroat. It is, however, a merely more active species than either. All the *Ficedulæ* have notes analogous to the above mentioned *check* ; that of the garden warbler is very seldom uttered ; it may be expressed by *chep* : the whitethroat's is a kind of *tchut* ; and the furze-warbler is similar, but rather more shrill, and it is usually preceded by a very peculiar rattling note, which I have once and only once heard from the babillard.

The song of the whitethroat is, I should imagine, too well known to everybody to need a description here ; it is to be heard in every hedge, in the margin of every wood, and upon every common ; and all who have ever walked in a field must be acquainted with it. Its notes are brisk and lively, and in some individuals extremely sweet and musical, but in others quite harsh and dissonant. In confinement it is a very amusing little bird, and, like the babillard, is perpetually singing ; like that bird, also, it will never suffer itself to be outdone, and will often (as Mr. Sweet observes) sing against a nightingale for hours together, but, in raising its voice so much above its natural pitch, the song loses, in my

opinion, much of its usual sweetness. I cannot, however, place the music of this bird in the very high scale to which it has been assigned by some writers: though undoubtedly a pretty songster, it is not to be compared to the garden warbler or the black cap, or in my opinion, to several other British birds. It is worthy of remark that the whitethroat, the garden warbler, the babillard, and the furze warbler, all repeat the same harsh note of alarm when their nest is approached; but the furze warbler and the whitethroat most pertinaciously, and it is amusing to observe the whitethroat when he thinks his nest out of danger, as he flies backward and forward crying *too-ip, too-ip, too-ip*, for joy.

The furze warbler's song is much like that of the whitethroat, and is delivered in the same hurried manner which is observed in all these birds; some of its notes are much like parts of the linnet's song, and it has others which are peculiar to itself. It is a very pretty little bird, erecting its crest and tail when it sings, and whisking about all the time with such agility that it is by no means an easy bird to shoot. Sometimes, like the whitethroat, it will sit singing on the topmost twig of a furze bush, and the moment it perceives itself observed, will drop down into the furze, and it will be often a long time before another sight of it can be obtained, as it re-appears singing on the top of another bush. A very beautiful feature in this little bird is the bright orange yellow of the orbits of the eyes, similar to those of the bottletit.

It is worthy of remark, that six or seven furze warblers in the possession of my friend Mr. Bennett, of Upper Baker Street, London, all, both old and young, exhibited the migratory impulse very strongly last winter, although the species is resident in this country throughout the year. I had long, however, suspected that there was a partial migration of these birds, having observed them in some places much commoner in spring than in the winter, and the above fact tends to strengthen my suspicions: possibly, as in the stonechat, the young of the preceding summer may leave the country, while the older birds continue resident; or their habits may be affected by the particular locality which they may chance to inhabit; as the robin-redbreast, a stationary bird in England is migratory in many parts of the continent. The manners of the furze warbler, in confinement, much resemble those of the babillard; it often darts about in the same active manner as that bird, and has also the same remarkable habit of throwing back the head. A babillard, in my possession, rarely descends to the bottom of the cage without performing a somerset in the air, throwing himself over backwards. I may here observe, that the babillard does not acquire the beautiful pearly

white iris until it is two years old, which has caused it to have been entirely overlooked by writers; indeed the birds of that age are altogether much handsomer than those of the preceding summer; in some individuals of this species the iris is of the purest white: the breast of the cock whitethroat, also, does not acquire its full roseate tinge until the second summer.

The different species of *Ficedula* are all, together with the aquatic warbler and the spotted grey flycatcher, very commonly confounded together under the one name "whitethroat." Some of the more discerning, however, among the peasantry, distinguish the different species by the names of *billy* whitethroat, for the garden warbler, *peggy* whitethroat for the common whitethroat, *little grey* whitethroat, for the babillard, &c., the latter bird (and not the whitethroat, as is said in books,) is very commonly known by the name of *nettle creeper*. The garden warbler I have also heard called *juggler* and *nightingale's mate*; and the few persons who know the furze warbler call it, some by the name of *furze wren*, and others by the term *rattle-snake-bird*; though the latter evidently confound it with the grasshopper-warbler, one of the aquatic species, which also haunts commons, but which I have never noticed in the same situation with the furze warbler. I have preferred terming the *Ficedula Hortensis*, *garden warbler*, rather than *fauvette*; the common *fauvette* (*la fauvette proprement dite* of Cuvier) referring to the *Ficedula Orphea* (*Sylvia Orphea*, TEMMINCK) of southern Europe, from which the garden warbler is distinguished by the term *la petite fauvette*. It is as well always to prevent, as much as possible, the confusion of names, which has already much obscured the natural history of many species.

Tooting, June 21, 1833.

SUNDRIES.

BY RURICOLA.

SEVERAL nests in my grounds having been robbed at different times, and some disappointment having been thus occasioned to members of my family, who were looking forward to the young birds making their appearance in due time, inquiry was made after the depredators, who were supposed to be idle boys or birdcatchers in the neighbourhood. One case in particular occurred of the plunder of a redpole's nest, which was known to contain four eggs, on which the female was sitting, about noon of a particular day, (May 14,) but was found to be quite

empty two hours afterwards, the nest itself remaining uninjured. In the end we ascertained, from the observation of persons employed in the grounds, that the plunderers were *magpies*; for they had been seen to visit the nests, taking away the eggs one at a time, which they deposited in a safe place, and then returned for the rest. The thievish propensity of these birds is well known, and the fact of their exercising it on the eggs of other birds; but their systematic mode of carrying off their plunder thus deliberately to enjoy it at leisure, and leaving the nests without any trace of the depredation, in the form of broken egg-shells, has probably been less the subject of remark.

The nest of the *redpole* is mentioned above as one of the sufferers from these plunderers. Since the plunder, the nest has been taken; it is small and compact, being in diameter about three inches and a half from outside to outside, two inches in the opening, about one and a quarter deep, and neatly formed of bent grass and a little moss, interwoven with threads and locks of cotton, and lined with feathers and willow down. It was fixed in the fork of a Scotch fir, about ten or twelve feet from the ground. The bird had suffered a person to take the eggs from the nest, and replace them, she hovering just above him at the time, and returning to her post immediately on his quitting them. The eggs were of a light colour, not white, with reddish or brownish spots.

It is said, but I know not on what authority, that the magpie was unknown in this part of the kingdom (the north of Ireland,) until of late years, when a certain curious lady caused a pair to be imported from England. However this may be, they are now very plentiful, of which we have had the most convincing evidence in the havoc they have committed among our small birds; in consequence of this we have taken within a moderate extent of ground, and in the course of a few days, five full grown birds, four nests, containing twenty young ones, and one nest with five eggs.

The most favourite places selected by our numerous birds, such as thrushes, blackbirds, green linnets, chaffinches, &c., are *evergreen shrubs*, especially laurels and laurustines. A situation probably of less frequent occurrence is a thick bed of lavender, in which a green linnet built early in the spring, but deserted her nest; in the same bed a blackbird has since established herself, and at this time (May 29,) is sitting on a fine brood of five nestlings. I observe that this bird on being disturbed does not fly upwards from her nest, but goes off laterally through the covert, and so escapes at the other side of it

By the way, with reference to what I just now said about the importation of the magpies, a large and very handsome sort of *snail* is frequent in Surrey, in the neighbourhood of Ashted, Leatherhead, &c., which is said to have been introduced into those parts originally on account of a young lady, to whom a diet, containing that ingredient, was prescribed as a remedy for consumption. To the fact of the snail in question being found abundantly in that part of the county of Surrey, I can speak from my own knowledge a few years ago, and at this time several specimens of the shell are in my possession; the fact was accounted for in the way that I have described, and the statement reached me under credible circumstances. It is familiarly spoken of in the neighbourhood as the *Spanish snail*, doubtless from the country of its supposed origin.

In "The Architecture of Birds," are mentioned the principal *heronries* recorded to be existing at present in Great Britain. There is one in this county, at Hillsborough, the seat of the Marquis of Downshire. A few years ago the noble proprietor, preferring fish to herons, and finding the latter very destructive of the former, his fish ponds being immediately under the heronry, determined on abolishing the birds, and used every expedient in his power for the purpose. The effort, however, was ineffectual, and the herons were ultimately left in undisturbed possession of their ancient hereditary domain. It is amusing to see them seated on the high trees, with their legs hanging down from the branches through their nests, which appear to be very loosely put together. There is another heronry, I am informed, in the county of Cavan, but I do not know the proprietor, or the particular spot, and another at the Marquis of Abercorn's, Baron's Court, near Strabane, in the county of Tyrone; perhaps there are others in this country; the bird itself is common in Ireland, and is perpetually seen, for example, on the sea shore in the counties of Down and Antrim. In the latter county it is frequent also at Shanes Castle, the seat of Earl O'Neill, on the borders of that extensive expanse of fresh water, Lough Neagh, sixteen or eighteen miles from the sea: but they do not appear to nestle and breed there. I am told that they never build except on an island.

I do not know whether the swift (*Hirundo Apus*, LINN.) will bear confinement. But a friend has recently sent me a specimen of this bird, which, at the time of its being shot, was found to have an orange ribbon tied round its neck, so that it must at some previous time have been in captivity. But where, and when, and how long, it had been

confined, and for what purpose the badge had been appended to it, are questions of which there is no obvious solution.

The Loon, or Great Northern Diver, (*Colymbus glacialis*, LINN.) is sometimes found in this neighbourhood. A fine specimen, of which by the kindness of a friend, I am now in possession of, was shot last winter on Lough Neagh, near the town of Antrim, about sixteen English miles from the sea. About the same time three more of these birds were shot near the mouth of the bay of Carrickfergus; all of them having probably been driven to these parts by the excessive storminess of the weather. My specimen measures, as near as possible, from the extremity of the beak to that of the tail, three feet one inch and a half.

TO A SWALLOW.

STAY thee, thou bird of nimblest wing,
Herald and harbinger of spring,
As round and round in airy ring,
Thou wheel'st thy flight;
Or dart'st right on, as if to meet
My pensive steps, when lo! more fleet
Than bowyer's shaft, thy turnings cheat
The following sight.

Stay, swallow, stay! I fain would view
Thy glossy plumes of changeful hue,
Where black, and brown, and green, and blue,
Conflicting vie;
Fain would I view thy belted chest,
Thy sable robe, thy snowy vest,
Thy front and chin in 'kerchief drest,
Of reddish die;

The steerage of thy forked tail,
Thy dusky legs so short and frail,
Each pointed wing's expansive sail,
I fain would mark.—
Thou wilt not: well then, onward go!
Well deem'st thou, thou hast tasks enow,
To hold thee through the summer's glow,
'Till winter dark.

Go! and ere the eye of day
Strike the low thatch with level ray,
Trill from thy home to morning grey
A welcome sweet:

Or call to aid, with sharp shrill cry !
 Thy tribes, and dart on him from high,
 If owl, or kestrel, sailing by,
 Thy precincts threat.

Go ! and beneath yon rafter'd shed,
 Hang thy clay house and procreant bed ;
 Or the strait chimney downward thread,
 Safe place to lay
 Thy six white eggs, with red besprent ;
 Now hovering o'er the steep descent,
 Now in thy murky chamber pent
 The livelong day.

Go ! and the mead or hedge-row skim,
 Or, passing, sip the water's brim ;
 Or plunge thee in the dimpled stream
 Thy wing to prune :
 Or with thy mate, now low, now high,
 In sport thy viewless pinions ply ;
 And catch, with sounding beak the fly,
 Thy nestlings' boon.

Go ! and abroad thy nestlings lead,
 Perch'd on the chimney top to feed,
 And train'd the quivering wing to spread
 For doubtful flight :
 Soon shall they make more bold essay,
 Mix with their kindred groups in play,
 And round the village dwellings stray,
 And church-topp'd height ;

Now watch to see thee duly bring
 The wonted meal, and forward spring
 With small brisk note, and on the wing
 Their dole receive ;
 Now fearless follow, here and there,
 The insect myriads of the air ;
 And thee to fresh domestic care
 Forsaken leave.

Go ! and a mother's task renew,
 Thy cares, and toils, and joys pursue,
 Long as mild autumn, bath'd in dew,
 The welkin warms ;
 'Till chill October's fickle hour
 Shall warn thee, with thy tribes, to cower
 On each slope roof and sunny tower,
 In countless swarms.

Then, where more balmy winters smile,
 Speed thee to blest Hesperian isle,
 Libya's warm shores, or palmy Nile,
 On wings of wind :
 Taught by His voice, who bids thee know
 Thy season, when to come and go,
 To seek our genial skies, or throw
 Our storms behind.

Farewell, sweet bird ! thou still hast been
 Companion of our summer scene,
 Lov'd inmate of our meadows green,
 And rural home :
 The twitter of thy cheerful song
 We've lov'd to hear ; and all day long
 See thee on pinion fleet and strong,
 About us roam.

And dost thou no wise lore impart ?
 Yes, still thou bid'st us act our part
 With body prompt and willing heart,
 While summer lasts :
 Prepar'd the course to take, which He
 For us appoints, who summons thee
 To climes of grateful warmth to flee
 From wintry blasts.

O may that warning voice be heard,
 Howe'er reveal'd ! To thee, sweet bird,
 The tongue that speaks the instructive word,
 Within thee dwells :
 To us, where'er around we look,
 Each passing wing, the field, the brook,
 But most his own unerring book
 God's wisdom tells.

That book directs our mental sight,
 To mark thy migratory flight,
 With pow'r, surpassing human might,
 On thee imprest :
 And trains, by thy observant kind,
 Man's wilful and reluctant mind,
 Its refuge in God's laws to find,
 And there to rest.

RURICOLA.

*Hollywood, Ireland,
 4th June, 1833.*

CHAPTER OF VARIETIES.

CANNIBALISM OF CATS, AND NON-CANNIBALISM OF POLECATS.—

A Mr. Craven was so fortunate as to capture four young polecats, about half grown, two of which he sent to the Zoological Gardens, and one he kept in a hutch. He also caught a rat half grown, and put with the polecat, purposely to see his dexterity in killing it, when to his surprise, but a very slight engagement took place between them. Mr. Craven then kept them two days, without food, but to no purpose; not even the pangs of hunger, could induce the noble polecat to taste the blood of his confined mate, and no sooner were provisions given them than they both ate together from the same dish, in the most amicable manner. Mr. C. then put a cat in to keep them company, which very soon became a sociable companion to them. A strange collection indeed, for the next introduced to the society was a hedge-hog, which neither party ever attempted to molest; but whether from the want of proper food, or from the fœtid stench of their confinement, I know not, but the latter animal soon died. Another cat was then put with them to fill up the vacancy, so that the tenants of this one hutch are four, viz. a polecat, two of our domestic cats, and one rat, which have now been living together, on the most friendly terms, for nearly two years, and what is more singular, the cats prefer the flesh of their own species, to that of any other animal.

Tooting, 22nd May, 1833.

OMICRON.

ON THE GRUB OF *CHIRONOMUS PLUMOSUS*.—The most inattentive observers probably have noticed in pitchers of water which have been allowed to stand undisturbed for three or four hours, black dirty lines of about an inch in length lying here and there at the bottom. These lines seldom exceed the above length, and at first appearance, would lead one to suspect that some metallic substance, as a needle for instance, having fallen into the water, had, by becoming oxidised, accumulated a rust around it. Upon looking into the ewer of water

standing upon the wash-hand stand in my bed-room the other evening, I observed by the aid of a candle that several of these black lines had collected at the bottom since morning, and I remarked a small red worm (the blood worm of anglers) with its body half protruded and stretching itself to the right and left at the entrance of these earthen tunnels. Having watched their proceedings I observed that they frequently withdrew themselves to within side, and almost immediately after would come out as before and proceed to collect together the dust and other atoms which had been deposited by the water, and these were added to the extension of the tunnels. Their proceedings bear no little resemblance to those of the clothes-moth (*Tinea pellionella*, &c.) and like them they live in separate apartments. Their tunnels never interfere with each other, from the following reason. As each of them appropriates to itself all the dust, &c., which it can collect in its progress, it consequently leaves a clear track behind and on both sides of it (*see cut*), upon approaching towards which its fellows upon finding a clean surface destitute of the materials they seek, alter their course and proceed in another direction; from which circumstance some of these tunnels may be observed to be bent, or running at right angles, whilst others direct their course from the bottom of the vessel up to its sides. They proceed very rapidly in their work, and it is surprising that they do not in their movement upset their frail fabric of atoms, but perhaps when they move withinside they contract the width of their bodies, and thus avoid jostling against its sides; or it is not improbable that the materials are held fast together by some glutinous substance insoluble in water. The latter opinion I would the more readily adopt, as the grubs of the common gnats (*Culicidæ*) which are closely connected to these, have the hairs of their beautiful fringed tails covered with oil so as to repel the water from that part, there being situated their respiratory organs; and that they are provided with a supply of this oil is evidently clear, for Swammerdam discovered that when it was rubbed off, the grubs put their tails within their mouths for the purpose of replenishing them with another coating. While upon this subject, I will mention a circumstance which I once heard from the lips of a gentleman from whom I some years since not only received academic tuition, but also imbibed that taste for natural philosophy which while I live I hope will increase with my years and add fresh pleasures to my existence. About a year ago, I was invited to attend one of his lectures at his residence in the New Kent Road, when in his discourse he mentioned that a leaden cistern of his having become perforated with small holes, he was induced

to examine it, when he discovered the mischief to arise from blood worms boring therein. Now as I know that this gentleman is not an entomologist, I suspected that he was mistaken in the identity of the species, for I cannot see what purpose worms of this nature could have in perforating so hard a substance; and I therefore think it not improbable that, if worms were indeed the real cause, they were of some other species: but I should be inclined to think that instead of worms the real offenders were some animals of similar economy to the *Teredines*, *Lithophaga*, and *Lithodomi*, molluscous animals which excavate galleries in wood and hard solid rocks.—**SOLITARIUS.**

May, 1833.

ON THE RELATIVE WARMTH OF COLOURS.—As many occurrences of Nature are only explicable upon the principles of caloric, it is very necessary that the naturalist should be acquainted with them, and therefore the following few lines upon the subject cannot be considered as entirely unconnected with his pursuits. In most works upon caloric the method given for ascertaining the relative warmth of different coloured skins, leaves, &c., (but more frequently cloth) is by laying them side by side upon a smooth and level bed of snow when the sun shines thereon, when the result will be, that the colour which imbibes the most warmth from the sun's rays will sink deep in the snow, while the rest will sink in depth in proportion to the degree of warmth which they contain. Now this plan of experimenting can only be tried in winter when the snow lies upon the ground, but my plan, which is very simple, can be tried in summer. Take as many burning glasses of the same power, as you have objects to experiment upon, and fix them upright side by side before the sun, and having fastened your objects in a row upon a board, bring them to the exact distance of the foci of the lenses, so that the concentrated rays of the sun may fall upon them, and then by means of a watch held in the hand, the variation of time required to consume the one before the other can be ascertained with exactness. The colour of that one which consumes first will be the warmest, whilst the others will consume according to their relative degrees of warmth.

SOLITARIUS.

London, May, 1833.

ON THE REDBREAST BUILDING WITH OAK-LEAVES.—The notion which your correspondent entertains of the materials employed by birds in the construction of their nests differing according to the localities in

which they are built, I, and indeed most naturalists, know to be a fact. In the neighbourhood of London, for instance, where many birds cannot procure in sufficient quantities particular substances which they may require for this purpose, they are obliged to use other materials. In truth, it would appear that the nidification of birds is, like their melody, subject to provincial differences. But the differences observable in the materials of which the redbreast's nest is formed, seem to me not to depend so much upon the neighbourhood, as upon the situation in which it is built, as will presently appear. The subject of oak-leaves being employed in the nest of this species, has, in my humble opinion, been as well supported by some, as it has been positively denied by others. Dr. Mason Good, in his "Book of Nature," gave his opinion in the affirmative; and you have, in one of your small volumes, the "Architecture of Birds," introduced his statement, but have appended to it the following dissentaneous observation: "So far, however, from preferring oak-leaves, we are bold to say that these are *seldom, if ever*, used in the formation of the redbreast's nest, which is *always* neatly made of moss and grass, and lined with hair, and sometimes (not always) with feathers intertwined." Feathers, I do not recollect ever having observed in its nest, but I can confidently state that I have found oak-leaves therein; and from my observation I am inclined to believe that these are only used in such nests as are built beneath the surface of the ground, down by the side of ditches, and not in such nests as are built in banks above the earth's surface. During last spring I found, in the ivy-covered and *raised* banks of a road, not far from Shooter's Hill, three nests of the redbreast, in neither of which was an oak-leaf; but I once took a redbreast's nest from out of the lower part of the bank of a ditch opposite the Tiger's Head at Lec, which had one solitary oak-leaf in it, and I could mention other instances; but in the following account copied from my field-diary for April, 1831, it will be seen that I once met with an instance in which the only foundation upon which a redbreast's eggs were deposited was oak-leaves. In the hollow stump of a tree, situated low down by a streamlet's bank, near the Harrow Road, I found the eggs of a redbreast, without a vestige of nest to contain them, unless a few damp decayed *oak-leaves* scattered within could be called such, and only sheltered by some over-hanging ivy. This was indeed a very unusual and singular occurrence; but I must confess that I had some reason to suspect that it was owing to some accidental causes. I suspected this the more, as I had never heard or seen any other robin near

the place, from which I conceived that, probably, it was a widowed mate, and if so, that circumstance might account for the eggs being laid in a hollow trunk, instead of a nest being built to receive them in a bank, as it might have found the task of nest-building impossible for itself to accomplish without assistance; and it might, therefore, have sought a depository ready made. I am sorry that I have no redbreast's nest containing oak-leaves in my possession, to send herewith, but should I hereafter meet with a specimen I will forward it to you, that the question may be at once decided by ocular demonstration, which is always, to the naturalist, more valuable than a thousand printed affirmations.

SOLITARIUS.

London, April 1833.

ON MICROGASTER ALVEARIUS.—In addition to the facts connected with the history of this very interesting parasitic fly, with which I have already furnished you, I am now enabled to add the following:—On the 15th of last October, I observed upon a wall at Hampstead, several caterpillars of the cabbage-white butterfly (*Pontia Brassicæ*) most of which were resting upon the yellow silken cocoons spun by those parasitic grubs which had previously inhabited and fed upon their bodies. There were, I should suppose, about twenty caterpillars which had been thus attacked, and I could only find three which appeared to have escaped. The latter I brought home with me, expecting to rear the perfect insects, but in this I was disappointed, for they had not been many days in my boxes before they died, having disclosed several similar parasitic grubs, which immediately spun their cocoons, which I kept until they hatched. On the 15th of the present month (May) they appeared in their winged state, and upon comparing them with those which came out of the spider's egg (figured at page 180), I found them to be of the same species. Now, it is a very extraordinary circumstance that those grubs which were deposited in the eggs of the spider never spun any cocoons, but were disclosed as perfect flies, and we may ask what became of the silk with which nature supplies them for that purpose? Is it probable that the reason of the fly's undergoing its transformation inside the eggs instead of coming out for that purpose as is usual, was in consequence of its not having the strength, when in the state of a grub, to force its exit through the shell, owing to its being bound round with silk, and obliged patiently to remain within until it acquired the power or implements necessary to remove the

impediment; or did it find that the egg-shell, when it had eaten the contents, formed as warm and as commodious a berth as any which it could have spun; from which circumstance it resolved to adopt it, and save itself the trouble of constructing a new one, which, by-the-by, would not have had the advantage of being defended by so hard an exterior? Is it not also a singular coincidence that this fly should be an egg-parasite, and also a grub-parasite? When I found the spider's eggs I was unaware how long she had lain previous to my discovering them in August*, but they were hatched a few days after, and thus we see from the two instances that there are two broods of these flies in the course of the year, the one appearing in May, and the latter in August, but whether the same parent is double brooded or otherwise, I know not.

London, May, 1833.

SOLITARIUS.

NEST OF A CHAFFINCH AND OF A REDBREAST.—I am led by Ruricola's account of a "redbreast's nest situated in a window," to address to you a line or two, detailing in my opinion an equally rare and interesting occurrence. Had I not met with his communication in your Magazine, I should not have thought of troubling you with what I considered unworthy of notice, except by a mere beginner like myself.

Immediately under, or rather in front of our sitting-room window, grows a strawberry-tree (*Arbutus unedo*), the branches of which nearly project into the room when the sash is thrown up. Upon a forked stem of this shrub, within reach from the open window, a pair of chaffinches built their nest, and having lately turned my attention to Natural History, I was an interested observer of their operations. The foundation of this beautiful nest was laid on the 12th April, and the first egg was deposited on the 2nd May: thus, by unwearied diligence was the beautiful structure finished in three weeks—it was really an elegant and compact habitation. On each succeeding day—during the next four—another egg was deposited: and I found on the 15th, that the whole five were hatched. Was not the time of incubation very short? Had the hot weather which we had at this time any effect in bringing out the young sooner than usual?

But I wish more especially to direct your attention—(and that of your readers—should you deem this worthy of a place in the *Field*

* Stated "April" by mistake at page 180.

Naturalist's Magazine)—to the following particulars. The sitting-room was very seldom without inmates, as we principally lived in it, and it not unfrequently happened that some one was sitting at the window during the greater part of the day. More than this—the sash was often thrown up by a member of our family, to call to persons in the lane—for you must know that our house is situated about twelve yards from the turnpike road, with only a small grass-plot and a few low flowering shrubs in front. The nest being so near us was an object of general curiosity and much observation; for I seldom let any of our visitors depart without directing their attention to it. None of these things, however, disturbed the parent bird:—she sat most patiently, and I don't recollect that she once flew away, although frequently observed through the open window. There was not by any means the care taken not to disturb her, which I could have wished; still she went on prosperously to the end, and, as I have stated above, the whole five eggs were hatched. During the time of incubation, the male bird often visited his partner, but I could not discover whether he ever brought her food, as I was, for the most part, engaged in the study. I have, however, seen him fly from beside her many times in the length of a day. To my no small annoyance the young were destroyed before they were fledged—(as we say in the country, when in pen-feather)—by the servant-man, as I suppose, in compliance with the commands of his master, who is prejudiced against them, because he considers that they do much damage in the garden. Now this statement respecting the chaffinch appears to me more remarkable than that of the redbreast, inasmuch as I have always considered the latter a much tamer bird than the former. I remember a few years ago, when I was quite a boy, a robin built its nest in one of the empty compartments of a book cupboard in a charity-school, and, if my memory is not treacherous, reared her brood, entering and departing through an open window, although the room was regularly filled with girls.

If you consider this worthy of notice, I shall be glad to see it in print. Most likely, on some future occasion, I may have other communications for you.

Sutton-juxta-Frodsham, Cheshire,

W. B * * * * w.

June 13, 1833.

ON THE NEST OF THE BOTTLE-TIT.—It is impossible for any one, even the most talented of writers, to form any thing like a good natural history of any description, without the united efforts of correspondents

in every part of the kingdom. It is by this means alone that the different internal migrations of birds from one part of one country to another can be observed, commented on, and accounted for. The present age, however, as all enthusiastic naturalists must see with delight (and who can be a good naturalist who is not enthusiastic in his pursuits?); the present age is particularly favourable to the advancement both of this and every other study. Societies have been formed, and communications have been established, the end of which will naturally be, the propagation of, and increased attention to, the delightful study of natural science. There was, a short time since, one circumstance which retarded every one's endeavours, and which restrained almost every one from the study I am now advocating. What I refer to was the extensive use of *books* rather than *field study*, and the fast increasing quackery of systems and forms. This is fast becoming obsolete, and natural history will no longer hide its "nitidum caput obscurâ ferrugine," and "impii gentes" will no longer dread "obscuram noctem." It is time, however, that I should begin to lay before you my few observations, in order to do which this communication was attempted. To commence, then, with some remarks on the nest of the long-tailed titmouse (*Parus caudatus*), which this part of Devonshire is so abundant in. On reading, a short time since, a work which decidedly is very excellently written, both with regard to style and matter, "Mudie's British Naturalist," I found the following description of this elegant little bird, and still more elegant nest. "This species is confined to England; it is of the same weight as the cole-mouse, but has the tail about an inch longer. It is a very pretty little bird, having a sort of rosy tint over the greater part of it. The throat, cheeks, forehead, and crown, all white, with which the secondaries of the wings, and the outside feathers of the tail are edged; a band of black runs backward above each eye to the nape, from their junction at which a black mesial line extends along the whole of the back; and the quills of the wings and middle feathers of the tail are also black; the remainder of the upper part is rose colour, and the under part grey, with a shade of the same. The nest is found in a thick tree or bush; and, where the locality suits, an evergreen is preferred. It is constructed with great neatness and care, made soft by abundance of feathers, closed over, and *formed with two openings*, so that the bird neither needs to turn in the nest, nor is in any way incommoded by its long tail, which projects from one opening of the structure. As is the case with all the other species, the eggs are numerous. In the pairing season this titmouse has a kind of cry, but it is simple and faint." Now this

description of the "Long-tailed Tit" is perfectly in accordance with my own and every other person's observations: with the nest the case is different; we cannot but acknowledge here, that the learned author of the foregoing remarks has fallen into a mistake of no little consequence. Had he examined, as he should have done, the nest of this highly interesting little bird, he would have discovered that it has but one opening, and that near the top. Had he even employed the common substitute of the generality of writers, *book-study*, he would have seen that naturalists have seldom, if ever, given credence to the tale. I need not here give a description of the nest; it has already been done in your "Architecture of Birds."

But the nature of my pursuits will not allow me to proceed further in these observations. If they are found worthy of a place in your Magazine, I may venture to trouble you with a few more of the same description.

Plymouth, April, 1833.

OBSERVATOR.

DOES THE WHIRLWIG-BEETLE (*GYRINUS NATATOR*) LIVE THROUGH THE WINTER?—I do not remember ever to have observed these little beetles, sporting in the sunshine during the colder months of winter, but having found a couple of them on the 17th of last December, I carried them home alive in a bottle of water, which I placed in a warm room, and in which they lived until the 22nd of February. As they had lived so long in confinement, I conjectured that it might be their nature to live through the winter, and that they might possibly have escaped my observation during that season. But desirous of obtaining proof of their living so long exposed to the chill open air, I removed the bottle and its contents, and hung it up to the wall outside the window. On the following day, when I looked at them, I found them lying upon their backs quite lifeless, at the bottom of the phial, killed, most probably, by the severity of the night. I might have considered this as a sufficient proof that they do not live through the winter, did I not think that possibly the sudden transition from a warm room to a cold atmosphere, might have had a deadly effect upon them, and it did not disprove that they might perhaps have borne it without suffering, had they always been kept in the open air. But as these ideas are anything but satisfactory, I submit it as a query to your readers, whether this insect is to be found throughout the winter, and if so, does it during that season, swim upon the surface, or conceal itself by retiring into the mud under water?

London, April, 1833.

SOLITARIUS.

PRESENTED

NATURAL HISTORY OF THE BIRDS OF AFRICA.

TRANSLATED FROM THE FRENCH OF LE VAILLANT.

WHITE NECKED RAVEN. (*Corvus albicollis*, LATHAM.)

Corbivau, *Levaill.* Ois. d'Afrique, ii. p. 1. pl. 50; *Corvus albicollis*, *Lath.* Index Orn. i. 151; *Daud.* ii. 227; *Corvus Vulturinus*, *Shaw's Zool.* vii. 343; *Corvus Torquatus*, *Spalowsk.* Voy. iii. l. 10; South Sea Raven, *Latham*, Gen. Synops. Sup. 75; *Id.* Sup. ii. 137; *Bruce*, Travels, App. p. 152; White-necked Raven, *Latham*, Gen. Hist. iii. p. 8; *Drapiez*, Dict. Class. iv. 464.

THE white-necked Raven is an African bird, similar to the common raven in the shape of its body, feet, and toes, the middle one of which is united by a membrane to the inner toe, as far as the first joint, and the feathers at the base of the bill are turned forward and cover the nostrils; but it differs very much from the raven in its bill, the length

of its wings and the wedge-like shape of its tail. This bird appears to me to occupy a part of the interval which exists between the ravens and the vultures.

The white-necked raven, however, is altogether more similar to the first. It only resembles the vultures of Africa, which I have described, in the dimension of its wings, which, when folded, are longer than the tail by three inches, in the tapering shape of its tail, and in the form of its bill, which is compressed on the sides, convex on the top, very much bent and rounded, that is to say, rising like that of the Caffre and Oricou as it lengthens, at the same time bending progressively : these characters distinguish the white-necked raven from all hitherto described ravens. If some travellers should at any future time happen to bring several species similar to the white-necked raven, the specific name will be drawn from the white spot which is on the nape of the neck, which is strongly contrasted by the glossy black, which is the only colour of the rest of its plumage, if a long streak of white, which emanates from the larger white spot at the back of the neck and which girts the chest, be excepted. This streak, which is very little seen, is formed by a single row of feathers, the half part of them white, of which the exterior edges only are seen. The throat is of a black, less deep than the rest of its body, and all the feathers which cover it are forked, and the plumelets spreading beyond the stem as if the end had been cut off, a remarkable characteristic which I have only found in very few birds. The tail of the white-necked raven, as I have already said, is wedge-shaped, the feathers at the sides being shorter than the others. The feet are black, as well as the bill, which is entirely so, with the exception of the end, which is white. The iris is hazelbrown. The size of the white-necked raven is less than that of our large raven, and holds a middle space between this species and the hooded crow. I shall also observe that the claws of the white-necked raven are stronger and more bent than those of the ravens generally.

The description which I have just given of the white-necked raven shows that this genus of ravens, if I may thus express myself, possesses some similarity of shape with birds of prey. The observations which I have made respecting its habits and its manners of living will present the same analogous features.

Voracious, clamorous, bold, sociable, and dirty, he imitates the raven in his taste for carrion, which is the principal part of his food, and sometimes assembles in very numerous and noisy flocks. This bird

utters most harsh and hoarse cries; almost similar to those of the raven, and which singularly concur with its shape and habits, to give the idea of a savage, cruel, and disgusting being which we form of the ravens in general, from the whole of their disagreeable and mournful attributes.

The white-necked raven joins to the habits I have just mentioned, a marked appetite for live prey : he attacks and kills lambs and young antelopes, and devours them, after having previously torn out the eyes and tongue. He is seen pursuing flocks of buffalos, oxen, and horses, and indeed the rhinoceros, and even the elephant himself. His taste for flesh and blood leads him to the pursuit of those large quadrupeds, on the back of which they are continually perched in great numbers. The white-necked raven would be for these animals a bird of prey, deadly and dangerous, if it had the strength necessary to destroy them ; but being powerless against their strong and solid hide, he satisfies himself by plunging his bill into the wounds of the animal, in the suppurating parts of its body, when the hide is opened by the pustules which have been made by the wood-lice, and above all by the breeze-flies (*Tabans*), in disposing their eggs in the thickness of the skin. If these quadrupeds thus allow the white-necked raven to perch on their back, it is in consideration of a service which its sanguinary instinct renders them ; a service which they receive with a sort of pleasure, since they suffer and allow him to pick out the larvæ developed and full of blood, the number of which is sometimes so great upon those large animals, that I have seen several of them perish from leanness.

The white-necked raven is not a bird of passage; he lives throughout the year in the canton where he was hatched. I have generally found it in all the places which I have visited in my travels through Africa. There are, however, some cantons in which it is more abundant than in others, as for example, among the Great Namaquas. He is more rare in the environs of Cape Town, but is found abundantly in Swarte Land, where he is seen to mix with another very common species of which I shall speak under the name of white breasted crow. The colonists call the white-necked raven, *Ring-hals-Kraai*. The female is rather smaller than the male ; the white of her collar is less spread ; and her black is also less glossy, and seems in general of a browner cast.

APPEARANCES AND INFLUENCES OF THE MOON.

BY M. ARAGO OF THE FRENCH INSTITUTE*.

ACCORDING to Aratus, if, on the third day of the moon, the horns of the crescent are sharp and well defined, the sky will continue serene during the whole of the month. In reality, when the moon in the evening begins to disengage herself from the sun's rays, she has always the form of a crescent, terminated by two very sharp horns ; but if the atmosphere happen to be troubled, the horns appear enlarged. This enlargement, however, is a mere optical illusion, and is occasioned by strongly illuminated clouds, in apparent contact with the moon, and seeming to form a constituent part of her body. The fine extremities of the crescent are then lost, as it were, in the parasitical light which surrounds the moon, and become invisible to the naked eye. All this is rendered evident by employing a telescope, which destroys the illusion.

It is generally believed, especially in the neighbourhood of Paris, that the moon in certain months has a great influence on the phenomena of vegetation. They give the name of *red moon*, (*lune rousse*) to the moon, which, beginning in April, becomes full either about the end of that month, or more usually in the course of May. In the months of April and May, the moon, according to them, exercises a pernicious influence on the young shoots of plants. They maintain that they have observed during the night, when the sky is clear, the leaves and buds exposed to this light to become red, that is to say, to be frozen, although the thermometer, in the free atmosphere, stood several degrees above the freezing point. They also assert, that if the rays of the moon are intercepted by clouds, and thereby prevented from reaching the plants, the same effects do not take place, under circumstances perfectly similar in other respects with regard to temperature. These phenomena seem to indicate that the light of our satellite is endowed with a certain frigorific influence, yet, on directing the most powerful burning-glasses or the largest reflectors towards the moon, and placing the most delicate thermometer in their foci, no effect has ever been observed which could justify so singular a conclusion. Hence, with philosophers, the effects of the April moon are now referred to the class of vulgar pre-

* Annuaire pour 1833.

judices, while the gardeners remain convinced of the accuracy of their observations. A beautiful discovery made some years ago, by Dr. Wells, will enable us, I think, to reconcile two opinions in appearance so contradictory.

No one had supposed, before Dr. Wells, that terrestrial substances, excepting in the case of a very rapid evaporation, may acquire, during the night, a different temperature from that of the surrounding air. This important fact is now well ascertained. On placing little masses of cotton down, &c., in the open air, it is frequently observed that they acquire a temperature of six, seven, or eight centigrade degrees below that of the surrounding atmosphere. The same is the case with vegetables. We cannot therefore judge of the degree of cold with which a plant is affected during the night by the indications of a thermometer suspended in the free atmosphere; *the plant may be strongly frozen, although the air remains constantly several degrees above the freezing point.* These differences of temperature between solid bodies and the atmosphere only rise to six, seven, or eight degrees of the centesimal thermometer, when the sky is perfectly clear. If the sky is clouded, they become insensible.

Is it now necessary to point out the connection between these phenomena, and the opinions of the country people regarding the April moon?

In the nights of April and May, the temperature of the atmosphere is frequently only four, five, or six centigrade degrees above zero. When this happens, plants exposed to the light of the moon—*that is to say, to a clear sky*—may be frozen notwithstanding the indications of the thermometer. If the moon, on the contrary, does not shine, in short, if the sky is cloudy, the temperature of the plants does not fall below that of the atmosphere; and they will consequently not be frozen, unless the thermometer indicates zero. It is therefore quite true, as the gardeners pretend, that under thermometrical circumstances precisely alike, a plant may be frozen or not, according as the moon may be visible or concealed behind the clouds. If they are deceived, it is only in their conclusion, in attributing the effect to the light of the moon. The moon's light is, in this case, only the index of a clear atmosphere; it is only in consequence of the clearness of the sky, that the nocturnal congelation of plants takes place; the moon contributes to the effect in no way whatever; although she were hid under the horizon, the effect would not be different.

A body exposed to the light of the moon, *that is to say, to a clear*

sky, becomes, in consequence of its radiation, colder than the surrounding air. Under these circumstances, the air deposits a portion of its humidity on the cold surface of the body, which is neither more or less than the phenomenon of dew, as analysed by Dr. Wells. Now animal substances become much sooner putrid when moist than when dry. The observation of Pliny and Plutarch is therefore correct in all its details. It was only necessary to reform the theory, and acquit the moon of the mischief ascribed to her.

Of all known substances the chloride of silver is that of which the colour suffers the greatest and most rapid change on exposure to light. But a plate of this chemical compound, exposed for a long time to the light of the moon, condensed in the focus of a powerful burning glass, is observed to lose nothing of its primitive whiteness.

ON THE ORGANS OF THE VOICE IN BIRDS AND MONKEYS.

BY BARON HUMBOLDT.

THERE is a great difference in the construction of the larynx in those animals which have an epiglottis and in those which have none. In the latter we do not find any thing resembling the cricoid and thyroid cartilages of the larynx of mammiferæ. In the amphibia, the glottis is situated in a round fleshy mass (*bourrelet*), formed by the interweaving of nearly circular fibres: in birds it is cartilaginous, almost osseous, and tolerably uniform in its external form. In the genera *Pelecanus*, *Phasianus*, *Ardea*, and *Phænicopterus*, the larynx has a triangular shape, the apex of the triangle being directed forwards, and its base or posterior part being fringed with little pointed, white, cartilaginous teeth. These tubercles, which border the glottis, are very broad and short in *Phasianus paraka* of the Orinoco, they form a white band in the *Ardea cocoes*; they cover, almost entirely, the glottis of the *Palamedea bispinosa*, and that also of the *Aras*, a family of the parrot tribe; but they are entirely wanting in some aquatic birds, as in the alkatras of the South Sea. The six designs in which I have represented the larynx of birds, present all these varieties of construction. The glottis is supported at its base by an osseous, broad, flat cartilage, sometimes crenated anteriorly, as in the Guyana pheasant, but pointed and elongated in the pelicans and *Phænicopterus*.

This cartilage, to which I shall give the name of base (*socle*) has not

a, "Socle" of *Pelecanus alcatras*. *b*, ditto of *Pelecanus olivaceus*. *c*, ditto *Phasianus garrulus*.

hitherto been well described. It has, on its upper surface, a membrane which divides it into two parts, and which proceeds from it at right angles. This membrane is triangular, and resembles the index of a sun-dial. In the living animal, it is generally visible at the centre of the opening of the glottis: it there forms a partition, the presence of which must contribute a great deal to modify sounds and render them more acute: it divides, so to speak, into two currents, the air which is driven by the inferior larynx towards the glottis. I was surprised to find that it was wanting in the glottis of the *Palamedea bispinosa*. This flat cartilage, thus furnished with a triangular membrane, is immediately attached to the rings of the trachea: it may be considered as a half-ring of a singular construction.

Besides this base, the glottis of birds is supported by four little bones, which are connected, two by two, in the form of compasses, the anterior pair of which is embraced by the posterior. I do not

a, Larynx of *Ardea cocoes* opened. *b*, bonelets or compass bones.

hesitate to call these bonelets; for, in tropical birds their substance is too dense for them to be ranked among the cartilages. They are triangular, diminish towards the extremities, and are joined in pairs by condyles. I have carefully copied those of the great heron with black neck and white floating comb, of the river Magdalena, and which constitutes an intermediate species between the *Ardea cocoes*

and the *Ardea johannæ*. This handsome bird is four feet four inches high, when he stands with his neck elongated, and his greenish bill raised. The two anterior bonelets, or the branches of the anterior compass (if I may be allowed the expression,) are immoveable, while the posterior compass, which is placed over and embraces the other, extends its branches by means of two fleshy muscles which are placed outside the bony glottis. These posterior bonelets might be likened to the arytenoid cartilages, while the anterior by their position might correspond with the thyroid cartilage of mammiferæ; but, in classes of animals whose entire organisation is so different, these comparisons, most frequently, only serve to lead to very inaccurate ideas.

It follows from this construction of the superior larynx, that the rima or opening of the glottis, confined by the anterior bonelets, can scarcely ever become either widened or more contracted; and that it is by the action of the posterior branches, which are placed at the outer border of the glottis, that the internal capacity of this organ becomes changed. The voice is always projected through the same opening, but the rapidity with which this is effected, depends as much upon the impulse it has received in the inferior larynx, as upon the approximation of the bonelets of the glottis.

But the modification of the sounds does not depend solely upon the extremity of the trachea, nor upon the form of the two larynxes. The whole trachea in some of the tropical birds, presents very extraordinary appearances. In the same species, the trachea in the male is sometimes twice the length of that in the female: Linnæus has already announced this in the description of the *Phasianus parraka*. We also meet with this difference in several swimming and wading birds of Europe, in storks, cranes, and herons; and M. Daubenton has observed it in the fine genus *Crax*, the *Koco* of the tropics, which has often served us for food in the woods. There is an extraordinary prolongation and sinuosity of the trachea in a new species of pheasant, which I shall describe under the name of *Phasianus garrulus*. This pheasant, which must not be confounded with the *Phasianus motmot*, is very common north of the equator, in the river Magdalena, in the province of Caracas, and in New Andalusia. Flocks of from sixty to eighty perch themselves upon the dead branches of contiguous trees, and fill the air with their piercing cries of *catacras! catacras!*

I found the length of the trachea in the male of this species, to be, from the superior larynx to the bronchi, fifteen inches seven lines, while the female's was but five inches four lines. That in the male first descends among the teguments under the sternum as far as the

legs; it is then folded back (in nearly the same manner as M. Bonpland found in the bronchi of the crocodile), forms a considerable sinuosity in reascending, and then enters the lungs. The trachea of the female, which is shorter in the proportion of five to two, does not form this sinuosity, but enters, without folding itself, at once into the bronchi. Here then we have a bird in which the air forming his voice passes between the legs before arriving at the glottis. The Indians observe that the cry of the female of this species is much less shrill than that of the male, whose trachea presents so singular a construction. M. Cuvier has communicated to me the important observation that, in the common pheasant (*Phasianus colchicus*) the trachea does not, in either sex, present this sinuosity, and that, in the *Cygnus canorus*, the female presents the elongation of this organ. It is remarkable that such differences should exist in species nearly resembling it.

In passing from Santa-Fé de Bogota to Quito, during the rainy season in 1801, we found the banks of the Canca covered with the *Palamedea bispinosa*, the kamichi of Buffon, which approximates in size to the condor of the Andes. It is called by the inhabitants the Uitre de Sienega. It walks about very gravely in marshy places, uttering constantly a uniform cry, somewhat resembling the sound produced by a boy's whistle (*soufflet*).

Staying some days at Buga, I had an opportunity of obtaining one of these birds, and of examining its larynx. I saw with surprise that it was rather its trachea than its inferior larynx which enabled it to produce such extraordinary sounds. This trachea diminishes in diameter from the bony glottis to the inferior larynx: it contracts in the proportion of two to three; but before arriving at the inferior larynx, it suddenly becomes much wider; it becomes nearly five-sixths larger

Enlargement of the trachea in *Palamedea bispinosa*, with the insertion of the two muscles.

than the glottis itself, and this enlargement is nearly fourteen lines long. Lower down, the trachea contracts again and more than before ; for, in entering the inferior larynx, it has not one fourth of its original diameter. I sketched on the spot this peculiar conformation of the *Palamedea bispinosa*, of which I have scarcely met with any analogy in other birds which I have dissected. M. Cuvier, however, has seen two other examples of these sudden enlargements, in the *Anas clangula*, and in *Anas fusca* ; but in these cases the swelling was of a spherical form, with a nearly circular disc, and different, in that respect, from that of the *Palamedea bispinosa*. In this two bundles of very long and slender muscles are attached to the enlarged part of the trachea ; these draw it downwards, so that the larger rings compress those of the narrower part ; a mechanism resembling that of some musical instruments, and which, without doubt, contributes to the production of the monotonous cries and cadences of this bird.

I shall not dwell long on the structure of the inferior larynx of birds. It would be difficult to add anything to a subject which M. Cuvier has treated of in a particular memoir. I have drawn, in the greatest possible detail, the inferior larynxes of the *Psittacus ararauna* and of a new species of pelican of New Guinea, which I shall describe under the name of *Pelecanus olivaceus*. It has the habit of a *Plotus* ; but its bill and its intermediate claw being serrated, indicate that it belongs to the genus *Pelecanus*. In one figure the various muscles are delineated, with which nature has furnished this inferior larynx, which is really an instrument of music. The other figure represents the sacs or valves in this bird, which are of an extraordinary size, being more than three lines deep and two broad ; but in some tropical animals which have a very strong voice, this seems to depend on the structure of the superior larynx, rather than on that of the inferior. This is the case with *Phasianus garrulus*, in which I have represented the bonelets and

Upper larynx of *Phasianus garrulus*, opened.

the arytenoid cartilages bent forward, in order to display the internal structure of the glottis. I did not find sacs in the inferior larynx of this bird, but simply a bulging out and broadening of the last rings. The base of its inferior larynx is sustained by a cartilage which I have not met with in any other animal of this class; it is a round, membranous, crenulated plate, upon which rises a small compressed bone. The want of sacs in the lower end of the larynx, in the *Phasianus garrulus*, is compensated by the mechanism of the superior larynx. Above the opening of the trachea there is a rima leading to two membranous pouches. In blowing through the bronchi into the trachea, these pouches are seen to swell. Valves are also wanting in the inferior larynx of the *Pelecanus fuscus*, but there are true sacs in the superior. In the glottis of the *Palamedea bispinosa*, whose trachea presents the extraordinary enlargement I have just described, there are folds having some analogy with the sacs which in man form the ligaments which go from the arytenoid cartilages to the thyroid. These folds seem to modify the voice of this bird; for in the inferior larynx, which I opened and have carefully drawn, there is nothing which can perform their functions. In the same class of animals, it is sometimes the glottis, sometimes the form of the trachea, and sometimes the inferior larynx, which modifies or gives character to the voice.

I cannot leave this subject without adding a few words on the formation of the os hyoides in parrots and pelicans, furnished with an immense sac under the throat. The os hyoides of the *Pelecanus alcatras* does not present small horns (*cornua*) anteriorly, but a complicated structure. It is triangular, spur-shaped and terminated

The os hyoides of *Pelecanus alcatras*.

by a large osseous button. Towards the base of the triangle, between the two large horns, is a bony member or branch, which I have not seen in any other animal, and which appears like a minute middle horn. I have carefully examined the tongue of parrots, to discover the reason that several tribes, the *Aras* for example, never learn to imitate

the human voice; while others, the Amazons for instance, which are marked with red on the bend (*fouet*) of the wing, talk so well. I think I have discovered the solution of this interesting problem in the formation of the os hyoides of the *Psittacus*. In those parrots which talk, this bone is slender and prolonged at the point; in the Aras, on the contrary, who are the dumbest, though ornamented with the finest colours, the os hyoides presents an extraordinary shape. The interval between the two cornua is partly filled with an osseous membrane, which becomes narrowed towards the point and apex, and is fixed to a square bone, which is more than a quarter of an inch broad. It is this

Os hyoides, upper larynx, and part of trachea, in *Psittacus araurana*.

extraordinary member, this spatula-shaped bone which, going to the tip of the tongue, renders it so inflexible in the *Psittacus ararauna* and the macaw.

Having lived for several years almost constantly in the open air, and in the midst of exotic animals, I have often been astonished at the perfection with which some mammiferae imitate the voice of birds, as is the case with some squirrels and small sapajous. In opening the larynx of these animals I have been struck with the similarity they present, with what M. Cuvier has discovered in the inferior larynx of birds. If the organ of the voice of the *Pelecanus olivaceus*, in my design, be compared with that of the *Simia Œdipus* of Brisson, and with that of the squirrel of Carthage, which is very different from the *Sciurus flavus*, somewhat approaching the *Sciurus erythæus* of Pallas, it will be seen that the larynx of the small whistling ape might be mistaken for that of the orange squirrel, and similar pouches which the bird has in its inferior larynx, will be found in

a, Larynx of *Sciurus granatensis*, opened ; *b*, os hyoides.

the superior larynx of these mammiferæ. When the small sapajous shut the epiglottis, and force, at the same time, the air into the trachea, the current of air is reflected downwards, and passes into the valves or pouches, the vibrations of which modulate the voice. The *Simia Œdipus*, the *Simia Jacchus* of the Orinoco, the *Simia leonina*, and several new species of small apes, imitate the voice of the *Gallinaceæ*. In them the os hyoides is slender, and presents very long cornua, resembling that of man : other apes, on the contrary, particularly those which have a very loud voice, and which are designated by the name of howlers, have the larynx of a very complicated structure. I do not think there exists a single genus of animals presenting such extraordinary contrasts in the organ of voice, as the apes.

The small sapajous of America have the os hyoides slender and of simple construction ; the large ones, as the *Simia paniscus*, and a species, unknown to the present time, and which we found on the banks of the river Amazon, (the *chuva* of Bracamorros,) have an osseous tambour. The same kind of tambour is also found in the howlers : it seems to be wanting in the apes of the old world, of which some, on the contrary, have, like the baboons and the orang-outang, described by Camper, a membranous sac in which the voice becomes lost. The most complicated larynx of all presented by this family is that of the *Simia seniculus* of Jacquin, which congregate in great numbers on the *Anacardium caracolis*, the *ochroma*, and the *myrodia*, on the banks of the Magdalena. Authors often confound the *Simia seniculus*, the *capucina*, the beelzebub, and the aragnato of the Orinoco

with each other. The last forms a new and distinct species, having the abdomen covered with hair. I shall designate it by the name of *Simia ursina, barbata, rufa, undique pilis longis tecta*. I have represented, in these designs, the larynx of the *Simia seniculus*

c, Larynx of *Simia Edipus*, opened ; d, do. closed.

open and shut to show how the larynx rests upon the bony tambour of the os hyoides, and how the air driven from the lungs enters the six pouches which I found in this animal. The osseous box of the os hyoides, measured by means of water, was found to have a capacity of more than four cubic inches. The larynx is slightly attached to it by some muscular fibres, and has communication with it by a broad membranous canal. The interior of the larynx consists of six pouches, two of which are in the form of pigeons' nests, having the valves two lines long, and from three to five deep. These pouches resemble those of the small whistling apes, those of the squirrel, and of some birds; they have the opening from above, on the same side as that of the glottis, so that the air cannot enter them except by closing the epiglottis; they present transverse muscular fibres, very red, and of a dense texture. Above these pouches, there are two others, the lips or borders of which are yellowish and fatty: these are pyramidal sacs, and enter nearly to two-thirds into the osseous box, and are formed by membranous partitions. The air forced into these sacs, which are three or four inches long, and terminate in a point, comes, at no part, in contact with the bone of the tambour: their opening is from beneath. The fifth pouch is in the rima, formed by two tuberosities of the arytenoid cartilage: it is situated between the two pyramidal sacs; it has the same form, but it is shorter by one third. The sixth is formed by the osseous tambour itself, in which the voice evidently acquires that lugubrious and plaintive character so remark-

able in these animals ; this larynx of the *Simia seniculus* is much more complicated than that of the orang-outang, which Camper has described, and which has attracted so much the attention of anatomists.

A CHAPTER FROM THE ALPHABET OF BIRDS.

ON THE LEGS AND FEET OF BIRDS.

ON comparing the legs and feet of birds with those of man, we find that the bones differ considerably in number, and in relative length, as may be seen in the figures.

Comparative view of the leg and foot in man and birds. *a, a*, the thigh bones * ; *b, b*, the leg bones † ; *c, c*, the heel bone ‡ ; *d, d*, the shank bone § ; *e, e*, the bones of the foot || ; *f, f*, the bones of the toes ¶ ; *g, g*, the knee.

* In Latin, *Femur*.

† In Latin, *Oss calcis*.

|| In Latin, *Ossa metatarsa*.

‡ In Latin, *Tibia* and *fibula*.

§ In Latin, *Ossa tarsi*.

¶ In Latin, *Phalanges*.

In the bird, the thigh is very short ; and the knee, which has no kneepan * in diving birds and some other genera, bends so high up that it is in most cases concealed by the feathers. The most conspicuous bone, which I have termed the shank-bone, has been variously considered by naturalists, according to the views which they have entertained respecting its analogy with the bones of other animals. The Emperor Frederick II. and Belon seem to have been among the first to compare the shank-bone with the heel ; Borelli terms it a foot-leg † ; Merrem, Herrmann, Wiedemann, and Daudin, take it to be the heel ; Vicq d' Azyr and Blumenbach consider it only a foot-bone ; while Stenson, Cuvier, Tiedemann, Ranzani, Savi, Carus, and Meckel, think it is partly a heel, and partly a foot-bone ‡. The arguments for the last opinion are derived from refined and fanciful analogies of what is termed *representation*, upon which it is not important to decide. Though the thigh, however, is often called the leg, the word leg is at table generally applied in the way adopted by M. Le Vaillant and other naturalists.

The lower extremity of the shank-bone has a projection corresponding with each toe, and forming a sort of pulley to act as a moveable joint. There are, consequently, three such pulley-like projections in most birds ; but only two in the ostrich, which has not more than two toes. In all birds that have four toes, with the exception of the swift, the back toe has but one bone ; this back toe acting, as Willughby observes, in place of a thumb. Birds have their toes for the most part, proportionally much longer than other animals, while they are brought more under the general centre of gravity by the bending of the thigh upon the leg.

The muscles which bend the parts of the leg and foot, are considerably different in birds from other animals, and consist of three masses. The first is in two portions, of which one arises from the outer knob § of the thigh bone, and the other from its hinder surface, running down to be inserted in the toes. This is connected, by fibres, with another muscle, which arises from the inner side of the thigh, runs over the knee down to the toes, where it is inserted so as to bend them when the thigh and the heel are bent.

* In Latin, *Rotula*.

† In Latin, *Crus-pedale*.

‡ In Latin, *Os tarso-metastarso*.

§ Technically, *Condyle*.

Muscles which bend the leg and foot of birds. *a, b*, the muscle arising from the head of the thigh bone; *c, d*, the knee over which it runs; *e*, its passage over the heel, and along the shank; *f*, to the toes, *g, g, g, g*.

In consequence of this curious mechanism, a bird is more perfectly at rest when standing than in any other position; for by letting the weight of the body fall on the thigh, this is not only bent itself, but without effort bends the toes inward, so as to grasp the bough of a tree, or whatever the bird stands upon. As the toes will also grasp more strongly in proportion to the weight thrown upon them, it follows, that by throwing the whole weight of the body upon one leg, rather than on both, the bird will be fixed more securely; and hence it is that birds most generally rest, or sleep, standing on one foot, with their head turned back, behind the wing, to throw the greatest possible weight directly over the leg.

The objections made by Vicq-d' Azyr and Barthez to this ingenious explanation, first given by Borelli, have been refuted by Dr. Barelay.

Most of the smaller birds, such as sparrows and magpies, hop or skip, but some walk by moving the legs alternately, as the larks, wag-tails, and the blue breast. The bullfinch and the tits walk sideways, up and down branches. Rooks and jackdaws swagger in their walk, and the stork throws out its feet in a stalking manner, while all poultry walk with a parading and not ungraceful strut, very different indeed from the awkward roll of the goose, or the waddle of the duck. In water birds, the bone of the shank is thin, and the skin sharp, while on bringing forward the foot, the toes close behind each other, so as to present but a small surface, and hence, in swimming, little velocity

is lost, though the foot is not, like an oar, raised out of the water at every stroke.

It has been supposed from the time of Gesner and Aldrovand to be peculiar to climbing birds, to have two toes before and two behind ; but this opinion, though adopted by Cuvier, Temminck, Lesson, and most modern naturalists, is founded on inaccurate generalisation, for several species such as the cuckoo and the wryneck, though they have their toes thus constructed, never climb, while other species which do climb have three toes before and one behind. The swift has all the toes placed forwards, by means of which it can cling to walls, and on entering a narrow crevice, as under the tiles of a church, it can turn up edge-ways and crawl to its nest. On account of its very short legs, the swift is termed "footless *," in books pretending to science, as is the great bird of Paradise, though it really has very large feet before they are cut off previous to exportation.

The fleetness with which some birds can run is very remarkable. I have often been compelled to give up the pursuit of young curlews, solely because they outran me ; but this is nothing to the speed of the great bustard, which, was wont to be hunted on Salisbury Plain and elsewhere, with greyhounds ; and even the bustard is far exceeded by the ostrich, which in the words of Job, when "she lifteth up herself on high, scorneth the horse, and his rider."

Among smaller birds, the partridge, the quail, and the corncrake are very swift in running.

RETROSPECT.

BY EDWARD BLYTH.

THE following errata in the paper on the British fruit eating warblers, published in the *Field Naturalist's Magazine* for July last, it would be as well here to correct. In page 315, line 17, for "song," read *song-thrush* ; line 37, for "of," read *and* ; page 316, line 25, for "merely," read *much* ; line 28, for *furze-warbler*," read *furze-warbler's* ; page 318, line 21, for "common," read *appellation* ; and at page 309, line 38, add, after "birds," the qualifying clause, *when seen at some height from the ground*.

The great length to which these remarks on the British *Ficedulæ*

* In Latin, *Apus*.

were extended, prevented me from mentioning a variety of minor particulars connected with these birds, which would, I conceive, be interesting to many persons who are desirous of becoming intimately acquainted with the Natural History of the British islands. I will not, however, at present, enter much into detail on this subject, but will confine myself here to a few observations which might, perhaps, have been as well inserted in the paper to which I have referred.

A gentleman, on the accuracy of whose observation I can depend, informs me, that he observed last April, a female blackcap (*Ficedula atricapilla*), singing with as much energy as the male bird; that he several times distinctly saw its rust-coloured head, and heard it more than once burst forth into the well-known loud song of its species. What was particularly remarkable, this individual had commenced *nidification* in the bush upon which it was seen to sing.

That various female quadrupeds and birds, when past a certain age, acquire much of the outward appearance, and many of the habits of the male, is a fact that has been long familiarly known to naturalists.

I have, myself, seen two or three instances wherein the common hen, when past the age for laying, has assumed the pendent tail and gaudy plumage of the cock, and has even crowed aloud, and strutted about the yard with the same jealous-looking and haughty demeanour. Such birds I have more than once seen in the London markets, for sale, where they are known by the somewhat anomalous name, *hen-cocks*; the small comb and wattles still giving a feminine appearance to the head. The hen pheasant and the pea-hen have often been known to undergo a similar change, and I have seen the skin of an old female blue breast (*Pandicilla? Suecica*), in which the patch of blue feathers on the breast was considerably larger than what is usual in the females of that bird. We need not, indeed, look beyond our own species for ample illustration of this curious tendency in nature. When old age has arrived, and the powers of reproduction have ceased, do not the breasts often flatten, the pelvis contract, signs of a beard begin to appear on the chin and upper lip, &c.? Does not, in short, the whole general structure of the body assimilate strikingly to the male? This tendency in old age, indeed, must be familiarly known to everybody who ever observes at all the various natural phenomena, which are constantly presented to our notice: but the above-mentioned instance of the female black-cap, singing, cannot be attributed to old age, for the individual was ascertained to have a nest: indeed, age would probably have

clothed it in the dissimilar plumage of the cock bird. Mr. Sweet informs us of a hen nightingale which he "kept four years, without its even attempting to sing; the fifth year it sang frequently, a pretty soft nightingale's note." He adds, "I have found that the case with several female birds; they do not sing till they become aged: but it is *not* a general rule, as I have had a female willow-wren (*Sylvia trochilus*), that sung when quite young." To this I can add an instance of a thrush (*Turdus musicus*), one of the finest songsters I ever heard, and which was always considered to have been a male bird until it was two years old, when an egg was found in the cage, and two days afterwards another. We have here, therefore, three authenticated instances of a curious deviation from ordinary rule, which, not improbably, occurs much oftener than we are aware of. There are, however, some small birds in which both sexes are endowed with the same musical powers; as examples of which may be adduced the common bullfinch of this country, and the cardinal grosbeak (*Guarica cardinalis*, SWAINSON) of North America. The female red-breasts, also, I am inclined to suspect, sing during the winter months; at least, I have never yet noticed a red-breast in the winter that did not sing, after I had taken the trouble to watch it for a few minutes. The fact, however, may be easily enough ascertained by dissection.

I have before had occasion to advert to the extremely quarrelsome and domineering disposition of the babillard or lesser whitethroat (*Ficedula garrula*), when in confinement. Though small in size, this species is generally master of the aviary it inhabits, whatever may be the size of its companions. I have known this little bird attack, and completely persecute many species very much its superiors in size, and apparently in force; amongst which, might be enumerated the bramblefinch, the bullfinch, the redbreast, the nightingale, and even the oxeye (*Parus major*); but it soon ceases its attacks when any of them attempt to retaliate. The most inveterate antagonist which my babillard has to encounter is the small redpole finch (*Linaria minor*), a species of about the same size as itself, and, in my individual, of an equally pugnacious disposition. These two little birds have fought many a well contested battle with various success; until, at length, each seems to have acquired a proper respect for the other's prowess; at any rate, it is now some time since I have heard of their contending. The furze-warbler (*F. ulicicola*), though equally animated and lively with the babillard, is of the same quiet, amicable disposition

as the whitethroat, living in perfect harmony with its own species, and with every other bird. This species may very easily be recognised when wild, amongst the furze, by its restless activity, and by its very dark colour; appearing, as it flies, considerably darker than even the common dunnoek (*Accentor modularis*).

I may as well here avail myself of this opportunity, to correct a variety of errors, &c., which have occurred in the course of my several papers in the *Field Naturalist's Magazine*. In the No. for January, at p. 22, line 28, instead of "back," read *barb*; and the preceding passage on the feathers of the stonechat's *back* should be erased; for although, in the specimen from which the remark was inconsiderately drawn, the fact was as there represented, the contrary is the case with regard to the species generally.

No. for February, p. 78, line 26, for "pallets," read *pellets*. A flusher, in this neighbourhood, was lately seen to seize an adult cock chaffinch; but, on the sudden approach of my informant, was compelled to relinquish his victim.

See No. for March, p. 130. Two instances have come to my knowledge this season of the grosbeak or hawfinch, (*Coccothraustes crataegi*) breeding in this country. There is, at the present time (July 10,) a brood of young hawfinches flying in the garden of one of my neighbours, one of which has been shot for my collection. The nestling plumage of these birds is worthy of remark; there is a strong tinge of yellow about the head and throat; the rump and all the under parts are of a brownish cream colour, with a number of small, transverse, dark brown spots on the belly and flanks, not much unlike those on a hen missel thrush (*Turdus viscivorus*); a small line of similar spots proceeds downwards, from each corner of the mouth, and curving slightly inwards, traces the outline of what in the adult bird is a large black spot, and the wing is without the ash-coloured cross-band which distinguishes the species when in full plumage. This bird is described as "subject to great variety of plumage," but the variation is, I suspect, subject to fixed laws, and indicative of the age of the individual. As in the babillard (*Ficedula garrula*), it is probably two years, or more, before the iris of the eye becomes perfectly white; and I have observed that individuals which want the ash-coloured cross-band on the wing, have always the iris more or less coloured. Many birds (but not all, as the jackdaw for instance,) do not change the wing and tail feathers until the second moult, and this is probably the case with the hawfinch, which consequently does not assume the band on the wing until its

second general change of plumage, by which time the iris has nearly lost its colour. The specimens in which the top of the head is described as "whitish surrounded by rufous," were probably aged individuals, and those which are mentioned as partially, or wholly black, were most likely such as had fed much upon hempseed, which is well known to have that effect upon the plumage of many birds in confinement, and to my knowledge, no species is fonder of hempseed than that now under consideration. The young hawfinches, in my neighbour's garden were first discovered by the great havoc which they committed among the green peas, and since one of their number has been brought down by the gun, they have become extremely shy and suspicious.

I think I may here safely record another instance of the parrot-cross-bill (*Loxia pytiopsillacus*), occurring in this neighbourhood, three winters ago. The specimen was not preserved, having been unfortunately destroyed by a cat; but the very minute description which I received of its size, and the peculiar structure of its bill, (which differs from those of its congeners in the crossing point of the lower mandible not reaching so high as the ridge of the upper one,) plainly indicated the bird to have been of this species; and on my showing plates of the different *Loriæ*, the *L. pytiopsillacus* was at once selected as the kind which my informant had shot.

No. for April, page 187. The account here given of a hawfinch which I kept some time in confinement, together with remarks "on the stomachs of birds," page 90, and on caged birds, page 190, with various other short anecdotes, &c. interspersed through the several numbers of this periodical, were extracted from a series of letters on Natural History written by me some time since to the editor. The hawfinch's song I have not as yet been able to ascertain; the individual above-mentioned contrived somehow or other to break his leg in such a manner, that it was thought necessary to have him killed, and I have not since succeeded in procuring another. The song of the brambling (if song it can be called) is extremely simple and monotonous; a few low chattering notes, varied occasionally by a harsh, dissonant call, is all the melody which this handsome finch can boast of. The call-note is not unfrequently uttered when the bird is not singing, and, with the exception of its simple song, is the only sound I have ever heard from this species.

What the *generic* name of the brambling and the chaffinch is, according to modern nomenclature, I have never been able to learn: the term *Fringilla*, used by the earlier naturalists to designate a numerous

and varied host of species, is now, I believe, restricted to that particular group, or genus of finches, to which the canary bird (*F. canaria*) belongs; and I know of no *generic* name that has been applied hitherto, exclusively to the chaffinch genus. The appellation *Spiza* is, I think, the most appropriate, and the best that could be affixed to these birds, the common chaffinch being undoubtedly the *σπιζα* of Aristotle; but the term, *Spiza*, unfortunately, has already been employed by Bonaparte to designate a genus of American birds (the painted bunting or nonpareil finch, *Emberiza ciris*, WILSON, and its immediate congeners), and according to the generally received rules of nomenclature, that genus must retain the name first given to it, however inapplicable and inappropriate it may chance to be; but the time must finally arrive, when a complete and thorough alteration will take place throughout zoological nomenclature, and I consider it now to be almost the duty of every lover of Natural History to endeavour, as far as he is able, to improve the systematic arrangement of the various productions of nature. The chief bar, however, at present, to all improvements in classification, is the confusion which is caused by calling the same species by various and different names; but this confusion may, in a great measure, if not entirely, be prevented, by adding to the approved systematic name of an animal, that also by which it was first known and described in systematical nomenclature. Thus, speaking of the birds now under consideration, we might say “the chaffinch (*Spiza leucoptera*, *Fringilla cælebs*, LIN.), the brambling (*Spiza montana*, *Fringilla montifringilla*, LIN.), or the ring-ousel (*Petrocincla meruloides*, *Turdus torquatus*, LIN.), &c.” If this simple plan were to be generally pursued in books, there would, of course, be no further necessity for swelling the pages of natural history with those immense lists of intermediate synonymes, with which they are now so frequently clogged and rendered tedious. To return, however, to the retrospect; instead of “mule,” at page 188, line 7, read *mute*.

No. for May, page 197, line 4, erase the first “or;” page 200, line 22, for major,” read *magna*; page 202, line 4, erase the commas in the nightingale’s *concluding* note, as I have there endeavoured to express it; and in a few lines afterwards, place a comma between the notes *water-bubble* and *whitlow*; not to write down these notes at all would be much better than to express them incorrectly. At line 19, also, a note has been printed “*curre*,” instead of *carre*. As this paper “on the nightingale” is merely the continuation of that at page 134, written at the same time, it will account for the latter concluding so very

abruptly. What further remarks I have to make on the history of this celebrated bird, want of space here compels me to reserve for another opportunity. At page 235, line 21, for "black," read *white*; and at line 26, erase the word *crimson*.

No for June, page 263, line 22, for "builds," read *build*; page 268, line 5, in a note which I have endeavoured to express in writing, the commas should be reversed: one should be placed after the sound "*pee*," and all those after "*vi*," should be erased. The tame cole-tit, whose habits I have there described, is since dead, but the degree of familiarity which he in time attained was most extraordinary: he would follow and play with a piece of thread for ten minutes together, like a kitten, and perform a variety of other little diverting duties, in many of which he exhibited a singular and most unexpected quantum of sagacity, quite surprising in so minute a creature. It is worthy of remark, that the cole-tit has a larger head, in proportion to its body, than any other small bird we have.

Tooting, Surrey, 17th July.

RURAL GLEANINGS.

BY SOLITARIUS.

It is amusing to observe the wide difference which frequently exists between the disposition of animals of even the same species. At the house where I am at present staying, there is a bantam cock which is so deficient in point of courage (for which this breed of fowls is so very famous), that he avoids and keeps at a distance from the other cocks, and runs away like a coward whenever they approach. Yet this bird, although wanting in natural courage, is in other respects more daring than his companions; for whilst they run away from every stranger in human shape, he keeps his ground and will fight for a long time with one's foot, if it be presented to him in a menacing manner. The display of affection manifested by parent birds for their young has often attracted the attention of mankind. Passing by a hen the other day, she was so solicitous for the safety of her brood, that she flew up at me as high as my chest. White has well remarked that "a hen become a mother is no longer that placid bird she used to be," and that

“every hen is in her turn the virago of the yard, in proportion to the helplessness of her brood, and will fly in the face of a dog or sow in defence of those chickens which in a few days she will drive before her with relentless cruelty.” The following affords a pretty good instance of sagacity in fowls:—A few days back a Dorking cock and his numerous wives being assembled round a tub (which is sunk in the ground for the ducks to bathe in), I flung a piece of bread on to the middle of the water’s surface to see what they would do in that case to obtain it. At first they strutted round and round the tub, trying at different sides to reach it, but after many attempts, finding their endeavours unsuccessful, all retired from the spot except the cock and one of the hens. The latter, after eying the desired morsel for some time, and apparently considering how to get it, at length hit upon this ingenious expedient: placing her beak down to the brink, she sucked up the water, and thus formed a current whereby the piece of bread was attracted towards her, but very slowly; which the cock perceiving, he ran round to the opposite side and commenced fanning his wings, and did not cease doing so until he had blown it over and within the reach of the hen, who soon swallowed it up.

It is a curious and well known fact, that many male animals, instead of being proud of their offspring and anxious for their care and preservation, will treat them with such relentless cruelty as often terminates with the death of their helpless victims. A duck lately hatched a brood in which she seemed to take much pride; but the drake, considering, it would appear, that he was neglected by her on account of her attention to her ducklings, had, it seems, determined upon their destruction. He was found the other day with one end of a little duckling in his bill, whilst the duck held the other extremity in hers, the former endeavouring to gain possession of it, and the latter anxiously trying to retain it. A stop was however soon put to this game of “pull devil, pull baker,” by releasing the object of contention from its perilous situation. As I have now noted all worth noting relating to animals domesticated here, I must now speak of those enjoying the sweets of liberty in the neighbouring fields.

At Snaresbrook, about a week ago, I witnessed an instance of great tameness in the robin, certainly very remarkable when we consider that it is rarely but in the winter that it makes itself familiar with man. A gardener was filling a wheelbarrow with dead leaves and other rubbish, which he was busily employed in sweeping up into a heap, when, whilst thus occupied, and not farther distant from his barrow than three feet, a robin continued hopping about the inside of

it, and searching for food amongst its contents. Although it flew away to a little distance as each successive spadeful was flung into the barrow, yet it returned as soon as the dust arising from it had subsided. Your very entertaining and well-read correspondent, Mr. Blyth, speaking of the robin (*vide* page 290), says it has "a strange tremulous motion of the tail which has, I believe, never yet been noticed." He does not mean by this, I suppose, the common wagging of the tail, which, as White observed years ago, is always up and down instead of being from side to side; but I conceive that he alludes to what I have often observed although never recorded, which is that the robin's tail has a quick irregular vibration like that exhibited by a piece of watch-spring (or other elastic body) when held tight at one end and struck violently at the other. This motion of the tail is most frequently to be observed when the bird is suddenly surprised, or when apprehensive of danger.

Not far from Leyton I observed, a few evenings ago, a couple of swallows flying after a straggling rook, and snapping their bills in a menacing manner close to him. This he bore very quietly without attempting to retaliate, but was evidently at a loss what to do, for when he directed his course one way they intercepted his retreat, and when he made for another direction they did the same. By what means he had offended them and excited their wrath I cannot conceive. I have often read and heard, though, of swallows strongly uniting for the purpose of buffeting hawks and other similar birds of prey, whenever they may consider themselves in danger from them, and to this fact your correspondent *Ruricola* alludes in the fourth verse of his prettily written poem (*vide* page 321), but I doubt his accuracy in asserting that they treat the owl in a similar manner. I doubt the truth of it for two reasons*: first, on account of owls generally flying when the swallows have gone to rest, and secondly, because it is contrary to a law much observed in nature, which is that birds strictly carnivorous, rarely (and then only when their usual food fails them) prey upon other birds which are like the swallow strictly insectivorous, and who are as equally serviceable in lessening the number of insects as the former are in preventing the superabundance of noxious birds and quadrupeds. It is seldom indeed that the swallow has to attack the hawk, for it being thus wisely ordained that animals of similar utilities shall not prey upon one another, it is rarely that the hawk gives any cause for their ire. As they perform equally important and

* If *Solitarius* will try the experiment, as I have done, he will find *Ruricola* is quite correct.—*See Field Nat. Mag.*, page 2.—EDITOR.

useful offices, nature, it seems, sets as much value upon the life of the one as upon the other, and for the preservation of it she has not implanted any spirit of constant warfare between them; but when hunger threatens the destruction of the stronger, he then breaks the amicable bond, and preys upon the weaker.

Heronries are now very scarce in England, and the nearest to London of the few remaining is situated not far from this in Wanstead Park. This one, I am informed, for I have not yet visited it, is of long establishment and very populous, and the birds, I am told, are frequently seen flying many miles distant from the spot. Epping Forest is just now a delightful aviary, being inhabited by wood-pigeons, blackbirds, cuckoos, thrushes, woodpeckers, tree-creepers, tom-tits, yellow-hammers, greenfinches, chaffinches, nightingales, linnets, larks, bullfinches, butcher-birds, reed-sparrows, redstarts, wrens, and some few others. I find it extremely difficult to discover the nests of birds in this county, which I fancy are better concealed than in most places, for when I ornithologise in Kent, Surrey, or Middlesex, I find them easily enough and in plenty. I have however found one nest and only one, which is that of the reed-sparrow. I found it at Snaresbrook, situated among some reeds in a pond, but not fastened to them, being only supported by their pressing upon all sides of it, and concealed by loftier ones drooping over it. Externally it was composed of rather coarse hay, having withinside a lining of the same material, but of a finer and softer quality.

Upon the thorns of a furze-bush, a few days since, I found some bees and moths impaled by the butcher-bird, which, as all your readers are probably aware, receives its name from this butchering habit, to explain the reason of its practising which naturalists have not as yet been able.

Finding a mole boring into the side of a ditch, which I thought would be too damp a situation for it, I took it up in my hand and conveyed it to a drier soil in quest of a hole for it. Having discovered a hole which had evidently been excavated by one of its brethren, I placed its snout to the entrance, but it refused several times to enter it, being apparently reluctant to intrude into the dwelling of another, from whom it might not have anticipated a very cordial reception. But finding that I would not allow of its receding, and longer exposing itself to danger by remaining above ground, it at length made a speedy descent. This mole was, I observed, infested with fleas, very similar

to those which suck the human blood, except that they were of a dark black colour.

Of insects, which are new to me, I have collected several in this neighbourhood, but their names and the observations I have made upon them I shall reserve for a future paper. But I must however speak of one species of butterfly, the *Hipparchia Mægera*, which you informed me upon the wrapper of one of the numbers of this Magazine is one of the commonest in Britain, if not in Europe. Now those who confine their observations to any particular spot, soon learn that many things which are pretty well diffused all over the country, are scarce in the district of their researches. Let us look to London for an instance proving the truth of this observation. The ornithologist there finds the goldfinch a *rara avis*; the botanist notices that the hemlock is there comparatively scarce, and I, who have paid attention to the entomology of London for the last five years, know that although the *Hipparchia Mægera* may be common in most places, like the goldfinch and the hemlock, yet it is like them scarce in its vicinity. Now the goldfinch may be scarce on account of its being a desideratum among bird-catchers, and the scarcity of the hemlock may be attributed to the hemlock-gatherers; but how to explain the scarcity of this butterfly I know not. I have found it but once, and that was in Battersea fields, and I have this year searched Epping Forest and the neighbouring fields, but cannot meet with a single individual of this species, although others of the genus are extremely plentiful.

Last Sunday I found a black slug down a lane, voraciously eating a piece of orange peel, a food which I was previously not aware they would eat, although I have observed them eating fallen apples, plums, and pears.

To-day I found, hanging upon a low furze bush on the forest, the empty skin of a snake, which had been changed by the animal for a new one, as snakes, if I am not mistaken, are in the habit of doing. Could mankind change their skins in a similar manner, how many discontented folks who value skin-deep beauty more than mental cultivation, and who are more anxious to excel their neighbours in outward show than to compete with them in intellectual attainments, would instantly avail themselves of the opportunity if it presented itself!

MUSCULAR STRENGTH OF THE OYSTER IN RESISTING ITS ENEMIES.—The oyster, as is well known, is provided with a very powerful muscle, by the aid of which it can immediately close its shells with

such firmness as obstinately to retain any substance that may be placed in between to prevent their union. The following circumstance, which appeared in the *Hull Advertiser* a few months ago, affords an amusing instance of the exercise of this muscular power:—"Tuesday night the family of Mr. Jennison, fishmonger, Queen-street, were alarmed by a great noise in the shop, and suspecting some persons had broken in, one of them went to the place, when to his surprise he found the disturber of his repose not a human but a four-footed thief, namely a rat, who in helping himself to an oyster on the shop-board (as we are informed is the custom with this species), had his intruding paw so firmly clenched in the grasp of the assailed oyster as to render his escape impossible." In Borlase's *Natural History of Cornwall* is a quotation from Mr. Carew's *Survey of Cornwall*, giving an account of three mice being similarly caught by an oyster; indeed the case is nearly parallel to the preceding. He tells us of one "whose shell being opened as is usual at the time of flood (when these fishes participate and enjoy the returning tide) three mice eagerly attempted to seize it, but the oyster claspng fast its shell killed them all." The same writer also informs us of the cautious method employed by the lobster to procure the oyster from between its strong resisting shells, as he was informed by a clergyman of great veracity, who had the account from a creditable eye-witness to the fact. "As he was walking one day, a fisherman observed a lobster attempt to get at an oyster several times, but as soon as the lobster approached the oyster shut his shell; at length the lobster, having awaited with great attention till the oyster opened again, made a shift to throw a stone between the gaping shells, sprung upon its prey and devoured it." Most readers conversant with natural history, from the many instances on record are aware, I presume, that the monkey has recourse to the same ingenious plan to secure the oyster as its food. In Brown's "*Anecdotes of Quadrupeds*," we are told that "Gemelli Carreri, in his voyage round the world, relates a circumstance concerning the ouran-outang in his wild state, which is indicative of very considerable powers both of reflection and invention. When the fruits on the mountains are exhausted, they will frequently descend to the sea coast, where they feed on various species of shell-fish, but in particular on a large sort of oyster which commonly lies upon the shore. 'Fearful,' he says, 'of putting in their paws lest the oyster should close and crush them, they insert a stone as a wedge within the shell, and then they drag out their prey and devour it at their leisure.' Milo of old might have saved his

life had he only been half so wise." The instances with which I have furnished the reader are sufficient to show that the oyster which seems so inactive and harmless a creature, is in truth one of no ordinary strength, having sufficient to render its enemies extremely cautious how they assail it. Besides the rat, the mouse, the lobster, and the monkey, the oyster has other enemies to contend with, for the sea-star, the cockle, and the muscle also prey upon it; but its most universal destroyer, and the one from which it has the least chance of escape, is of that species to which the late illustrious Dando, of oyster-eating celebrity, belonged.

Laytonstone, July. 1833.

THE AURORA BOREALIS, OR NORTHERN LIGHTS, HISTORICALLY CONSIDERED.

BY RURICOLA.

Two of your former numbers contain some valuable observations on the Aurora Borealis; I beg leave to submit the following on the same subject, historically considered, for the purpose of correcting what I suppose to be an error, which has been for a long time in considerable circulation.

In Collins's posthumous "Ode on the Popular Superstitions of the Highlands of Scotland" is this passage:—

"As Boreas threw his young Aurora forth
In the first year of the first George's reign."

Upon which the editor of the Ode, in or about 1789, subjoins a note, copied in subsequent editions of Collins's poems, and among others by Mr. Pickering, in his Aldine edition of 1830, in these words:—"By *young Aurora* Collins undoubtedly meant the first appearance of the *northern lights*, which happened about the year 1715; at least it is most highly probable from this peculiar circumstance, that no ancient writer whatever has taken any notice of them, nor even any modern one previous to the above period."

That "the first appearance of the northern lights happened about the year 1715" would be hardly credible, considering the nature of the phenomenon, even if they had not been previously noticed by any

ancient or modern writer. But in truth they had been previously so noticed, and in one instance by an author who was a great favourite of Collins himself, if, to adopt his own language—

——— “ If not with light regard,
I read aright that gifted bard,
Him whose school above the rest
His loveliest elfin queen has blest.”

I allude to Spenser, who, in his “ Faerie Queene,” thus describes Britomart in a passage so beautiful in itself, and containing so apt and uncommon a comparison, and withal so curious in its application to our subject, that I take leave to insert the whole stanza:—

“ With that her glistening helmet she unlaced,
Which doft, her golden locks, that were upbound
Still in a knot, unto her heels down traced,
And like a silken veile in compasse round
About her backe and all her bodie wound.
Like as the shining skie in summer's night,
What time the days with scorching heat abound,
Is crested all with lines of firie light,
That it prodigious seems in common people's sight.”

F. Q. iv. i. 13.

It must be, I think, sufficiently obvious to every reader of this extract that, as Dr. Jortin remarks upon it, “Spenser here gives a description of what we call *Aurora Borealis*.” And I think it also sufficiently obvious that the appearance had not escaped pretty general observation in Spenser's time, though “common people” were puzzled to account for it. Now the fourth book of the “Faerie Queene” was published in or about 1593, and written but a short time before, which is about 122 years previous to “the first year of the first George's reign,” the supposed period of “the first appearance of the northern lights.”

But in the recent edition of White's “Natural History of Selborne,” by Captain Thomas Brown, Edinburgh, 1833, occurs the following note by the editor in reference to the *Aurora Borealis*, which White describes as having “made a particular appearance, Nov. 1, 1787.” The editor says, “At what time this meteor was first observed is not known; none are recorded in the English annals till the remarkable one which happened on the 30th of January, 1560: another very brilliant one appeared in 1760.” It may be noticed, in passing, that the

earlier date, assigned in this note to the phenomenon, is more than thirty years prior to the publication of the "*Faerie Queene*," and of course more than 150 years prior to the date mentioned by Collins's editors.

With submission, however, to the writer of the foregoing note, to whom I feel obliged for many curious observations in his edition of White's *Selborne*, several examples of the meteor in question are recorded in the English annals at much more early periods than he supposes. For instance, the phenomenon is described by our historians, Matthew of Westminster and Florence of Worcester, as having occurred in the years 555, 567, 743, 776, 926, and 979. The terms which they employ for describing it are respectively "appearances, as it were of lances, seen in the air from the north as far as the west"—"fiery spears seen in the air"—"fiery beams seen in the air, such as the men of that age had never before beheld"—"seen in the heaven after sunset red signs and horrible"—"fiery rays seen all over England in the northern quarter of heaven"—"a cloud seen at midnight all over England, sometimes blood-red, sometimes of the colour of fire; and afterwards being disparted into rays, and changed into sundry colours, it disappeared about day-break." And in some of the instances they speak of the phenomenon as portending future events; according to Spenser's remark, "that it *prodigious* seems in common people's sight."

The reader who is desirous of seeing the original Latin of these extracts, if the works of the annalists are not easily accessible, may refer to an article in the *Gentleman's Magazine* of 1756, by the late eminent antiquary, Dr. Samuel Pegge, whose observation on the last cited example is as follows:—"These lights, it seems, were seen all over England, and lasted till very late in the night; at first it was one body of light (*nubes*), but changed its colour from red to white, or rather fire-colour; afterwards was disparted into rays or streamers of various colours, just as the *Aurora borealis* is known very often to do."

The foregoing examples of the *northern lights*, as recorded by our early annalists, occurred at times before the Norman Conquest. For examples since that period I refer to the *Saxon Chronicle*, as edited and translated by the Rev. Dr. Ingram, Oxford, 1823.

"A. D. 1098. Before Michaelmas the heaven was of such a hue, as if it were burning nearly all the night," p. 318.

"A. D. 1117. Also in the night of the 17th day before the calends of January was the heaven seen very red, as if it were burning," p. 338.

“A. D. 1122. After this there were many shipmen on the sea and on fresh water, who said that they saw in the north-east, level with the earth, a fire huge and broad, which anon waxed in length up to the welkin, and the welkin undid itself in four parts and fought against it, as if it would quench it, and the fire waxed nevertheless up to the heaven. The fire they saw in the day-dawn, and it lasted until it was light over all. That was on the 7th day before the ides of December,” p. 343.

“A. D. 1131. This year, after Christmas, on a Monday night at the first sleep, was the heaven on the northern hemisphere all as if it were a burning pile, so that all they who saw it were so dismayed as they never were before. This was on the 3rd day before the ides of January.” p. 361. The learned editor remarks on this last appearance “Aurora Borealis, or the northern lights;” and I presume the same remark to be equally applicable to the other instances of red and fiery appearances in the heaven.

To the foregoing may be added one other example from another of our annalists, who records the following appearance with reference to the year 1173:—“On the ides of February there appeared in the heaven a wonderful sign soon after midnight; for a certain redness was seen in the air between the east and west in the boreal region. And athwart that redness were white rays, which now slender like lances, and now broad like tables (or boards), now here, now there, were raised high from earth as it were up to heaven. The aforesaid rays were shining white, as the rays of the sun when they pierce a very thick cloud; thereupon there followed a lightsome brightness, like to the summer dawn (*auroræ similis æstivæ*) when it clearly brightens into day. At last there was lifted up from the earth as it were, in the same quarter, a very thick blackish cloud, which spreading onwards by slow degrees overshadowed that daylight.” The original Latin may be found in the appendix to the life of King Henry II, vol. vi. p. 436, 2nd edit. by George Lord Lyttelton, who remarks upon it, “It is hardly possible to give a more exact description than this, which Gervase of Canterbury has delivered down to us, of an *Aurora Borealis*, a phenomenon then unusual in these parts of the globe, but of late much more frequent.”

Thus I apprehend it to be clear enough, that the meteor in question not only had *appeared*, but had been often *recorded* by our annalists as well before the year 1560 as before 1715. With respect to the latter period, Dr. Pegge, in the paper before cited, observes, “The lights that appeared

then were very extraordinary, and happened at a very critical time, which occasioned their being taken notice of, as also their being mentioned by our historians, to which I may well add that none so copious or remarkable had probably happened for many years before." In this last suggestion, as to the copiousness of the lights, the learned writer is perhaps warranted by the fact; but I would specify one example of the phenomenon, which was discovered about $7\frac{1}{2}$ years before the date in question, in this part of the British isles, and which is thus described under the title of "A Northern Streaming, by Mr. Neve, of Maghrafelt in the north of Ireland," county of Londonderry. I copy it from "A Natural History of Ireland," published by George Grierson, Dublin, 1726; and I believe that it may be found in the Transactions of the Royal Society, but for what year I know not.

"On Sunday, Nov. 16, 1707, after a frosty morning and fair clear day, wind north westerly, about half an hour after eight in the evening, there appeared a very strong light in the north. The evening was clear and starlight, only the horizon was darkened with condensed vapours in the north, reaching, I guess, ten or fifteen degrees above the horizon. Out of this cloud proceeded several streams or rays of light, like the tails of some comets, broad below and ending in points above. Some of them extended almost to the tail of *Ursa minor*, and all were nearly perpendicular to the horizon, and it was as bright as if the full moon had been rising in the cloud. But what I wondered at most was the motion of the dark and lighter parts, running strangely through one another in a moment, sometimes to the east and sometimes to the west. It continued after I first saw it about a quarter of an hour, often changing its face and appearance as to form and light; sometimes broken, sometimes entire, and long rays of light in the clear sky, quite separate from and above the cloud, and none below in the cloud," page 126. The next page contains an account of "An Aurora Borealis at Dublin, by an Unknown Hand;" but the year of its appearance is not stated, so that I cannot say whether it was observed before "the first year of the first George's reign," or at or after that epoch. It seems, however, to have been of great brilliancy and beauty.

This very curious phenomenon is much more known in the present age than it was a century ago, perhaps from the more general spirit of inquiry and habits of observation, and from the greater facility of disseminating intelligence, as well as from the fact of the phenomenon itself being, according to the prevailing opinion, of more frequent occurrence. I remember to have seen it in Sussex, not far from Chichester, in December, 1804; and at sundry times and in various places in the

interval, especially within the last ten years in this neighbourhood, and in Dublin, and most of all in the northern part of the county of Antrim, near the coast of the great northern ocean. Your correspondent from Dundee, I perceive, states himself to have made his observations upon it on no less than ten different occasions between August 13, 1828, and March 21, 1833, being not quite five years. However, this is out of the way of my proposed object in the present communication, which was to lay before your readers sufficient evidence of the *Aurora Borealis* having appeared, and of its appearance having been recorded by our annalists and other writers long and often before the period to which it has been inadvertently, I apprehend, and improperly assigned.

In the foregoing inquiry I have confined myself to the subject as connected with our own writers. If the *Aurora Borealis* has not been noticed by the writers of classical antiquity, the omission is easily accounted for by their remoteness from the climates where it might be expected to appear. There are those, however, who are of opinion that it has not been unnoticed even by such writers. In illustration of the martial character attributed by our old annalists to the phenomenon, and of its being thought predictive of great political events, Dr. Pegge has cited a passage from the first Georgic of Virgil, where the poet, enumerating the several prodigies that preceded and betokened the death of Julius Cæsar, mentions a sound of arms in the sky, heard, not in Italy, but in the more northern regions of Europe.

“Armorum sonitum toto Germania cœlo
Audiit.”

“The noise of battle hurtling in the air
Germania heard.”

Upon which passage Heyne, in his edition of Virgil, notes that “Arms are often related to have been seen in the sky, a superstition which appears to have derived its origin from the *Aurora Borealis*.” And the late Professor Martyn, in his translation and notes to the Georgics, having remarked that “Ovid speaks of the clashing of arms and the noise of trumpets and horns,” and that “Appian also mentions great shouts in the air, and clashing of arms, and rushing of horses,” adds “Perhaps this was some remarkable *Aurora Borealis* seen about that time in Germany. The learned M. Celsius, professor of astronomy at Upsal in Sweden, has assured me that in those northern parts of the world, during the appearance of an *Aurora Borealis*, he has heard a rushing sound in the air, something like the clapping of a bird’s wings.

Before these phenomena were so frequent among us as they now are, it was no unusual thing for the common people to take them for armies fighting in the air."

I am aware that the noise, which is said sometimes to accompany this meteor, is not at all times observable. Thus Captain Parry, in his third voyage for the discovery of a north west passage, chap. 3, relates, "We frequently listened for any sound proceeding from this phenomenon but never heard any;" and accordingly the fact has not only been questioned, but the possibility of it denied. The testimony of other eye-witnesses, however, is certainly in favour of its sometimes emitting a noise. The experience of Professor Celsius has been stated above; to which I would annex the following from the Quarterly Review, vol. xix. p. 316;—"Dr. Henderson says, 'when they are particularly quick and vivid, a crackling noise is heard, resembling that which accompanies the escape of the sparks from an electric machine.' Sir Charles Giesecke, who had frequent opportunities in Greenland of observing them streaming forth with peculiar brilliancy, has remarked that they sometimes appeared very low, when they were much agitated, 'and a crashing and crackling sound was heard like that of an electric spark or of the falling hail.' Gmelin gives a most terrific account of the effects of the Aurora Borealis on the borders of the Icy Sea: 'All the animals are terror-struck, the dogs of the hunters are seized with such dread, that they crouch on the ground, while the streams of brilliant light in every tint of the rainbow, 'crackle, sparkle, hiss, make a whistling sound, and a noise equal to that of artificial fireworks.' 'I have frequently,' says Hearne, a plain unostentatious traveller, 'heard them making a rustling and crackling noise like the waving of a large flag in a fresh gale of wind.'" These statements give probability to the opinion, that the *Aurora Borealis* was the appearance noticed at the time of Cæsar's death. But however this be, that the phenomenon has been often recorded by our own annalists seems indisputable.

Should any of your readers be disposed to peruse a poetical description of the *Aurora Borealis*, and of the superstitious terrors that have been excited by it, they may be gratified by turning to a passage of thirty-five lines in Thomson's Autumn, beginning, "But when half blotted from the sky," &c.; where, however, by representing it as an "appearance beautiful and new," the poet falls into the popular mistake which we have been now considering.

Holywood, Ireland, June, 1833.

CHAPTER OF VARIETIES.

INLAND GULLS.—Is it not unusual to find a gull so far inland as the neighbourhood of London? I was surprised last night in passing by the Serpentine to observe one floating on the surface, and sailing about in the air uttering its wild scream, just as when hovering over its sea-girt cliffs. Do you imagine that it was a tame one escaped from some private garden, or that it was driven inland by this tremendous gale we have just experienced. If you think the circumstance worth recording, you will perhaps notice it in your magazine.

I shall take this opportunity of sending you a few remarks on the habits of one of my companions, a squirrel, which I have hitherto delayed, from supposing that everything must be known with regard to so familiar an animal that is worth knowing, or putting into print. If in this account, you find anything new or of interest enough for your excellent magazine, so much the more shall I be pleased; I have had him for a year, and have brought him up almost from the nest, and a tamer creature it would be impossible to find. This squirrel shows a decided preference for warm places, either getting into my lap, under the bed-clothes, or (if allowed) contriving to creep into my pocket, where he will remain till disturbed. He is apparently very indifferent about mere exercise, frequently remaining in his cage the whole day, though this is not constant, for I have seen him out for several hours, and then his chief amusement seems to consist in running up and down a pair of steps, or other lofty thing in the room; moving like a pendulum in his cage; at intervals darting rapidly out of the door, and back again to repeat the motion; in climbing up to the heads of any persons in the apartment; in scratching himself almost incessantly (when uncaged); in hiding his food; in patting the table or other flat surface with his claws, which is done with a sudden twist of the body, at the same time making a sound which may be perfectly imitated by withdrawing the tongue suddenly from the roof of the mouth; the call-note, I suppose, among squirrels. He sits up also and rubs his face with his fore-paws, seemingly with the intention of cleaning it. After eating he rubs his nose against the carpet, first on one side, and then on the other; hiding what he cannot eat in some corner of the room, or under the edge of the carpet, and pushing it with

his nose as far as possible. His manœuvres to get a nut which he has placed in this manner under a fireguard, or other moving article, are sometimes extremely diverting; for though he may be close to the desired morsel, he almost invariably retires when he finds the pressure upon him increasing, and returns to the trial again, again to be defeated. Though he is generally careful of placing the thing hidden out of sight, I have known him to put it in the shadow of my boots, or that of a book, or even of a smaller article, as a pair of snuffers, and be quite content. In his cage he sometimes drops it in the water, and as I have seen him do this repeatedly with sugar, I presume that he relishes the water more afterwards. If he is allowed to climb on the table during a meal, he seems perfectly satisfied, and pries into every thing, hoping to find either milk or sugar, laps the tea or coffee, if not hot, and is very partial to butter. Fearing that I am becoming tedious, I shall here conclude with mentioning that, if thwarted, he, like many rational creatures, loses his temper, and seems nearly wild, but this ebullition soon ceases, and he is as quiet as ever.

June 11th, 1833.

WILLIAM FOWLER.

SQUIRRELS.—A very marked variety, if not a distinct species, of squirrel exists in England, which I do not find noticed by any author. It is, I think, generally, when full grown, rather larger and stronger built than the common squirrel, and the fur is much coarser, and of a very red colour; the tail also is more bushy and handsome, and the ears are rounder, and not furnished with those long hairs which adorn the ears of the common squirrel. It is now three or four years since I have seen one of these animals, so that this notice of it is merely written from memory. It may be procured occasionally in the London markets, where, at different times, I have seen upwards of a dozen of them; I once saw a nest of these round-eared squirrels, containing five young, in which the above mentioned characters were all as decided as in the adult animals.

Tooting.

E. BLYTH.

TREE AND MEADOW PIPITS.—In the writings of the earlier British naturalists, much confusion prevails respecting these two birds; it having been generally supposed that there were three species, which have been described under the names of the tree-lark, the titlark, and the pipit-lark. The true origin of this confusion has never yet been pointed out, although it has been long shown that one of these birds

had been multiplied into two species. Our later writers have supposed the provincial name "pipit," or "pipit-lark," to signify the meadow-pipit (*Anthus pratensis*) in its winter plumage, and the term "tit-lark" they have referred to the same species in its summer garb. This application, however, of the two provincial names is incorrect; the "tit-lark" of bird-catchers and bird-fanciers being the tree-lark, or tree-pipit (*A. arboreus*) of naturalists; while the meadow-pipit (*A. pratensis*) of naturalists is, at all seasons, and in every state of plumage, provincially known by the name of "pipit," or "pipit-lark."

Tooting.

E. BLYTH.

HABITS OF THE LAMPREY.—I hardly know whether the following observations on the habits of the lamprey are worth your notice; but as I do not recollect to have seen them mentioned elsewhere, they may be new to some of your readers. Many of the brooks in Surrey, particularly in the valley running from Guildford to Dorking, abound with this species of eel. They do not grow to a size exceeding nine inches in length, and seldom are so thick as the small end of the little finger; they have on each side of the head, in the place of gills, seven small orifices, through which they breathe, and which gives them the common name in the country of "nine eyes." I merely mention these facts, being myself no naturalist, to identify the animal to you. The mouth, when the creature is at rest, is of a very extraordinary form, and one which I cannot at all describe, but which is no doubt familiar to you. I was much struck, however, on a fine day some short time ago, to see in a small brook a number of these little animals very busy among the stones in the sunshine, and observing them closely, I found that they fastened by the mouth to stones of considerable size, and by strong muscular exertion, which was shown by a violent struggling motion of the body, accompanied by considerable dilatation of the small orifices at the side of the head, they succeeded in moving the stones from their places, and instantly letting go their hold, they commenced an investigation of the spot whence the stone was removed, feeding on any small insects which had made their haunts beneath the stone. I had one taken from the water and placed in a small bottle, when it fastened by the mouth to the side; the mouth then described a perfect circle, with an orifice in the centre, in which a tongue, of considerable size for so small a creature, and what appeared to be four teeth, were visible.—*Tavistock Square.*

* * *

ON THE MAY-FLY.—A very mistaken notion is prevalent in most places, with regard to the insect so well known to fishermen by the name of the may-fly ; and until very lately I also acquiesced in the popular error.

Most people, I believe, imagine that the cadis, which is to be found at the bottom and sides of every streamlet, is the may-fly in an imperfect and undeveloped state, and many fly-fishers, as well as other persons, are not aware of the incorrectness of the supposition. The grub from which the may-fly is formed, is to be found under the weeds which grow at the bottom of rivers, buried in a fine green sand, and presenting in every respect an accurate resemblance both in the head and tail to the perfect fly ; the growth of the wings being indicated by small pointed substances like the wing-cases on the back of an earwig.

The cadis, on the contrary, when drawn from its covering, does not present either in its head or tail any similarity to the body of the may-fly, nor is there the slightest appearance of the growth of wings ; and this is the case not only in February, March, or April, but even after the may-fly has been some time on the water ; neither is one cadis ever found in a greater state of forwardness than another, excepting as far as regards its size, which would not be the case if the fly was formed from that grub.

Besides which, numbers of cadis are frequently found in places where *it is notorious that the may-fly never rises at all* ; and that simple fact I should consider as a conclusive argument.

Perhaps it may be as well to state that one of the members of the fishing club at Stockbridge has caused the keeper to send a number of the may-fly grubs up to London in a box, that the truth of this assertion may be apparent.—D. M. *Devizes, 12th May.*

ON THE PECTINATED CLAWS OF HERONS AND NIGHT JARS.—Having observed, in the last number of the Library of Entertaining Knowledge, entitled “Habits of Birds,” the various conjectures of naturalists as to the use of the pectinated claws of certain birds, my attention was recalled to the subject to which it had been directed some time ago, when examining a bittern (*Ardea stellaris*) by finding in its stomach a number of the large water beetle (*Dytiscus marginalis*?). It struck me at the moment that the comblike structure on the claw was solely intended for disengaging the hooked feet of beetles from the bill, to enable the bird to swallow these insects. It appears to me indeed, that no better instrument could be devised for the purpose ; the

sharp serratures being admirably calculated for catching in the polished limbs of beetles. He who has attempted confining *Dytisci* or *Scarabei* in a collecting box, must be aware of the difficulty of getting their feet free from the edge, to which they hold with extraordinary pertinacity, one foot being no sooner pushed in than another is protruded. The experiment of putting into a pill box the common dung beetle (*Scarabeus Stercoraneus*) probably an insect often devoured by our night jar (*Nyctichelidon Europæus*) and endeavouring to remove its feet from the edge with a pectinated claw, will exemplify, I think, in a sufficient manner to convince the most sceptical, both the necessity of such an instrument to birds swallowing entire insects of this kind, and its surpassing efficiency for the use now ascribed to it. The kestrel (*Falco tinnunculus*) though feeding on beetles, does not require a pectinated claw, as it devours them piece-meal. The opinion, that the instrument is used as a cleanser from vermin, is not in accordance with the usual distributions of providence, so many birds from their habits of nesting, &c. having much greater need of a comb than those to whom it is supplied. The idea, that its object is to enable its possessor to perch more firmly, is refuted by the fact that the bittern always alights on the ground, and that the serrated edges of its claws never come in contact with it. The view I have taken is, I think, supported by the observations of White and Dillon, who saw the night jar repeatedly put its foot to its bill, as White conceived in the act of delivering prey into the mouth, having previously taken it with its foot, though this seems quite unfit for grasping. Dillon thought the movement was that of combing the bristles (*vibrissæ*) round the beak; a position not tenable, considering the many birds furnished with pectinated claws that do not possess bristles. I believe the act observed was that of disengaging the hooked feet of the bird's prey from its bill, for the accomplishment of which I conceive the pectinated claws were intended. If this be admitted it will supply the desideratum alluded to by Audobon, and, I trust, observation will establish its truth, which may be ascertained by any person who has a living specimen of one of the birds concerned, providing it with a meal of beetles, easily procured on a fine evening.—R. B.

Dublin, 10th June, 1833.

SCIENTIFIC TERMS OFTEN OBJECTIONABLE.—In the study of natural history, the use of scientific terms is justifiable; but in many instances they are introduced unnecessarily. We like jointed just as well as articulated, and see no need of such words as carinated, corne-

ous, crenated, coriaceous, dentated, emarginated, ferruginous, fluviatile, muricated, plicated, rugose, setaceous, striated, &c., when such good English words as the following would have served the purpose as well : ridged, horny, notched, leathery, toothed, &c., and perhaps we shall not be thought less classical for preferring the English cover or lid, to the Latin operculum ; the ordinary word partition, to the coined one dissepiment ; and the monosyllable beak, to the foreign dissyllable rostrum ; or for remonstrating against such a word as canaliculated, when channelled would have been much easier to pronounce, and quite as expressive. The word semitransparent is generally received ; in what respects is it inferior to the heterogeneous compound subdiaphanous ?—*Quarterly Journal of Education*.

NESTLING OF THE REDBREAST—A pair of robins chose for their abode, a small cottage, which though not actually inhabited, was constantly used as a depository for potatoes, harness, &c., and repeatedly visited by its owners. It closely adjoined a large blacksmith's shop, in which it may be truly said

“ That all day long with clink and bang
Close to their couch did hammer clang,”

and in which the usual din of such places, is considerably increased by the strokes of a hammer which would have baffled the strength even of “ Hal of the Wynd” himself to wield, and is worked by water. But neither the noise of the adjacent forge, nor the frequent visits of the owners of the cottage deterred these fearless settlers. They entered through a window frame, the lattice of which had been removed ; and in a child's covered cart, which, with its horse attached to it, was hanging on a peg over the fire-place, and just afforded space for the purpose ; they built their first nest early in the spring. The circumstance was observed, and soon became an object of curiosity to the neighbours, many of whom came to look at the nest ; these inquisitive visits, however, had not the effect of alarming the birds, who here reared without accident, their first brood. When the attention of the parents was no longer needed by their full-fledged offspring, they set about providing for another family, and built their second nest on a shelf on the opposite side of the room close to an old mouse-trap. Here again, they received visits of inquiry from bipeds of a larger growth, and reared and dismissed their progeny. This second brood had no sooner left them, than, as if mindful of their Creator's mandate,

"increase and multiply," they again betook themselves to the task of building a third nest under the same sheltering roof, and for this purpose chose another shelf, in a different corner of the same room, and there in their mossy bed on a bundle of papers on the 21st of June, I saw four half-fledged nestlings which the parent birds were feeding, while a party of us were watching their proceedings. I am wrong perhaps in saying the parent birds, for the hen alone entered the room while we were there, the cock bird contenting himself with observing us from the outside. There can be no doubt, that the same pair of birds belonged to each successive nest, as the loss of her tail rendered the hen conspicuous amongst her kindred in the neighbourhood.—J. R.

Bath, 10 July, 1833.

NATURAL THEOLOGY—PALEY'S DOCTRINE OF COMPENSATION.—To hold that the "compensatory providence of God," (an objectionable if not an incorrect term of itself, and not used by Paley), is one of the two principles which are to be traced throughout the works of nature, (*Nat. Theol.*, ch. xvi.), is in effect to bring down the faculties of the Divine Mind to a resemblance of, if not equality with our own imperfect powers. It is to admit the possibility of after-thought and improvement on works before made by an all-competent artist; for the very idea of compensation presupposes defect, and necessarily implies the supply of this defect by counteracting contrivances. And even if, for argument's sake, and with a view to the expression "compensating providence," as understood in its most literal sense, the Divine Architect be supposed to have counselled with himself previous to the actual formation of his creatures, it is rather a clumsy expedient to make him conceive the idea of a being having a structure inadequate to his intended functions, and then supply the imagined deficiency by a different species of mechanism. If the doctrine is designed merely to accommodate human views of nature, that is, to show the impressions which the various apparent contrivances of Deity make on our minds, it is scarcely correct to give it a place so conspicuous in a work on natural theology, or in an elementary treatise.—*Quarterly Journal of Education.*

REDSTART NOT RARE IN SCOTLAND.—I was surprised to see that the redstart was included among the scarce birds in Scotland, in an article on that subject in your magazine of last month; having always considered it rather common, not only in the neighbourhood of Edinburgh, but also in the more mountainous parts of Bamffshire. In the

latter locality, I used some years ago to observe it very frequently during the spring and summer months, and that too at a time when I did not take so great an interest in birds as I now do, and consequently was little likely to have noticed it, had it been of rare occurrence. I however, remember only to have once found its nest, which was situated in a hole of an old garden wall near the house in which I then resided.

In your edition of Colonel Montagu's Ornithological Dictionary, there is an account of one of these nests, which was constructed in a hole of a wall close by an old gateway at Craigcrook Castle; and I may mention, that in the month of May last, there was a nest of some small bird, in what appears to me to be the hole there alluded to. But the young had flown, and their nest had been destroyed before I had an opportunity of examining it, so that I cannot say what bird it was, though I am informed it was a redbreast. (*Sylvia rubecula*, LATHAM.)

I saw a redstart (*Sylvia phœnicurus*, LATHAM), at Craigcrook last month, and understand they have been numerous there this season; and that one pair built their nest in the garden, between the branch of a tree and the wall.—T. M. G.

Edinburgh, 4th July, 1833.

STEROPUS MEDIDUS.—Should you think the accompanying sketch of a singular specimen of *Steropus medidus*, in my possession, worthy of a place in the Field Naturalist's Magazine, it is greatly at your service.

I took the insect in my own garden, and was greatly astonished to find it had *eight legs*! the two extra ones articulated in contact with one of the usual middle legs, perfectly formed, though somewhat smaller than the other six. I have shown it to several collectors, who were much pleased and astonished at the sight; should any of your numerous readers have a wish to see this *lusus*, I shall feel much pleasure in showing it.—G. W. B.

Kensington.

NATURAL HISTORY OF THE BIRDS OF AFRICA.

TRANSLATED FROM THE FRENCH OF LE VAILLANT.

THE RAVEN (*Corvus Corax*).

Grand Corbeau, *Le Vaill.* Ois. d'Afrique, ii. 9 pl. 51. *Corvus Corax*, *Lath.* Ind. Orn. i. 150. *Lin.* i. 155. *Gm.* *Lin.* i. 364. *Faun. Suec.* No. 85. *Scop.* Ann. i. No. 45. *Brun.* No. 27. *Muller*, p. 11. *Kram.* El. 333. *Georgi*, 140. *Bor. Nat.* ii. 103. *Bris.* ii. p. 8. *Id.* 8vo i. 156. *Raii*, Syn. p. 39. A 1. *Will.* p. 82. t. 18. *Frisch.* t. 63. *Klein.* Av. p. 58. *Schoeff.* El. t. 30. *Lett. Nc. Sard.* p. 69. *Shaw's Zool.* vii. 341, *Amer. Orn.* ix. 113. pl. 75. f. 3. *Lin. Trans.* xii. p. 530. *Tem.* Man. d'Orn. p. 66. *Id.* Ed. ii. p. 107. Grand Corbeau, *Buf.* iii. 13. pl. 2. *Pl. enl.* 495. *Kolb.* Cap. ii. 146; *Daud.* ii. p. 224. *Gunth.* Nest. U. Ey. t. 71. *Bart.* Trav. p. 286. *Kolkrabe*, *Naturf.* ix. s. 140 to 2. *Schmid.* Vog. p. 44. t. 28. Raven, *Lath.* Gen. Syn. i. 367. *Id.* Gen. Hist. iii. p. 4. *Id.* Sup. 74. *Id.* Sup. ii. 106. *Br. Zool.* i. 218, 74. *Id.* fol. p. 75. *Id.* Ed. 1812, 1.279. *Arct. Zool.* ii. 134. *Russ. Alep.* p. 69. *Alb.* ii. pl. 20. *Bewick*, i. pl. p. 66. *Lewin*, Birds, i. pl. 33. *Id.* Eggs, pl. vi. f. 1. *Will.* Engl. 121. t. 18. *Walcot*, Syn. i. pl. 32. *Wood's Zoogr.* i. p. 435. *Montagu*, Orn. Dict. & Sup.

THE raven of this article is so similar in many respects to our raven of the large species, that described by Buffon simply under the name of raven, of which he has given a bad figure in the coloured plates of his work, No. 495, that I am very much inclined to believe it is merely a variety of the same species. This raven being generally spread through all the different parts of Europe, it would not be surprising if it was to be met with at the Cape of Good Hope. I shall, however, remark that in Africa this bird is rather larger, its bill stronger and more bent; but as in other respects all the characters are like those of our raven, their habits are also exactly similar, and besides this, it has been remarked that, in several countries, these birds are either larger or smaller, and their bill more or less bulged. We shall leave this raven of the Cape by the side of our own, as a simple variety of the European species.

I have seen these ravens most commonly in the mountains in the environs of the bay of Saldanha. They live in small isolated flocks, without mixing with the other species of the same genus. They scent offal, feed on all kinds of carrion, earth-worms, snails, the land tortoise, and even insects. When in flocks they sometimes attack young antelopes and succeed in killing them. It is asserted that in Europe this bird feeds on fruit and even corn. I have not observed that this takes place in Africa, having only found in their stomach the different sorts of food which I have mentioned, though I have killed several in the cultivated property of a negro colonist, whose habitation was situated in the mountains of the environs of the bay of Saldanha, and who reared a great deal of corn. This man has assured me that these birds were not birds of passage, and that he saw them all the year round in the same cantons. I have also learned from him that they lay their eggs and rear their young in the rocks; that their eggs, four or five in number, are of a dark green, spotted with brown. In the cantons of the colony where this species of raven is found, the colonists distinguish it from the others by the name of *Groote-Kraai*, or great crow. This name is also that which the people have given to the same bird in all the different provinces of France where it is known.

The general colour of this bird is of a deep black, glossy on the wings and tail, without, however, possessing any shade either of green or purple, as in the rook. The eyes are of a deep brown; the feet, bill, and nails, of a beautiful black. The tail is very little wedge-shaped, and the folded wings spread nearly three-fourths beyond its length. The female is a little smaller than the male, and is also of a browner black.

I have never seen our small species of carrion crow, or that which Buffon calls the Corbine or Corneille noire at the Cape; neither is our hooded crow found there.

ON SWIMMING.

BY PROFESSOR BORELLI, OF NAPLES*.

SWIMMING may be considered as a certain species of flying; the motion in each case being performed in a fluid in which fishes and birds of different kinds both move forwards supported in the same manner as terrestrial animals are upon the ground. As the ancients have not fully investigated the causes of these motions, nor the means by which they are performed, we shall endeavour to supply what they have omitted.

In explaining the difference between flying and swimming, the object of our inquiry is not the difference between the aërial and aqueous fluid, but the manner in which birds and fishes move through the air and water. It is evident that two operations are necessary in flying: the first is the suspension of the body of the bird in the air, effected by frequent leaps and by the great power of the pectoral muscles; the second is the transverse motion of the bird which carries it forward in flying. But animals that swim do not require any power to suspend them, for they are supported by the specific gravity of the water so that they cannot fall to the bottom, and therefore they can only move through the water by the impulse of organs of motion peculiar to themselves.

As to the differences in the modes of swimming, it is evident from the doctrine of Archimedes, that bodies which float upon the surface of water are not wholly immersed in it, but a part of them remains above the water; the weight of the water displaced by the body is equal to the weight of the whole body, both the part under and that above the water; and the body is said to be of less specific gravity than water. Bodies, which, wholly immersed, remain in any situation in the water being of equal weight with the water they displace, are said to be of the same specific gravity as water: and those bodies, which, when wholly immersed, do not remain but sink to the bottom, are heavier than an equal quantity of water, and are said to be of greater specific gravity than water.

* Translated from the Latin, by John Sharp, Esq., Bannockburn, near Stirling.

We observe that all terrestrial animals while alive, likewise birds, and fishes which breathe and have lungs, are not wholly immersed while in the water, but a part of them at pleasure remains above the water without any effort of the muscles, these are of less specific gravity than water, and they move in it as animals do upon land. But since these animals are supported by their specific gravity, not by the hardness of the water, these animals' motion in the water is performed by the rowing of feet and arms, as ships or boats by oars. In this manner terrestrial animals, birds, frogs, and tortoises, swim by one large oar or tail violently moved sidewise as boats and fishes of the whale species move directly upon the water; or by impelling the water upwards and downwards by the tail extended like a shovel, as dolphins swim by rising and sinking in the water.

All fishes, except oysters and a few other shell-fish, are of the same specific gravity as water, and therefore can remain at any depth, and move in any direction, whether upwards or downwards, sideways or backwards, as we shall afterwards explain.

That we may be enabled to proceed further, we premise the following explanations.

Any foreign body, whether at rest or in motion in a fluid, will dispose itself so that its centre of gravity will occupy the lowest place; that is, will fall nearest the bottom.

Fig. 1.

Let a body, Fig. 1. be composed of lead *pih* and of thin and light wood *lih*, whose lineal centre is *b*, and *c* the centre of gravity, be immersed in water *rst*. First let the whole compound be of the same specific gravity as water. It is evident that when covered wholly with water, so as not to reach the bottom, it will remain at rest where it is placed. I say, however, that it will revolve in such a situation, until the heavier portion *p*, occupy the lowest place.

The mass of water a may be considered equal in weight to the body of lead pih , and the mass e to the wood lih . These will form two weights, ap and el , the former of which will turn and fall downwards by bending the arm to which the lead is affixed, and the latter upwards to which the wood is affixed. The centre of gravity of the whole body pl remains in the same situation, that is, it neither rises nor falls in the water; therefore the right line cb joining the lineal centre with the centres of gravity, will turn round upon the immoveable centre b , by describing the arc of a circle cd (with the radius bc) so far like a pendulum, until it reaches bd perpendicular to the horizon and the centre of gravity c nearest the centre of the earth, and thence p will occupy the lowest, and l the highest situation.

Secondly. When the specific gravity of the compound body is either greater or less than water, then it (pl) always rises or sinks in the water, and the two collateral weights ap and el balancing themselves in the same manner as a ship, turn round the lineal centre b , equally yielding to their tendency as if the ships and centre of the magnitude were altogether at rest. Therefore it is necessary that the heavier part p fall along with the common centre of gravity c towards the lowest place, that is nearest the earth's centre; and the lighter part l rises upwards as already mentioned.

If the same compound body pl float upon the water, the result will be the same. To illustrate this, let the spherical figure $ehfg$ (fig. 2.)

Fig. 2.

whose centre of magnitude b is the centre of the sphere, but c the centre of gravity, and let the portion ehf be above the water rs . It is evident that the compound body pl , in whatever manner it revolves round the centre b , the portion fge , which is immersed, will always be of the same magnitude, because the mass of water equal to the part immersed is of the same weight as the whole compound pl . Hence it follows that the sphere pl rests in such a position equally well as if it

were suspended from its centre b by a strong nail. Then the cord-pendulum bc rises, because the whole force of gravity pl is employed and rests at the point c .

The pendulum bc , as its nature requires, will turn about the fixed centre b , until the centre of gravity of the whole arrive at the lowest point d perpendicular to the horizon.

Hence it plainly follows, that in any foreign body, either at rest or in motion in a fluid, the common centre of gravity is in the lowest part of it, nearest the centre of the earth.

As to the situation of the centre of gravity in animals swimming upon the surface of water, since all land animals and birds, while living, are of less specific gravity than water, it is evident that they can swim in water; and if wholly immersed in it, can rise at pleasure (to the surface), so that some parts of the body will remain above the surface. This takes place without any effort of the animal, even although the feet are not moved by impelling the water under it.

Provided we knew what part of the animal is the weightier, and in what situation of its bulk the centre of gravity is, we should be certain of the posture of the animal while it swims, because quadrupeds and birds, in whatever manner they fall into the water, or are immersed in it, or in whatever posture they are in it, yet always rise and emerge from it with the belly downwards, and with the back and head extended upwards.

Therefore, their centre of gravity is in the middle of the belly, and summit of the breast; the back and head are of less specific gravity than the rest of the body. But this is by no means the case in man, for the head is of much greater weight, which, when under the water, is raised with difficulty to the surface, unless the body be constantly impelled by the hands and feet, which is performed by quadrupeds without any effort; their head rises above the water of its own accord. Fishes of the whale species seem to have the centre of gravity in the belly, and for this reason, they always swim, rest and sleep, upon the water with the belly downwards and back upwards. Not so with sea tortoises; they sleep in the water with their belly upwards. Therefore, their centre of gravity is situated in the back, the magnitude of the shield with which it is covered leading to this belief.

As to the manner in which fishes preserve their equilibrium in deep water, it was the opinion of Archimedes, that no body under the surface of water, and not supported by the bottom, can remain at rest, unless of the same specific gravity as water; namely, unless the absolute weight of the body immersed be equal to the weight of the volume

of water it displaces. It must be admitted, that fishes are of the same specific gravity as water, since they are observed to remain at rest in any depth without any exertion made with the tail or fins. Hence it happens, that fishes are supported better and easier in water than they are upon land. The under parts, likewise, of fishes are not pressed by the back and shoulder-blade above; that is, they are not fatigued by supporting their proper weight, as I have shown when treating of the motions depending upon gravity, showing, in the first place, they do not require feet, as land animals and birds do; secondly, they are not fatigued, nor do they feel any uneasiness, while stationary, because their limbs being of the same equilibrium as water do not gravitate nor press upon their under parts; thirdly, their bodies can be formed of greater bulk than land animals, as Galileo taught, because fishes are not under the necessity of supporting their weight, and they employ no pressive force on account of their specific gravity. But the manner in which they preserve their equilibrium in water, depends upon the laws of hydrostatics; for nature has formed in the belly of fishes an air-vessel, that the air it contains might counterbalance the excess of weight of the muscles and bones; by this resource the whole mass of the fish, compounded of solids and the included air, is reduced to the same specific gravity as the same volume of water. Besides the air contained in the vessel, nature does not employ any instrument of quicker effect; for we observe, that oysters, and other shell fish, which live always at the bottom of the sea, do not require such an air-vessel. We have observed, in the Medical Experimental Academy, that a fish, whose air-bag had been broken in a Torricellian vacuum, could not rise in the water for a whole month,—the time it was in the pond,—but crept along the bottom like a serpent. Fishes being of the same specific gravity as water, can move in it in any direction, upwards and downwards, and sideways, the water by its density and stillness opposing the impulse, and they move forwards the head and rest of the body by an effort of the tail, and the force of the muscles connected with it. Since they balance themselves in the water, provided their whole mass is immersed, they can stop and rest in any place in the water, whether above or below.

As the equality of the specific gravity of fishes and the water in which they swim is preserved, the weight and body of fishes must necessarily remain in precisely the same degree, and the density and gravity of the water also must not be changed, for otherwise the equilibrium, which consists in indivisibility, would be destroyed, and so the fishes will either sink to the bottom, if they have been rendered

heavier than the water, or will float upon its surface, if their weight has been diminished.

But such uniform constancy in the gravity of fishes, and in the density of water, cannot be preserved in all places and for any length of time, because fishes themselves add to their weight by food, and lessen it by excretion and transpiration. Besides, water is condensed and rendered heavier by the mixture of salts, by the conturbation of mud, by ambient cold, by the absence and occultation of the solar rays. And the same water, on the contrary, is rarefied and made lighter by the mixture of the fresh water of rivers and rains, by subterranean heat, by the ambient air, and sunbeams. And these changes happen at different times. But some parts of the water may be gladdened by the rays of the sun, whilst, at the same moment, others being overcast with clouds, or shadowed by rocks, are not rarefied to an equal temperature. Some parts of the sea may be sweetened by rivers, and others not. Moreover, the upper parts of water are lighter than the deeper, because the salts, and other earthy particles, slowly descending, render the water at the bottom more turbid and feculent.

By all these causes, therefore, the very equilibrium of fishes, which consists in indivisibility, is disturbed; and hence, provident nature has bestowed on fishes that ready mechanical artifice, by which the inequality of weights may be reduced promptly and easily to the precise equilibrium. As to this matter, among elementary bodies nothing admits of greater expansion, or condensation, than air; for experience teaches, that five times the quantity of air is conveyed into the pneumatic receiver by the aid of a piston, and is there condensed, than is usually contained in the same narrow space; and in the Boylean ma-

chine, and Torricellian tube, air is expanded to a remarkable rarity. This being granted, that the same operation may be perceived more clearly, first, in the same fluid, retaining the same degré of gravity, let the syringe, AB , in which the piston, CD , being inserted, with its stop-cock tightly pressing upon the smooth internal superficies, let there remain a portion of air, DB , which may occupy the half of the internal space of the syringe, and the spiracle, M , being stopped, let the piston, cd , be drawn out, until the base, d , is brought near the orifice, a , and is there violently retained by the handle, the internal air, db , being rarefied, will fill double the space it did in its first natural expansion, DB .

In the third place, let the same portion of air, BD , be compressed, by violently pressing down the piston, $\kappa\delta$, until it nearly touches the bottom of the syringe, $\beta\mu$, and let it be firmly kept there by the handle, in these three constitutions, the bulks or spaces occupied by the same machines will be unequal; for instance, CAB will be greater than $\kappa\alpha\beta$, and less than cab ; but the absolute weights of the same bodies will be equal to each other, as they consist of the same syringe, the same piston, and the same portion of air. Hence it follows, that the gravities of the same unequal bodies are very much altered in appearance in respect of the water. For if the body of water, EF , be equal to the space $CABM$; and the body of water, $H\varepsilon$, be equal to the space $\kappa\alpha\beta\mu$; and in like manner the body of the same water, eG , be equal to the space, cab ; and the three bodies of water, ef , EF , and εH , are understood to be equal to each other; the body, EF , will be greater than εH , and smaller than eG . Now if the absolute weights of the syringe, $CABM$, and the bulk of the water be equal among themselves, they will also be equally heavy; and, therefore, the syringe, $CABM$, being sunk within the water, will remain equipoised in it, since their bulks and weights are equal*. But the elongate syringe, $cabm$, will be lighter than the fluid body eG , which is equal to it; because the weight of the water, eG , is greater than the weight EF , or of the syringe itself, CB , or cb ; and, therefore†, it does not remain sunk down within the fluid, but ascends, until some portion of it, cs , rests on the surface, of the water. And on the other hand, the syringe, $\kappa\beta$, being compressed or shortened, will be heavier than the fluid, εH , a body equal to it; and for the same reason, $\kappa\beta$ descends and rests, floating at the bottom of the vessel.

* In Arch. Auct. de Ins. Flu. Prop. 2.

† Ibid. Prop. 1.

Now, suppose the fish is a machine similar to the syringe, CABM, and that such fish contains in its abdomen a small bag, *e*, filled with air, which, in a moderate constitution, may be compressed in such a manner as to render the bulk of the fish equal to the bulk of the equally pendent water ; in that case the fish can remain without motion immersed in the water. But if it wishes to become lighter, in order that its machine may rise to the surface spontaneously, it is necessary, that by relaxing the abdominal muscles, it can do so, and that the air, by exercising its elastic power, can expand into a larger space, *d* ; and, on the contrary, if it wishes to be of a greater specific weight, and to sink spontaneously to the bottom, it is necessary, that by a contraction of the muscles of the abdomen, it tightens the air-bag, like a press, until it occupies a small space, *f*.

Experience proves, that boats impelled by a single oar placed at the

stern, and turned and vibrated here and there, glide upon the surface of the water in a direct and rapid motion, without the aid of lateral oars. And fishes, in like manner, are not impelled by the rowing of the side fins, as we have already said ; and we observe, that as often as their tail is vibrated, they pass with the greatest velocity through the water ; and, on the other hand, when the tail is not moved in the slightest degree, we observe they continue in the same situation. Therefore the contortion and vibration of the tail is the true cause of their motion, as the vibration of that single oar in the stern of a boat is the cause of its direct motion.

But the mode in which both operations are effected, is this. The single oar, whilst it obliquely impels the posterior water resisting its support, necessarily forces the boat forwards, although in a zig-zag course, by deviating from a straight track. But, because such deviation is suddenly corrected, either by a contrary movement, or by a firm retention of the oar in an oblique position, by performing the office of a rudder, it happens, that those momentary deviations are not perceived, and the direct motion is alone conspicuous.

Now let us consider the configuration and motion of the fish, *abc*. Whilst the head, *a*, with the belly, *b*, of the fish, directly constitutes its remaining mediety, *bfc*, it bends and vibrates laterally, violently lashing the water on account of the lubricate connection of the spinal vertebræ, which like strong bows, may be easily contorted and turned to the right and left. The extreme production of the fish has, besides, an ample flexible tail, *de*, composed of cartilaginous small rods, which are invested by a subtle membrane, as the feet of geese, and may be contracted and dilated in precisely the same way. Again, at the supreme edge of the back, and at the lowest edge of the belly, are also consimilar cartilaginous fins, which are bent, contracted and expanded just as the tail.

But the order of the motion is this. The fish, *abc*, being extended in a straight line, it begins its motions by extending the tail, *bfc*, towards the right side, *g*, which flexion is executed with such rule, that the moved part, *bc*, whilst it is turned about the centre, *b*, does not retain the precise rectitude like the rays of a circle, but is incurved with a two fold sinuosity about *b*, by moving forwards the side *f*, towards the right side *g*, and about *f*, and by retroceding with the extreme tail, *d*, towards the left side ; and such is the first motion, not the rowing, but somewhat anticipation of the tail, similar to the anticipation of the feet of a frog swimming, like which the palmary fins of

the tail, *de*, back, and abdomen are tightened and contracted, lest by striking against the water, they should hinder the anticipation of the tail, *bc*. Now the tail being carried to *g*, and very much incurved towards the head, *a*, and all the fins being expanded, the whole length, *bg*, strikes with great velocity, and impels the lateral water like an oar, by describing not a circular, but elliptical arc *gd*; by which motion impelling the posterior water, and leaning against it, the fish must necessarily move forwards from *b* towards *a*. In the second place, the tail being anticipated, it finally strikes from *h* towards *c*; by which contrary motion, the preceding deviation from a straight course is corrected, and, at the same time, the direct impulse of the fish from *b* toward *a*, is doubled. And by this reasoning and method the progress of fishes is effected in water.

The same flexion of the tail easily performs the office of a rudder, by bending its course either to the right or left. But the bifold fins which exist at the extremity of the lower part of the belly, serve for the motion towards the bottom. Because these fins, lying underneath and exerting towards the tail, are expanded and erected, and perform the office of an horizontal rudder, as the tail being depressed does in birds. Therefore, the head of the fish must be inclined towards the bottom: and the contrary for the motion upwards. The lateral fins, or oblique flexuous wings, and elevated above, can discharge the same office; and also the tail of birds by which the course of the bird is directed upwards, being raised up does the same.

And perhaps, by the fins in the tail of fishes being inclined obliquely upwards or downwards the same act may be executed; which is conjectured from the circumstance, that fishes are directed upwards or downwards in a moment, from a state of rest; which rapid contortion those small fins could not effect, as the flexion of a rudder would be unable to turn a ship that was at rest.

ON THE EFFECT OF COAL FIRES UPON THE COLOUR OF THE EYES.

BY THE REV. T. PRICE.

It is a remarkable fact, and no less so, as having remained so long unnoticed, that in Britain the dark coloured eye is always found to prevail in the neighbourhood of coal mines, and where coal is used as the general fuel; while, on the other hand, the light, or blue eye belongs

to those districts, in which the mineral is not used ; and, notwithstanding the numbers of persons, continually pouring into the coal districts, from other parts of the country, in consequence of the demand for labour, yet the prevalency in the former of the dark eye, especially among the children, is so evident, that whoever will take the trouble to make the observation will most assuredly acknowledge the accuracy of this statement. In what way the sulphuretted hydrogen, &c., occasioned by the coal fires, affects the pigment of the iris, it is not now my intention to inquire. I consider it sufficient, for my present purpose, to establish the connexion between the use of coal, and the dark colour of the eye ; though, from repeated observations, I feel assured, that there are more curious facts connected with the subject than have yet come under the notice of physiologists ; and which, when properly developed, will considerably alter the bearing of many opinions hitherto entertained.

But as a system so new and unlooked for, cannot be expected to be received without proof, I shall state such facts as I trust will be sufficient to place the matter beyond all reasonable doubt. And as the principality of Wales affords a great variety of the different characters alluded to, I shall therefore commence with that portion of the island. And, though writers upon this subject have generally referred to the colour of the hair, yet I must state my opinion, that it is by no means so steady and decided a characteristic as that of the eye. The hair is continually changing its hue, even in individuals ; for what in the child is yellow, becomes in a few years, brown, and at maturity, not unfrequently black ; but the colour of the eye is much more fixed and unchangeable, usually assuming its character of hue at a very early period of infancy, and retaining it, without any great variation, to an advanced age. Besides, the light eye is accompanied by every shade of hair, whether red, yellow, or black, and the colour of the eye is apparently less influenced by those external causes, which sooner or later must succeed in changing the general physiological character. And while I am describing the several districts, upon which I have made observation I must state, that in grown up persons I have generally found the hair to have, more or less, a shade of brown : and though black, is not uncommon, and red sometimes seen, yet the people of Britain are, in the aggregate, a brown-haired race.

But to proceed with this physiognomical survey.. Almost the whole of North Wales, and a considerable portion of South Wales, are occupied by a light or blue-eyed people. This feature is so obvious, that Dr.

Macculloch attributes it decidedly to a Belgic extraction, and says, "no other supposition will explain the Gothic race or blue eye of North Wales." This temperament is observable in Anglesea, Caernarvonshire, Merionethshire, and the adjoining districts, in which the people generally use peat, or wood fires, until we come to the south of Breconsaire, and approach the great coal basin of South Wales; then an almost sudden change is observed. The light eye ceases to be general, and the dark prevails, and continues to do so through a great part of the counties of Glamorgan and Monmouth; so much so, that in the vale of Neath the coal black is very generally seen, and even in Merthyr Tydvil, notwithstanding the continued influx of strangers, this feature is very distinguishable, especially among the children of those who have been some time settled there. On coming from the district of the peat and wood fires into this part of the principality, this change in the colour of the eye is singularly striking and observable. And it is a remarkable coincidence that this is the very country of the ancient Silurians, whom Tacitus describes as possessing characteristics, which might have attended this feature and temperament, and which induced him to suppose they might be a colony from Spain. The ancient castle of Dunraven in Glamorganshire, is said to have been one of the strong holds of Caractacus.

But though the black eye still remains, I have not been able to ascertain that the hair of the present Silurians has a greater tendency to curl than that of their neighbours; nor is their complexion darker than that, which in Britain naturally accompanies the melanic temperament.

Whether the ancient Silurians derived their dark complexion from the use of coal, or whether they were really a colony from Spain, as Tacitus is inclined to suppose, I cannot undertake to say, but it appears certain that they were acquainted with the use of coal, which is found in such abundance in their country, as Pennant informs us that an ancient flint axe was actually discovered in one of the coal mines of Monmouthshire.

As we return from South Wales the change becomes visible in the course of a few miles; for as we quit the vicinity of the coal fires, the light eye resumes its prevalency, until we approach the coal fires of North Wales, in the neighbourhood of Rhuabon and Oswestry, where the dark eye again appears; notwithstanding the smallness of the coal basin, and the number of strangers employed in working it.

But though the people of North Wales are generally a blue-eyed race, as Dr. Macculloch has justly observed, yet that colour assumes

various shades, and from Conway to Holywell the iris has an extraordinary uniform leaden hue. The dark shade, as I apprehend, being thrown in by the small supply of coal along that coast.

It ought to be observed here, that in towns where coal fires are used, even in the clay and slate districts, the dark eye is not uncommon, as in the town of Llandovery for instance; while the people of the surrounding country, who burn turf and wood, are universally light-eyed.

As we leave the principality and pass through Herefordshire, where coal is not commonly used, the eye is uniformly of a light grey, and continues so, with very little modification, towards Worcester and Birmingham. But as we approach Wolverhampton, the change to the dark eye is very perceptible, and here we find another coal field. From Shrewsbury to Chester the dark blue eye is very prevalent; forming an intermediate tint between the black and blue varieties.

As we quit this coal district and proceed through Staffordshire in a northern direction, the eye resumes its grey character, until we approach the coal of Newcastle-under-Line, where symptoms of the use of that fuel present themselves; otherwise, the grey character prevails until we approach Manchester, and in the vicinity of that extensive coal field it becomes decidedly dark, and continues so for a considerable way on the road towards Preston; and in this country I have noticed several instances of an anomalous description,—i. e. of dark eyes, accompanied by light hair.

As we proceed from Chester towards Manchester, the black eye is very rare, and at Warrington particularly so, and even onwards to the environs of Manchester. What quantity of coal the common people use as fuel I have not ascertained, but on the road side I noticed an extensive turf bog, with its stacks of peat piled up in great quantities; indicating that a considerable portion of the inhabitants were supplied from thence. And as might be expected, the blue eye prevails in its vicinity.

On passing Manchester through Stockport, the influence of coal is again very perceptible; but in the Derbyshire hills, where it is more expensive, and of course more sparingly used, the dark eye declines. On approaching, however, the great central coal field in the neighbourhood of Matlock, it resumes its character.

As we skirt the borders of this coal field towards Derby, the blue eye becomes a good deal darkened, and forms a sort of transition from blue to black; but if we dip into the basin, at Nottingham for instance we find the dark eye appear, and become more and more frequent, so

that at Mansfield it is pretty general, and at Chesterfield decidedly the prevailing feature.

If we return southward through Leicester and Coventry we shall perceive the same effect of coal, particularly at Nuneaton, as also along the line of canals. And as the facility of conveying this fuel by means of canals and rail-roads increases, we shall find that what is called the Gothic character, will gradually give way to the Celtic.

It may be noticed that in Lancashire, the eye, which is generally blue, has often a dark circle on the outer rim of the iris, giving it a higher expression than when unaccompanied by that finish, and having much the character of that of the people of Belgium, and which I do not recollect having seen so general in any other part of England; though the inhabitants of Cheshire partake of it.

As we quit the coal districts and pass through Westmoreland and Cumberland towards the North, the eye resumes the grey colour, and retains it through the whole of those counties, and also through the southern part of Scotland, on for a distance of more than a hundred miles on the Glasgow road until we approach the neighbourhood of Lanark, and the great coal fields of Scotland, where a change to the dark eye is immediately perceptible. At Hamilton that melanic tint becomes general, and continues to prevail along the whole of the coal district, from Glasgow to Edinburgh, in so decided a manner, that when once the fact is brought under notice it is impossible not to connect it with the use of coal fuel. But when we quit this district for the Highlands, in which coal is not found, and very little used, the grey eye again makes its appearance; and, notwithstanding the very positive assertions respecting the dark character of that feature among the Highlanders, I do not hesitate to say that, whenever it does occur among them, it is so unusual, as to form an exception to the general appearance; whereas, on the other hand, in the country of the Gothic Lowlanders where coal is used, the grey eye forms the exception. So much for the system of Goths and Celts. A few facts accurately observed are worth all the fanciful systems upon earth.

And here may be noticed a remarkable instance of that delusive coincidence between real facts and imaginary theories which occasionally occurs; and which has not unfrequently succeeded in confirming prejudices already partially adopted, however absurd and erroneous; for on going from England towards Glasgow, it is impossible for the physiognomist not to notice the sudden transition from the grey to the dark eye, as he approaches that city; and never suspecting the

real cause of this change; and having nothing in his head but Goths and Celts to account for every variety of physiognomical appearance, of course these black-eyed people must be Celts. And it happens most opportunely for his system, that this was the country of the Strathclyde Britons, or Welsh of Strathclyde (Strathelud-Walli), whose citadel was on the rock of Dumbarton: and therefore he is convinced, that the people retain the Celtic character of their ancestors to this day. And this circumstance, in conjunction with that of the same character occurring among the descendants of the Silurians of South Wales, seems to establish the fact to a demonstration: the blue-eyed Celts of the remainder of Wales, Cumberland, and Ireland, being entirely overlooked; and these inconsiderable spots made to represent the great Celtic race.

Whether the author of Ossian was afflicted with the Celto-gothic mania, and wished to make his heroine a genuine Briton of Alclud, or a Roman of Theodosia, he certainly contrived to make her, in some respects, correspond with the character of the country: for, in describing Moina of Balclutha, in the poem of Carthon, he calls her; "the daughter of strangers," "Moina with the dark blue eyes;" and says, "Her hair was dark as the raven's wing."

Having never visited the coal-fields of Sutherland, in the north of Scotland, I cannot say whether that fuel has been used there in sufficient quantities to influence the physiognomy of the people. But as far as regards those districts of the Highlands which I have visited, I never saw anything to justify the assertion of the dark complexion of the people. At Inverness, it is true, the dark eye sometimes occurs: but not in a greater degree than in towns in general, where it always prevails more in proportion than in the country. I have also, in this part of Scotland, met with some remains of the gipsey race; and am much deceived if some of this gipsey blood has not been mistaken by Dr. Macculloch for that of the aboriginal Celts; as we know that, some years ago, gipsey families were very numerous in Scotland. Meg Merrilies' kraal was one of those establishments, very frequently met with; and, even in England, at this day, in the militia regiments of those counties in which gipsey encampments have been most numerous, the gipsey blood is very distinguishable in the dark Asiatic countenance, which here and there meets the eye, as we pass along the ranks, and forms a striking contrast to the fair and xanthous complexion of the old agriculturists. Had this variety been noticed in a Welsh or

Highland regiment, the two races would have been pronounced Goths and Celts beyond all recovery.

I must, however, frankly acknowledge here, that I am aware in what degree this circumstance may be quoted against my own hypothesis: inasmuch, as it may be asked, how, if the physiognomy undergoes so great an alteration as I have said, the gipseys retain their peculiar features unchanged? I answer, that I deny the fact of their remaining unchanged; as it is evident that they are at this day less dark than their ancestors who first arrived here: for Bishop Heber remarks, that the gipseys which he saw in India were blacker than those of England. Their retaining so much of their original character in Europe must be attributed to the savage life which they always lead; and I have no hesitation in stating my opinion, that if a colony of gipseys would attach themselves to the soil, in any one spot, and become an agricultural and civilised people, even though unmixed, they would soon change their Asiatic character for one more European. And, however absurd the idea may at first appear, I am satisfied from analogy, and a comparison of facts, that, had a colony of Senegal negroes established themselves on the banks of the Thames or the Rhine, two thousand years ago, and assumed the habits of civilised agriculturists, their descendants at this day would scarcely have retained a trace of their African origin.

But, to return to our survey. If the melanic complexion occurs in the north, it is but very rarely. The grey eye uniformly predominates throughout the whole of the Grampians, with the exception of the towns, for a hundred and fifty miles, until we approach Kinross, where the coal-fields again commence, and there a marked change takes place; for the eye is not merely occasionally dark, as in other places, but here generally so. And these observations will perhaps explain a fact mentioned by Dr. Macculloch, in his chapter upon the Origin and Races of the Highlanders, vol. iv., when speaking of the female beauty of Scotland, and making handsome mention of Ilay, Skye, and the Highland borders of Perthshire, he concludes:—

“And generally it is true, that the beauty of the females predominates on the line which allows the high and low countries to intermix.” Now, as he gives the fact from his own observation, there can be no reason to doubt its accuracy, though his mode of accounting for it can by no means be admitted. But it is deserving of notice, that the Highland borders of Perthshire will just occur where the light eye of the northern country merges in the dark tint of the coal districts: and

perhaps the expression thrown into the grey eye by this tinge of black, contributes more towards that beauty of countenance to which he alludes, than any imagined mixture of Goths and Celts: for, whatever inferiority the dark complexion may labour under, with respect to the hue of skin, yet it must be allowed, that it communicates a certain degree of expression to the countenance, which the fair sanguine temperament never can possess. And, though the claims of the fair complexion to mere beauty cannot be disputed, yet it almost entirely depends upon its protection from the sun and weather; for when the sanguine complexion loses its fair hue by exposure, the fine expression of the blue eye is completely lost: and in men, when the face is much tanned by the sun, there is a certain species of light blue eye, which assumes an aspect often exceedingly sinister and unpleasant, so as perfectly to explain the classic expression of *truces oculi*: but the dark complexion bears the influence of the sun much better, and strong manly features are generally even improved by its bronzing effects.

MR. BLACKWALL'S EXPERIMENTS ON FLIES*.

THE various papers—we are sorry to say short papers—which Mr. Blackwall has occasionally contributed to *Natural History*, are characterised by much originality, and at the same time have little of the speculative fancies that so frequently vitiate the researches of our most ingenious observers. The account given by Sir E. Home of the structure of the foot in flies, enabling them to walk on smooth glass against gravity, was considered so satisfactory, that it has been adopted by most succeeding writers. This account Mr. Blackwall, however, found to disagree with his own observations, as well as to be at variance with those of Hooke and Derham, and determined to examine the subject with care and minuteness.

“Satisfied,” says Mr. Blackwall, “that this difficult problem must admit of a solution more consistent with the various phenomena it comprehends, than the popular one here controverted, I determined to institute an experimental investigation of it. Accordingly, having procured living specimens of the house-fly (*Musca domestica*), and of the large flesh-fly (*Musca vomitoria*), I enclosed them

* Remarks on the Pulvilli of Insects. By John Blackwall, Esq. F. L. S. Linn. Trans. vol. xvi.

in clean jars, and phials of transparent glass; the interior surface of which they traversed in every direction with the greatest facility, walking upon it even with their backs downwards, while they remained in full vigour; but when enfeebled by exposure to cold, or when fatigued by over exertion, the identical individuals ascended the sides of the same jars and phials with considerable difficulty, falling from them in numerous instances, and they were entirely incapacitated for adhering to them in an inverted position; yet, when their physical energy was restored by repose, or an increase of temperature, they again repeated their most extraordinary feats with all their original promptness and dexterity.

“Flies which are unable to maintain an inverted position on highly polished bodies, will frequently adhere firmly, with their backs downward, to glass rather defective in polish, or slightly soiled; indeed, I remark generally, that the results of experiments, similar to those detailed above, will always be modified by the vigour of the insects and the state of the glass vessels, with regard to cleanness and polish.

“These facts plainly indicate, that flies are not supported on the vertical sides of smooth bodies by the pressure of the atmosphere, nor by the aid of a glutinous secretion, but by means strictly mechanical, as Dr. Hooke has suggested: he erred, however, in supposing that the hairs on the underside of the tarsal membranes are pointed, and that there is a smoky substance on glass which they penetrate. One other link in the chain of evidence was wanting to place the matter beyond all dispute, and that, the kindness of Mr. W. Hadfield, of Colnbrook, has enabled me to supply. With his assistance, and the help of his air-pump, it was demonstrated to the entire satisfaction of several intelligent gentlemen present, that the house-fly, while it retains its vital powers unimpaired, can not only traverse the upright sides, but even the interior of the dome of an exhausted receiver; and that the cause of its relaxing its hold, and ultimately falling from the station it occupies, is a diminution of muscular force, attributable to impeded respiration.

“Having thus established the mechanical theory of the movements of flies on polished perpendicular surfaces, I shall offer a few remarks on the apparatus, by the instrumentality of which they accomplish their purpose. In structure and function, it bears the closest analogy to the *pulvilli* of insects, which, if named with reference to the most important office they perform, should be termed holders, or supporters. It consists of expanded membranes, varying in size, figure, and number, in different species; the edges of which are plain, not serrated, as Sir E. Home asserts, though when placed in such a situation relative to the eye of the observer, that the hairs connected with them are fore-shortened; they certainly present an appearance which, on a superficial view, might lead to the latter conclusion.

“The hold which insects are enabled to take of any roughness, or irregularity of surface, by means of the fine hairs composing the brushes, must be very considerable; and whoever examines the most carefully polished glass in a favourable light, with a powerful lens, will speedily be convinced that it is not free from flaws and imperfections.” p. 421.

To us these details are highly interesting, and we cannot too strongly recommend our readers, who may have an opportunity to

repeat Mr. Blackwall's observations, and extend the inquiry. He was led subsequently to make the following experiments.

"Clean phials of transparent glass, containing spiders and various insects in the *larva* and *imago* states, capable of walking on their upright sides, were breathed into till the aqueous vapour, expelled from the lungs, was copiously condensed on their inner surface. The result was remarkable. The moisture totally prevented those animals from obtaining any effectual hold on the glass; and the event was equally decisive, if a small quantity of oil was substituted for the aqueous vapour. A similar consequence ensued also, when the flour of wheat, or finely pulverised chalk, or gypsum, was thinly strewn on the interior surface of the phials, the minute particles of those substances adhering to the tarsal brushes of the spiders, the pulvilli of the perfect insects, and the under side of the feet of the larva. These facts, far from corroborating the mechanical theory, appeared quite inexplicable, except on the supposition that an adhesive secretion is emitted by the instruments employed in climbing. The next point to be determined, therefore, was, whether spiders and insects, in the larva and imago states, when moving in a vertical direction on clean glass, leave any visible track behind them. Careful and repeated examinations, made with lenses of moderately high magnifying powers, in a strong light, and at a favourable angle, speedily convinced me that my conjecture was well founded, as I never failed to discover unequivocal evidence of its truth; though, in the case of the spiders, considerable difficulties presented themselves, in consequence of the exceedingly minute quantity of adhesive matter emitted by the brushes of those animals. On submitting this secretion to the direct rays of the sun, in the month of July, and to brisk currents of air, whose drying power was great, I ascertained that it did not suffer any perceptible diminution by evaporation under those circumstances.

"Now it is reasonable to infer, from the foregoing remarks, that the hair-like appendages constituting the brushes of spiders, and occurring in such profusion on the inferior surface of the *pulvilli* of insects, are tubular. The delicate membrane also, on the under side of the pro-legs, and the tarsi of the perfect legs of various larvæ capable of traversing polished perpendicular bodies without the aid of lines produced by a spinning apparatus, must be provided with numerous pores, or minute *papillæ*, from which an adhesive secretion is emitted. Some *larvæ* which are not supplied with pro-legs, those of *coccinellæ* for example, have the inferior part of the *tarsi* of their perfect legs thickly covered with hair-like appendages, resembling in figure and in the function they perform, those on the *pulvilli* of insects in the *imago* state; while others, altogether destitute of legs, emit a viscid mucus from both their extremities, and by advancing and attaching each alternately, are thus enabled to ascend smooth bodies with facility.

"According to my observations, the instrument is composed of several branched membranous *papillæ* included in a common envelope. They are extremely flexible and extensible, and, either separately or collectively, can be protruded beyond the caudal segment, or retracted within it at the pleasure of the animal. Their efficacy as a cleaning apparatus and an organ of adhesion and progression depends principally upon the mucus they emit, which is secreted in great abundance, and not upon the power of producing a vacuum. When this instrument is applied to the

body of the insect any extraneous matter immediately becomes attached to it, and the impurities thus collected are ultimately expelled by a fresh discharge of mucus and a peculiar motion of the papillæ." *page 770.*

Again we impress it on those who take interest in these curious researches to repeat the ingenious experiments of Mr. Blackwall, which, we confess, are by no means so satisfactory to us as they appear to be to the worthy author.

NOTES.

BY RURICOLA.

In the delightful description of spring, with which Chaucer commences the "Prologue" to his "Canterbury Tales," he commemorates it as the season, when

— "smale foules maken melodie,
That slepen alle night with open eye,
So priketh hem nature in her corages."

That some of our little songsters are very wakeful at that season, and pass a portion at least of the night in singing, or "making melody," as the poet says, is well known. Milton, indeed, goes so far as to affirm of "the wakeful nightingale,"

"She all night long her amorous descant sung."

PAR. LOST, iv. 603.

If applied to such a case, Chaucer's phrase, "with open eye," would require no explanation or justification. But that birds when they *sleep*, "sleep with open eye," is a property attributed to them, concerning which I should be glad to be informed whether the position is physically good.

In the course of the last spring, one of my family took a nest of three greenfinches, or green linnets, which had been a few days hatched, and succeeded in rearing them by hand. In about four weeks, when they appeared strong enough to make their own way in the world, they were turned into a large cage, containing several canaries, a couple of bulfinches, two or three goldfinches, a redpole, and a grey linnet, among whom they immediately made their way as well as the best of their companions. But what particularly took my attention was that

a vessel of water being placed in the cage, one of the young birds instantly flew to it, and bathed himself profusely. This was certainly done from natural instinct: for he had never seen such a thing before, nor did any of his new companions now set him the example. But, like Virgil's bees, in pursuance of another natural instinct,

“ Which strike, and leave their lives within the wound,”

I apprehend that our poor greenbird would have fallen a victim to his temerity, if care had not been taken to withdraw him from his bath, and to dry and warm him in the sun.

A friend of mine in this neighbourhood was less successful in rearing a brood of young partridges about the same time, which came into his possession in a remarkable manner. The whole history of the case is so curious, that, being desirous of reporting it to you with the greatest accuracy, I requested him to inform me of all the particulars, and shall proceed to transcribe his narrative. “ I grieve,” he says, “ that the knowledge I possess, relative to hatching a brood of partridge eggs, is so unsatisfactory, that it is not worth your notice: however, you shall have the facts as they occurred.

“ When mowing a meadow, the men disturbed a partridge on her nest, and the creature sat so long, that her head had nearly been severed from the body. She escaped and flew away. Twelve eggs were in the nest. This happened before breakfast on a Friday morning. A patch of grass was left adjoining the nest; and next morning the two birds were seen near the nest; but on feeling the eggs, we thought from their coldness, that the mother had not resumed her care. The eggs remained uncovered till about six or seven o'clock in the evening, when Mrs. ——— had them brought to the house. We put them into a small tin pan and covered them with tow, and the whole was put into a slow oven. Our cook took much interest in the work; and on referring to her, she says, the pan was only in the oven, when very cool, but generally was kept on the top of it. The oven is a perpetual one, placed, or rather built in the fire-place, heated by a flue, which conveys the heated air of the fire round it; and on the top is a course of thick plaster to prevent the escape of heat. On this course the pan was placed. The temperature of that place, as now ascertained, is about 88° of Fahrenheit: but it varies according to the cook's operations, the minimum being about 75°, the maximum 90°. Unfortunately we did not keep notes, so that what I write is from the collected opinion of the house.

"In about four or five days the cook came hastily up stairs, and declared she heard the chicks *chirp*. I went, and distinctly heard the little creatures chirp indeed; and observed a small part of one egg broken, and as if something was forcing against the skin within the shell. (Here I may mention, that on all the eggs I observed a circular line of *shell broken* by the chick, although the film or inside coating of the shell remained sound: and in most pheasant eggs, which had been hatched by the parent, I have found the one-half of the shell nicely put within the other so that the shell seemed only to be a half egg*.) Next day the first bird appeared, and was pretty strong and able to move about. In succession ten, I think, made their appearance; and all continued to live for some days. And could we have prevailed on them to eat, I have no doubt they might have been reared. Mrs. ——— thinks we were too kind; for a general interest was excited, and all and every body offered advice or assistance. And I own when we saw the little creatures begin to be weak, and felt them as if claiming assistance, by nestling themselves in our breast or between the hands, the heart would have been hard, which would not have felt sympathy, and yearned to afford assistance. But we could not hit upon substantial food. Auts' eggs, milk, every thing we could think of was offered; but no disposition to eat was evinced; and after four or five days of suffering they died. As a last resource they were taken to the short grass before the door, which seemed much to revive them. And although, when in the house, they appeared weak and incapable of much action, when in the grass I saw some make wonderful exertion, perhaps to hide from the haunts of men. We now begin to think they were kept too warm, after being hatched: but that is not likely to have prevented their eating. I forgot to mention that the eggs were exposed to much rain the night they were deserted by the mother."

This closes the account of the partridges. My correspondent adds, that he had often taken common chicks *the day they appeared*, and reared them in the house. And "I well recollect," he proceeds, "that Mrs. ——— found one somewhat troublesome, and we went to the yard to put it with a mother, who had her brood of about a similar age. Mrs. ——— put *her* bird down beside the others, and ran into an adjoining house, and peeped at what was going on. The little creature began to make most piteous and loud complaining, and looked about in

* I have explained these facts in my "HABITS OF BIRDS." Pages 170 and 171.
—EDITOR.

much terror, Mrs. ———'s petticoat blew past the corner of the house; the bird saw it; and, although it was but a *wasp*, it ran to her and seemed to feel perfect safety when lodged close to her feet. All this I saw, and can never forget."

As you have allowed me to address two favourite little birds in your pages, I crave the same indulgence in behalf of a favourite little flower, *Convallaria majalis*; the "Lily of the Valley," or "May Lily," as it is popularly called, with reference to its natural situation, and the reason of its flowering. In illustration of some allusions in the following lines, I would premise, that "the Lily of the fields," mentioned by our Saviour in his sermon on the mount, Matt. vi. 18, is supposed by Sir J. E. Smith to be the *Amaryllis lutea*, or "yellow Amaryllis," sometimes called the "autumnal Narcissus," or "Star Lily:" which overruns the fields of the Levant in autumn, and by its golden liliaceous flowers affords one of the most brilliant and gorgeous objects in nature. "The Mount" is generally supposed to be Mount Tabor, in the plain of Esdraelon, or Esdrela.

TO THE LILY OF THE VALLEY.

FAIR flow'r, that lapt in lowly glade
Dost hide beneath the greenwood shade,
Than whom the vernal gale
None fairer wakes on bank or spray,
Our England's lily of the May,
Our lily of the vale.

Art thou that "Lily of the field,"
Which, when the Saviour sought to shield
The heart from blank despair,
He show'd to our mistrustful kind,
An emblem to the thoughtful mind
Of God's paternal care?

Not thus I trow: for brighter shine
To the warm skies of Palestine
Those children of the east.—
There, when mild autumn's early rain
Descends on parch'd Esdrela's plain,
And Tabor's oak-girt crest—

More frequent than the host of night,
Those earth-born stars, as sages write,
Their brilliant disks unfold;

Fit symbol of imperial state
 Their sceptre-seeming forms elate,
 And crowns of burnish'd gold.

But not the less, sweet springtide's flower,
 Dost thou display the Maker's power,
 His skill and handy work,
 Our western valleys' humbler child ;
 Where in green nook of woodland wild
 Thy modest blossoms lurk.

What though nor care nor art be thine,
 The loom to ply, the thread to twine ;
 Yet, born to bloom and fade,
 Thee too a lovelier robe arrays,
 Than e'er in Israel's brightest days
 Her wealthiest king array'd.

Of thy twin leaves th' embowered screen
 Which wraps thee in thy shroud of green ;
 Thy Eden-breathing smell ;
 Thy arch'd and purple-vested stem,
 Whence pendent many a pearly gem,
 Displays a milkwhite bell ;

Instinct with life thy fibrous root,
 Which sends from earth th' ascending shoot,
 As rising from the dead,
 And fills thy veins with verdant juice,
 Charg'd thy fair blossoms to produce,
 And berries scarlet red ;

The triple cell, the twofold seed,
 A ceaseless treasure-house decreed,
 Whence aye thy race may grow, |
 As from creation they have grown,
 While spring shall weave her flowery crown,
 Or vernal breezes blow :—

Who forms thee thus with unseen hand ;
 Who at creation gave command,
 And will'd thee thus to be,
 And keeps thee still in being thro'
 Age after age revolving, who
 But the Great God is He ?

Omnipotent to work his will ;
 Wise, who contrives each part to fill
 The post to each assign'd ;

Still provident, with sleepless care
To keep ; to make thee sweet and fair
For man's enjoyment, kind !

“ There is no God,” the senseless say :—

“ O God, why cast'st thou us away ?”

Of feeble faith and frail

The mourner breathes his anxious thought—

By thee a better lesson taught,

Sweet lily of the vale.

Yes ! He who made and fosters thee,

In reason's eye perforce must be

Of majesty divine :

Nor deems she that his guardian care

Will He in man's support forbear,

Who thus provides for thine.

RURICOLA*.

Hollywood, Ireland, July 27th, 1833.

GLEANINGS.

BY SOLITARIUS.

MICE IMITATING THE GRASSHOPPER'S CHIRP.—In a field opposite Porto Bello farm, near Wormwood Scrubbs, one evening in last May, my attention was attracted by a noise at the bottom of a hedge resembling the chirping of a grasshopper, but accompanied by a rustling among the dry reeds and fallen sticks that lay beneath, caused by some little animal running and jumping under and over them alternately. This circumstance I have often observed in the country, and from the hasty glimpse which I have now and then obtained of the animal, I came to the conclusion that it was some shy little bird, and which, for the want of a name, I christened the hedge-creeper ; but since I read “ White's Selborne,” I renounced that name, feeling satisfied that it must be the grasshopper warbler. But in the present instance, I embraced the opportunity of assuring myself as to its species, with which view I cautiously advanced towards the hedge and patiently awaited, hoping to obtain another sight of it, but my approach had frightened it, and all was still for some time. I was bending over the bank, when suddenly I heard the same noise as before, and saw the little author of it run out from under the dead stalks, and giving a fluttering sort of jump, which defied one to form any idea of its shape,

* Will Ruricola have the goodness to inform us where a letter may at present find him.—EDITOR.

it concealed itself again in the dried rubbish under which it ran, uttering its grasshopper-like chirp all the while. I now had my "eyes about me," and remaining as perfectly still and motionless as though I had been but an overhanging tree, I watched and listened attentively. Not many seconds had elapsed before there came another, a second, a third; but to sum up, I do not think I shall exceed the limits of truth, if I say that there at length came the thirtieth of these creatures, and all from the same direction, and uttering the same cry as they jumped in their fluttering style one after another over my foot (which rested upon the bank), and then betook themselves to the same path as the leader did. Some of them, however, halted in their career at the sight of my foot, and then it was that I got a correct view of them, and was somewhat surprised to find that the objects of my attention were nothing more nor less than mice of a thick bulky form, with blackish backs and light coloured bellies, and abruptly terminated tails; but one individual, which I had nearly succeeded in catching, was of a beautiful sleek fawn colour above and white beneath, and was in every respect an elegant little creature. In a short time they returned from the opposite direction, and coming out with more caution from their *run*, as it is termed, they first took a reconnoitring peep; but observing me perfectly motionless, they at length collected round my foot to satisfy their curiosity, and were so desirous of removing it (for as it rested upon their *run*, it intercepted their regular course), that two or three of them had actually commenced nibbling the leather of my boot. As fate would have it, however, I sneezed, and thus frightened this interesting group, which in a moment was dispersed in different directions, yet I still kept my quiet position, not doubting but that in a few minutes, when their fears had subsided, they would again return. It was not long before they did as I expected, but they came in a less regular order, some arriving from one quarter and some from another, and again they reconnoitred, but, as I moved not, they appeared unapprehensive of danger. They had re-assembled round my boot, when I, who now felt anxious to capture a specimen, dashed my hand among them, endeavouring, but without success, to grasp one. It was with no better effect that I hit about with a stick in every direction in which I heard them running, for the purpose of disabling or killing one as a specimen, that its name might be ascertained. I waited some time afterwards, until it grew dusk, yet, as I neither heard nor saw anything of them subsequently to my attack upon them, I retired from the spot, but well pleased with this singular occurrence.

July, 1833.

A SPARROW FOUND IN A BANK.—The notice of your having found a cock starling frozen to death in a hole in Copenhagen-fields, as stated in your new volume upon the "Habits of Birds," caused me to smile with surprise upon reading it, it being a singular coincidence, that it is exactly similar in every particular, except as regards its being frozen, and of a different species, to a circumstance noticed by myself. About four years ago, in the same fields above named, I observed, one cold evening in March, a bird apparently disabled in its flight, fly past me and enter a hole in a bank; I was then more of a novice in natural history, yet I had lately read with pleasure and attention, that book which we one and all so much admire and value, "White's Nat. Hist. of Selborne;" but I took particular interest in the statements, pro and con, contained therein, relative to the long pending question as to whether swallows conceal themselves in caves and holes during winter or not, and as I had not been able to come to any decided opinion upon the subject, on account of the various statements appearing equally entitled to credit, I now upon seeing my bird (which I conceived was a swallow), run into this hole, felt much rejoiced (as every naturalist does when he anticipates a discovery), at the idea that it was now within my power to decide this question, or at least to satisfy myself upon the subject, by ocular demonstration, with which view I ran up to the bank, and having stopped up every hole, except that at which it entered, I proceeded to dig into it with the hope of disinterring the object of my attention, but I had not reached a greater depth than three feet, when the darkness of the hour obliged me to suspend my operations until next morning; so having taken the precaution of stopping up the hole to prevent its egress in my absence, I retired and returned home. Early next morning I was upon the spot, and after having dug to a considerable depth, I at length spied the tail, and when in a few minutes the remainder of the bird was released from the earth, I was not quite so pleased to find it was merely a hen sparrow. Upon examining it closely, I could not discover any bruises or any other appearance of hurt, and unless a small species of mite (somewhat similar to that found upon the field mouse), with which it was infested, could have weakened it, and have rendered its safety endangered by remaining above ground, I could find no cause for its retiring into so singular a place for a bird of its species to enter. If one might indulge such an idea, one might suppose that it was some poor disconsolate widowed bird, who, following the custom observed by the females of

many uncivilised nations, upon being deprived of their husbands, had, like them, sought death by self-inhumation.

ON THE HUMMING OF GNATS. (*Culicidæ*).—It appears to me very probable that the humming noise emitted by the gnat when flying about in a dark room is useful to the insect itself, for, as it would be differently modulated according to its distance from, or nearness to, surrounding objects, it may have the effect of preventing its injuring itself by knocking against obstructions to its flight. As a proof of the great difference in sounds arising from even but trifling causes, we have only to take a card in hand and whistle against its edge at a little distance, then at a greater distance, and then against its flat surface at a greater or less distance, and we shall observe that the tone widely differs under each of these circumstances. Now, if we suppose that the gnat knows, from either instinct or experience, that sounds thus differ according to such circumstances as the above, it may learn its situation in a dark room by the variation produced upon its piping noise (which may thus be as serviceable to it in the dark as its sight in the day time), and avoid breaking its wings, or otherwise hurting itself by flying against anything in its way. In the same manner, I think, one may explain the utility of the humming of the cockchafer (*Melolontha vulgaris*), the dung-beetle (*Geotrupes stercorarius*), and many other insects.

THE WAGTAIL DOES NOT ALWAYS SHUN NOISE.—The common wagtail in general seeks a quiet cottage or other retired place to build in, and shuns all noise, but in the instance I now relate, a pair of these birds built their nest in perhaps the noisiest place they could have selected. Some years since, when I was a pupil of Mr. Bicknell's at Tooting in Surrey, a couple of these birds built between the roofing of the school-room, which was detached from the house. On one side of the building there was a pond partitioned off from the play-ground, and thither the birds frequently resorted, flying from this backwards and forwards to their nests, quite regardless of the gambols and shouts of the boys at play. In this situation, no doubt, they would have remained, had not one of the boys more ornithologically mischievous than the rest, by means of a ladder and a net, entrapped the old birds whilst flying out from between the tiles.

Laytonstone, July, 1833.

MR. MAIN'S VEGETABLE PHYSIOLOGY*.

WE have been much pleased both with the manner and the matter of this work, which bears the impress of personal observation, of a love for truth, and of a desire to write intelligibly upon subjects which a fantastical misguided taste so usually bedizens with pedantic jargon, and what is worse, mocks the understanding with the unreal seeming of sounding words instead of things, and with fancies instead of facts. Several of these fashionable gew-gaws may be seen in the *ALPHABET OF BOTANY*, second edition, and in the *ALPHABET OF SCIENTIFIC GARDENING*, stript of their meretricious finery and exhibited in their proper nakedness, and Mr. Main has, in several places of the work before us, argued judiciously against the fanciful doctrine of rooting buds, though we are sorry to say that his own doctrine of the life of a plant being a "distinct member" is out of all doubt a fancy no less void of foundation. This fancy, however, it may be well to remark, is by no means the staple of the book, and is only a sort of episode which may amuse the ingenious that are fond of speculation; and as it is not likely to be ever adopted to any extent, more than the organic vortices of Baron Cuvier, we may consider it as a piece of innocent pleasantry, at the risk, mayhap, of the worthy author not much relishing this view of the subject, for he has evidently written in good and sober earnest respecting this new "distinct member" in plants, termed by him the "life," which he alleges is situated in some inscrutable space between the bark and the wood. We say "inscrutable," for he does not, so far as we can find, pretend to have ever either seen or touched this "distinct member," and we may thence justly infer that it is as invisible, intangible, and consequently as unreal as Cuvier's vortices, or the spirit of the scholastic philosophers, which does not exist in place but *ubi*. It will be but fair, however, to allow the excellent author to give his own evidence in this matter, and we cannot select a better passage for this purpose than the following.

"The foregoing idea of the existence of a distinct vital member, whence all new accretions proceed, is directly opposed to the modern doctrine of the "organisable property" of the elaborated sap of plants. The idea is founded upon the general

* Illustrations of Vegetable Physiology, practically applied to the Cultivation of the Garden, the Field and the Forest, consisting of original Observations collected during an Experience of fifty Years. By James Main, A. S. L.

law of vegetable nature ; for where do we find the most insignificant vegetable body come into visible existence without having a pre-existing embryo or rudimental atom, whence it derives its essential structure and qualities. There is no such instance in nature. Can the most minute species of *Fungi* spring forth without its propago, or the smallest herb without a seed, or previously existing part of itself? Is the bark or wood self-productive? No : when either is destroyed it cannot be renewed but by the assistance of that vital member which is the origin of both.

“ Admitting, then, that plants and certain parts of plants possess the property of perpetual reproduction and extension, a question follows: How is this subdivision effected? In the case of bulbs it has already been stated that the radicle plate is composed of an endless train of gems, which are developed in the order of their seniority ; tubers are multiplied by division or branchés ; fibrous-rooted herbaceous plants perpetuate themselves by lateral offsets ; but how is the annual subdivision of the vital envelope of trees accomplished? To this question a direct answer cannot be given, because the process is invisible ; but we can gain a knowledge of the changes which take place between the wood and the liber of a tree by making frequent incisions through the bark, and marking the changes during the spring, summer, and autumn growth.

“ In early spring, say in the beginning of February, the transverse and vertical sections of the stem of four years old appear as represented.

Transverse and perpendicular sections of a stem four years old; the latter through the pith. *a*, pith and wood of the first year; *b*, *c*, *d*, layers of wood of the second, third, and fourth years; *e*, the four thin layers of bark.

“ About the end of May, sooner or later, according to the favourableness of the season, similar sections of a stem of the same age will appear thus.

Sections of a stem as it appears in May or June of the fifth year. The white spaces show the swelling cambium,

"At the end of September, and in many kinds of trees much sooner, the sections appear as beneath.

Sections of a stem at the end of the fifth year. The envelope and layers of liber are too thin to be shown by the pencil.

"Here we observe that a new concentric layer of alburnum has been added during the fifth summer, and also an additional layer of liber has been parted off, and placed close to that of the preceding year, and lined on the inner side with an almost imperceptible membrane or coating of gelatinous matter, which is the vital envelope, and from which the new growths of wood and liber of the next, and all succeeding years will be produced.

"Judging, then, from these changes, about which there can be no doubt (because of them we have an ocular proof), we may conceive *that the vital envelope is constructed of an indefinite number of distinct concentric layers, two of which are developed annually*; the inner one (A, Fig. 46) being inflated into alburnum, and the outer one (B, Fig. 46) into a layer of liber.

Fig. 46.

Segment of a transverse section of a tree five years old, magnified: *a*, growth of alburnum first year; *b*, the second; *c*, the third; *d*, the fourth; *e*, the fifth; *f*, five layers of liber, ideally magnified; *g*, epidermis and cuticle.

"The appearance of the structure of the alburnum affords confirmation of the reasonableness of this idea. If we examine it as soon as it is formed, or in any future stage of its existence, we find the longitudinal fibres strongly and distinctly marked, and the minute vesicles of the cellular fabric between the fibres posited *horizontally*; showing that they are enlarged in the same direction—that is, advanced from the centre of the tree outwards. (Fig. 2.)

"This hypothesis is only objectionable, perhaps, on the ground of the difficulty of conceiving how such a mass of organisation, forming the extended trunk of a full grown tree, can be contained in such a slender space as that between the liber

and the wood of one of four years' growth. But this difficulty is not greater, indeed not quite so incomprehensible, as is the other supposition already alluded to, namely, that all increments are elaborated from juices and qualities inherent in the plant, or formed by accidental associations of certain electro-chemical bodies extractable from the earth, air, and water. The identity of the vital envelope, during summer, is visible and palpable; and if in winter it be only a cincture of transparent cellular matter, no doubt need be entertained of its subsequent expansibility. That vegetable matter appears in the first stage of its existence as a colourless homogenous mass is indisputable; and that it gradually gains consistency and organic form, may be easily believed by examining an orange when first visible in the flower, and again when fully ripe and deprived of its juice. Besides, the accrescent powers and indefinite limits of vegetation in this case, should banish incredulity; in many other instances it is equally surprising; witness the monstrous gourd, the majestic oak, the magnificent *Banyan Fig*; the latter shading acres of surface, all originating in an atom of a seed.

"The new layer of wood which is added on the old stem or trunk, ranges with the first layer of wood on the terminal shoots. On the latter all primary buds, and consequently branches, originate. The shoots developed this year, except water shoots*, are based on the alburnum formed on the last; and the buds formed in this year are seated on this year's alburnum, and on which they remain to be developed in the next or some following year. The pith, wood, buds, and bark of every shoot are all simultaneously produced.

"But all buds or branches are not *primary*. Such as are produced from an old stem (*b*, Fig. 47) whether naturally, or by consequence of pruning, may be called,

Example of a primary shoot *a*, and a secondary shoot *b*. The former is seated on the alburnum of the first year, the latter on that of the third.

for the sake of distinction, *secondary*†. These can have no immediate connection with the first formed layer of wood and pith, and therefore invariably spring from the envelope. The following delineation represents the disposition of the layers of wood and bark, with the places of the primary and secondary buds or shoots, on a section of an abbreviated stem of a tree of three years' growth.

* Water shoots are such as are produced on luxuriant growing shoots of the present year, frequently seen on the peach, apricot, and always on the grape vine.

† Botanists suppose that there are what they call "adventitious buds," that is, if buds come forth from other places than the axils of the leaves or bractea, they are adventitious and new creations. Their appearance, indeed, may be adventitious, but not their identity. If a bud can be produced without a rudiment, so may a whole plant.

Fig. 47.

" This figure shows, that the lateral shoots, *d, d, d, d*, and new layer of wood, *b, b*, on the lower part of the stem of the present year, are not attached to each other ; and that the growth of the former can only affect that of the latter indirectly ; nor can they (the shoots, *d, d, d, d*, except the leading one, *c*,) be supposed to assist the formation of the new zone of wood by ejecting fibres *down into it* ; because their fibrous attachment is upon the alburnum, as at *e, e*, Fig. 47 ; that is, upon that division of the envelope which was formed into alburnum in the previous year.

" The young shoots which are elongated and bear the foliage of deciduous trees, are pretty regularly studded with buds along their whole length, though only a small

number of them are developed in succeeding years. A few at the point always burst, namely, the leader and two or three laterals, part of the latter being resolved into branches. Some of the lower situated are prolonged into spurs, and become flower buds, as at *f, g*, Fig. 47; many remain dormant, and are never developed unless the stem be cut over immediately above their station.

"From these circumstances it appears, in respect of secondary or tertiary buds springing from the vital envelope, that that member is possessed of these latent principles, which are put forth when surrounding circumstances favour their development. It was this fact which induced an eminent French botanist to imagine, that vital gems floated in the sap: for on no other principle could he account for their inexplicable appearance."

Lest our readers should imagine that Mr. Main's work is throughout of this fanciful cast, we must remark that by far the greater portion of it is practical, derived, as is stated on the title page, from fifty years' experience. We have accordingly most excellent chapters on "sowing;" "transplanting;" "propagation;" "pruning;" "training;" "felling timber;" "grubbing;" &c. We shall select as a specimen, a passage from his remarks on "pruning," which the reader may remark is not even tinged, much less vitiated, by his fancies about the life being a "distinct member."

"Fir timber for the use of builders and mast makers cannot be too free from knots, and it is impossible to have it so, unless planted and trained up in the closest order. When so disposed no lower branches can live to distort the longitudinal structure of the bole. The centres of the trunks when cut up for use, only show the bases of the first laterals; but every concentric layer of wood imposed after these first branches decay is free from knots. (Fig. 55.)

Fig. 55.

Vertical section of a tree, the lateral branches of which had consecutively died, or been cut when three years old.

"A single fir requires a large space, and produces the worst timber; its first branches continue to enlarge and extend themselves, sweeping the ground as long as the stem continues to rise; and though the latter arrives at a great size, its timber is of the most inferior description, being deteriorated by large knots. (Fig. 56.)

Fig. 56.

Section of a fir tree which has never been pruned, supposed to be cut through opposite branches.

"In fact, fine grained deal cannot be produced unless the trees are planted, or chance to stand so closely together as to prevent all extension of branches. All sorts of the pine tribe intended for profit should be planted to grow up, and, like a field of corn, be all cut down together. Such plantations do not admit of being gradually drawn, except when very young. They may be called, on this account, social trees; for as soon as the unity of the congregation is broken, the exposed trees, for want of their wonted protection, not only cease to thrive, but many die. Firs planted for ornament should stand at forty or fifty feet distances; otherwise they cannot show the grandeur of their forms. The pruner must not touch them; his interference only tends to make them the most ugly objects in the vegetable kingdom. Planted as nurses in young woods of deciduous trees, they are kept within due bounds by a very simple method of pruning, recommended by Mr. Billington, viz. by pinching off from time to time the leading buds of the branches. This induces a spray-covered, rather than a naked stem; and prevents the encroachment of the branches, without destroying their character as nurses. By the same means, fir tree may be formed into impervious screens, or sheltering hedge-like boundaries; very useful in many cases of rural improvement.

"Ash timber is produced of superior quality by being grown in close order; its toughness and clearness of grain make it enviable material for the coach maker. Straight, smooth sticks of ash, fifty feet in length, and from eight to twelve inches diameter, are highly prized by all machine makers. Whether for timber or underwood this tree should always be grown in plantations by itself; not only because of its greater rapidity of growth, but because it is a most noxious tree in hedge rows, or as standing single in corn fields or meadows.

"Oak and elm are best suited for hedge rows. It is incredible how much elm timber can be raised in hedge order. And as the superiors are cut down, a constant succession of young stems are rising from the old roots. No tree bears pruning so well as the elm. So severely is this executed in Middlesex and elsewhere, that a very small branch only is left at the top every time the tree is shredded. This property of being unhurt by wholesale pruning, is owing to the vivency of the tree which, being every where studded with latent buds, throws out a numerous spray over all the stem; and, though unequal to increase the diameter

of the trunk as a large branch head would do in the same time, yet it gives the wood a gnarled character particularly useful for the naves and fellies of carriage wheels, and other purposes where liability to split would be a defect.

"Ages had elapsed before forest trees were considered as objects worth the expense of pruning; but during the last century, the great demands made upon both public and private woods and forests, and the great quantities of defective timber rejected at the dockyards, at last called attention to this neglected branch of rural economy. The defective state of oak timber was attributed to the want of pruning. The rotten stumps of branches which had been torn off by the wind, and which in their decay admitted water into the trunk, were said to be the cause of the disaster. Pruning was therefore had recourse to; but a bad style was introduced, viz. cutting off the lower branches at the distance of two or three feet from the bole. This plan was soon given up; not only because it disfigured the tree, but also because many of the stumps dying, the same defects followed this practice as were complained of before it was had recourse to. Close pruning was next recommended; but with no good result, as has been previously shown. A middle course is now adopted, namely, what is called *foreshortening*. This method preserves all the branches, but the lower ones are kept back, by having their leading shoots repeatedly taken off.

"This is particularly suitable for hedge-row timber, as it prevents the trees from overshadowing the land. It must be observed, however, that though this method gives *soundness*, it does not produce *clearness* of grain, which is the grand object of pruning."

This instance, (and we could easily select many more) will show our readers the useful practical character of the work, and at the same time exemplify the plain easy flow of style which marks every thing that Mr. Main writes. Considering the number and good execution of the cuts, and the manner in which the whole is got up, we must pronounce the work to be as cheap as it is excellent.

CHAPTER OF VARIETIES.

ANECDOTE OF THE DOMESTIC CAT.—The sagacity of animals in shunning disease has been observed by several naturalists, particularly among gregarious animals, who are constantly found to avoid such as are affected with any complaint. Domestic animals are not generally so remarkable for this propensity, as their habits are associated with those of man. A cat I have, however, has exhibited a remarkable instance of sagacity during the present epidemic. She had been in the practice of coming up to my bed-room every morning to drink out of my ewer; but during the continuance of the febrile symptoms attending the influenza, she did not come to drink, and never entered the room. No sooner, however, had the fever subsided, than she immediately returned, and took her morning draught as usual. This shows that the senses of animals, particularly that of smell, must be extremely acute, and that the diseased atmosphere, however insensible we may be to its effect, has a powerful influence on their more acute organs.

E. G. BALLARD.

Islington, August 1, 1833.

THE FOX.—The keen senses of this animal form one of the most distinguishing characteristics and marks of the genus. His predatory habits render it necessary that he should be equally prepared for the attack of his prey or speedy flight. The acuteness of his sight and smell are very remarkable, as well as his agility and suppleness of limb, which enables him to enter passages which would seem impassable to his bulk. To these qualifications, rather than to any preternatural mental endowment, may be attributed the greater part of those tales of his cunning so plentifully recorded by authors. The singular story of the arctic foxes related by Bingley, on the authority of Steller, may, I think, be reasonably questioned, as its particulars are so strongly tinged with the marvellous.

But in this animal, as in many others, we find nature has provided compensation. The rattle-snake is furnished in its moveable rings with an instrument, the noise of which seems as a warning to the inferior animals that would become its prey; and the body of the fox exhales a foetid odour, most probably destined for a similar purpose. It may be for this reason also that it seeks concealment during the day, in holes

in the earth, where it can remain in safety, and seeks its prey while they are asleep, and thus unable to detect its approach.—I have often found that both large animals and insects, particularly those which are either destructive or helpless, are of nearly the same colour as the places of their retreat. This, in common with many others, is the case with the fox.

E. G. BALLARD.

Islington, August 1, 1833.

THE NIGHTINGALE.—The following singular fact is taken from a note relating to this bird, in the Rev. Mr. Bowles's "History of the Antiquities of Locock" (which will shortly be published). "Of the character of the song of the nightingale (says Mr. Bowles), Mr. Coleridge has spoken as being lively and not melancholy. But neither Mr. Coleridge, nor any ornithologist, to my knowledge, has remarked what, I have no hesitation in saying, will be found a fact:—The nightingale has no note of its own, except in commencing its rich and varied song, the first short whistle, and succeeding—jug—jug—as if to prepare itself for its elaborate and rich song. It invariably opens, or, I should say, *preludes* its song, only with those two, its native notes. It then distinctly, and literally as a *mocking bird* *, pours out with richer, louder, and more mellow tones, the identical notes in rapid succession of other singing birds, from the notes of the thrush, the blackbird, the yellowhammer, the lark, the red-breast, the wren, &c., until it is tired. This I know from those who can instantly pronounce, from the song which they hear, what bird sings. Another remarkable fact may be mentioned. The nightingale never sings without a twig upon which it can rest its breast whilst it sings, as if to assist it in exerting all its powers, and for this reason, it always lays a twig across its nest, for the purpose of teaching its young to resort to the same assistance in their future song. While I am on the subject, I may remark another curious fact. The bulfinch naturally has only one note, and that dull. To sing, it must have the regular instruction of art, and then it learns its varied song in cottagers' houses. It may be taught the perfect scale of eight notes, with the half and the whole notes, and modulate exactly any tunes, or bits of tunes, its music master teaches."—E. G. BALLARD.

Islington, July 1, 1833.

* See "HABITS OF BIRDS," chap. xvii. for a refutation of all this.—EDITOR.

THE KINGFISHER AND THE SEDGE BIRD.—On Tuesday last, a man called on me with four young kingfishers, which he had just taken from a nest about five hundred yards from my house. I went the next morning to see it, accompanied by a man with a pickaxe and spade. It was situate in a bank over a very small pond (which for some weeks has been dried up) about a foot and a half below the surface of the turf; about two feet and a half deep, and nearly horizontal, though slightly sloping upwards. We found in it three more young ones, making in all seven. They are all doing very well upon meat soaked in water, but I am obliged to cram them, as they are full fledged and very obstinate, and can fly faster than I can run.

I have procured a very handsome sedge bird, the first aquatic warbler I have ever kept in confinement. It is doing extremely well, and is unaccountably tame. When first caught it would readily take food from the hand. It is very fond of earth worms, and will swallow a very large one, considering the size of the bird: this is quite at variance with the *Ficedulæ*. Its manners closely resemble those of the willow wren.—E. BLYTH.

Tooting, Aug. 22nd, 1833.

THE LONDON NATURAL HISTORY SOCIETY.—While societies for the study of Natural History have been formed throughout the different counties of England, it has been a matter of surprise and regret to the lovers of that science, that no similar institution has been established in the metropolis, which would afford sufficient and general facilities to the student, at a reasonable expense.

To remedy this deficiency, a society has been formed for attaining mutual improvement in this study, in all its branches, by means of Meetings, Excursions, and the formation of a Library and Museum. The subscription is fixed at £1 per annum, to be paid quarterly, in advance; the admission is 5s.

Any person wishing to become a member of this society, is requested to apply by letter, (post paid) to Mr. OGILVIE, 10, Gloucester Street, Queen Square, who will furnish him with copies of the regulations, and any other information he may require.

[We wish all success to this society, which originated in a notice on the cover of an early No. of our Magazine. Such associations we know from experience are both pleasant and profitable.—EDITOR.]

1827, makes mention of a perfectly white monkey that had been caught there. The hair on the animal's body was white, curly, and soft as silk, and excited great wonder and admiration among the natives. They represented that such a creature had never but once, to their knowledge, been seen in those parts, and that the king of Ava sent down a golden cage, with a host of people, to escort the animal to his presence, and expended, besides, 20,000 rupees in sacrifices and public rejoicings, auguring from the arrival of the extraordinary stranger, the most happy presages of good fortune. The monkey brought to our correspondent was one of the same description, but unfortunately it was of too young and tender an age when caught. A Burmese woman who was nursing an infant of her own, requested permission to suckle it, and fairly divided her maternal attention between the two. Pug lived in apparent good health and spirits for six days, but whether it was that its nursing disagreed with it, or that it was naturally very delicate, it died on the seventh day.—E. G. BALLARD.

Islington.

THE CUCKOO.—I take the liberty of sending you a drawing of a young cuckoo, which I trust is faithfully though roughly executed*.

When we consider the difference of plumage between the young and adult birds, it is by no means surprising that it should have been considered as a different species; but there is, I think, no doubt but that the red cuckoo, described by some authors, is the young of the common cuckoo, and so totally different is the plumage of the immature bird, that I think more than *one* year must elapse before the bird acquires its perfect plumage.

The bird which I possess feeds entirely upon raw meat, of which it eats considerable quantities, but is extremely dainty, and prefers being fed by hand to taking food itself. It is very tame, and has no objection to sit on my hand; in fact, when once seated it is difficult to shake it off. When at rest or going to sleep, it sits in the position in which I have endeavoured to draw it, and one would think it was unwell, but it seems perfectly healthy, and chirps when hungry, seeming very eager for its food, which it takes about every hour.

This bird I purchased in London on the 10th of this month (July), and I remarked that it was with another cuckoo, to all appearances

* An excellent figure, which we would have had engraved, had we not already a good cut of the bird from Le Vaillant, in "Architecture of Birds," p. 88.—Ed.

exactly similar in size and markings. Could they have been brought up in the same nest? When I first had him, he was so weak in the wings that he could not fly even across the room, and now, though he grows fast, I am sure that he could not be able to take any long journey at a stretch. Now it has appeared to me, that if the cuckoo leaves this country in the beginning of July, and I believe it does about the first of the month, what can become of the young ones? I have never heard of its being noticed that they leave late in the year, by themselves, but I am sure that this must be the case, unless my bird was hatched remarkably late, and then the circumstance of there being another with him of the same age, seems to throw some doubt as to this being the case.

The migration of this bird is altogether very singular, and I think the reason that we have not noticed particoloured birds (and this must be the case, or the red cuckoo would not have been considered distinct) is because the cuckoo does not *breed* until it is two years old; for I do not think it possible that it can change its brown plumage, for the beautiful and regular colour of the adult bird, in less than two moults, and there can be no doubt that the cuckoo comes to England *solely* to breed.

I think this bird can have no other motive for resorting to this country, because it is believed to migrate from the south, and therefore it cannot come for the sake of *climate*, for it comes in the most temperate part of the year, and leaves us when the hot weather commences: and secondly, it breeds almost immediately upon its arrival, and leaves us as soon as it has performed the necessary duties for propagating the species. The natural history of this bird is perhaps more interesting than that of any other, the wonderful instinct with which it is endowed for providing for its young, and more particularly that it should only choose the nests of those birds which would provide proper food for the nestling, is truly astonishing; how wonderful indeed is that Divine Wisdom which instructed this bird to seek proper nurses for its young, and which taught the foster parent to nourish the young stranger in preference to her own family.

T. C.

REASON OF CATS ALIGHTING ON THEIR FEET IN FALLING.—The instinct which all animals seem to possess in bringing the line of direction of the centre of pressure within the base is admirable. It is this instinct which renders the wild goat and the chamois so fearless of danger in the terrific leaps they take among Alpine precipices; and which enables a cat always to alight on its feet in falling from heights

that appear sufficient to render a fall fatal. Now the operations of instinct, though in many points of view not a little miraculous, are always regulated by some ingenious principle, when that can be discovered; and in the instance of the cat always falling on her feet, it appears to me that the same principle operates which enables us to walk upright by regulating our centre of pressure according to the things around us. In learning to walk, we judge of the distances of the objects which we approach by the eye; and by observing their perpendicularity determine our own. Hence it is that no one who is hoodwinked can walk in a straight line for a hundred steps together; and for the same reason most people become dizzy when they look from the summit of a tower or battlement much raised above the objects in the sphere of distinct vision. A whirling wheel or the current of a rapid river, or the apparent motion of the sea on looking over the side of a fast sailing ship, have often a similar effect. When a child can first stand erect on his legs, if you gain his attention to a white handkerchief tended like a sail, he will stand firm, but the instant you wave it he will tumble down. It is for this reason that rope-dancers, who have a very narrow base upon which to maintain the line of direction perpendicular, keep their eye fixed on a point of the framework upholding the rope by which to regulate their centre of pressure, and for the same reason those who perform difficult feats of balancing keep their eye fixed on the top of the things balanced, to retain the line of direction within the base. It may be accordingly inferred that the reason why a man loses his balance when tipsy is, that his eyes roll so unsteadily as to prevent him from regulating his balance by the things around him, while the muscular feelings that assist him when hoodwinked are also deranged.

It would be curious to ascertain whether a cat, if rendered tipsy, would fall equally on her feet when dropped from a height as a sober cat. The difficulty of the experiment would lie in getting a cat to drink beer, wine, or spirits, all of which it greatly dislikes. I have no doubt, indeed, that it is by fixing the eye on the things around, that a cat falling from a height regulates her centre of pressure, so as to fall on her feet. She is, however, aided in this by the form of her body, somewhat the reverse of that of a greyhound, the centre of pressure lying far back from the head, and consequently bringing down the hind feet rather before the fore feet.

* From "ALPHABET OF PHYSICS, OR NATURAL PHILOSOPHY," by the Editor, now in the press.

NATURAL HISTORY OF THE BIRDS OF AFRICA,

TRANSLATED FROM THE FRENCH OF LE VAILLANT.

THE PIAPIAC (*Pica Senegalensis*, BRISSON.)

Piapiac, *Le Vaill.* Ois. d'Afrique, ii. p. 17, pl. 54. *Corvus Senegalensis*, *Lath.* Ind. Orn. i. p. 163. Lin. i. 158. Gm. Lin. i. 374. *Shaw's Zool.* vii. 371; *Pica Senegalensis*, *Briss.* ii. 40, t. 3, f. 2; Id. 8vo. i. 166; *Corvus Piapiac*, *Daud.* ii. 239; Pie du Senegal, *Buf.* iii. 97, Pl. Enl. 538; Senegal Crow, *Lath.* Gen. Syn. i. 394; Id. Sup. ii. 114; Id. Gen. Hist. iii. p. 39.

I BESTOWED the name of Piapiac on the only species of Magpie which I observed during my travels in Africa, and which I met with in the remotest district of the country of the Great Namaquas. This bird appears to me to be of the same species as that which Buffon has

described under the name of the Senegal Magpie, and figured in his coloured plates, No. 538 ; but I think that the individual, which served as a pattern for the engraver, and from which Buffon wrote his description, was a young bird, that had not attained its full development, for its tail is neither of sufficient length nor sufficiently wedge-shaped ; and, according to the indication of Buffon, his bird not only appears smaller, but has more brown on the tail and wings. Such characteristics, indeed, are perfectly conformable to the piapiac in its young age, and add force to my opinion, that the Senegal and Namaqua magpie belong to the same species. As this bird, therefore, is not found exclusively in Senegal, I considered myself at liberty to bestow on it a different name, which is far more appropriate, and ought to be adopted, on account of its resemblance to the tones of its cry, and which it repeats as distinctly as we can pronounce it.

These magpies perch at the top of lofty trees, where they sometimes assemble in small companies, consisting of twenty individuals. The tail is much longer in the males ; it is even longer than that of our European magpie, and is strongly wedge-shaped, but as its quills are narrower, and exceedingly pointed, it is consequently not so broad.

This bird, although as long as our magpie, is, moreover, more slender in its body ; it is, besides, more rapid in its flight, as the wing-quills are proportionally shorter.

The piapiac, like our magpies, builds its nest at the top of the loftiest trees, fortifies it strongly with thorns, and leaves only a hole for its admission into the interior. Its eggs, which are from six to eight in number, are of a bluish white, besprinkled with brown spots, which are larger and more numerous at the thick end. The savages declared to me that these birds arrived only at certain periods of the year, in the canton in which I discovered them. It is singular that, possessed of such strength and rapidity of flight, they have not penetrated into countries which are situated much nearer to the Cape, and have not, in fact, reached so far as the borders of the Great River, where, at least, I never heard or saw any of them.

This magpie is entirely of a glossy black, paler on the belly than upon the back ; the primary wing-quills, and the lateral tail-quills, have a brownish tinge. The legs and bill are of a pure black, as in our European magpie, and the eyes hazel brown. The female is absolutely similar to the male, except that she is rather smaller, and her tail shorter.

In the splendid cabinet of M. Ray de Breukelerwaard, of Amsterdam,

a bird of the same species is remarked, which, as I have been informed, was sent from Senegal: but this individual has a very remarkable peculiarity, one of its tail-quills is double, at least a beardless stem, which is absolutely of the same dimension as that of the feather to which it is attached at its base throughout its full length, arises from the same quill-barrel; in other respects there is nothing which distinguishes it from the bird which I observed in the Namaquas; and as for the bare stem, which I have just mentioned, it must certainly be looked upon as an accidental variety, a mere whim of nature, occasioned by a superabundance of matter, which produced a double plume, but nevertheless without plumelets. Might not this circumstance give rise to the idea, that the matter which forms the barbs of feathers is of a different nature from that which produces the stem? Besides it is not uncommon to observe double feathers, which are completely formed, rising out of the same quill-barrel.

A GENERAL ARRANGEMENT OF THE BRITISH WARBLERS,
(*Sylvianæ*) AND BIRDS OF THE ROBIN KIND, (*Rubeculinæ*)
WITH VARIOUS REMARKS.

BY EDWARD BLYTH.

IN my paper on the nightingale (p. 196,) it was remarked, that the usual classification of this noted songster amongst the warblers, (*Sylvianæ*), is by no means so natural, and agreeable to the general conformation and habits of the bird, as could be wished; and I there pointed out a number of little dissimilarities, of which, each, in itself, might probably be thought trivial, and of little consequence, but which considered altogether, and conjointly, seem to intimate that the situation which the nightingale has hitherto held in systematic arrangement might, in all probability, be somewhat ameliorated. It is impossible to overlook the great general resemblance which the nightingale bears to the birds of the redstart genus, (*Phœnicura* of authors;) in its form, its manners, its actions, in many of its habits, in the structure of its nest, and in the mottled plumage of the young birds, it approximates closely to the redstart, and the robin-redbreast, and in all these particulars it differs as obviously from the group in which it has been hitherto arranged. The genus *Phœnicura*, however, has been placed

(and naturally enough,) with the birds of the wheatear kind, (*Saxicolinæ*), and it would hardly appear very natural to arrange the nightingale in a group which takes its name from so dissimilar a species as the wheatear, although the wheatear and the nightingale also might both range quite naturally as "birds of the robin kind." I propose, therefore, first, that the Linnæan *specific* name of the robin-redbreast, (*Rubecula*) should be employed as a *generic* name, to denote the redstart and robin genus, and that the term *Phœnicura* (or *red-tail*, which has been used to designate this genus,) should be consequently abandoned as objectionable, inasmuch as it is quite inapplicable to the redbreast, the most conspicuous member of the genus; and secondly, that instead of *Saxicolinæ*, or birds of the wheatear kind, the group should be denominated *Rubeculinæ*, or birds of the robin kind; a general appellation which should comprise the nightingale genus, *Philomela*.

According to this view, the following, I think, appears a natural arrangement of the British *Rubeculinæ* and *Sylvianæ*, two of the subdivisions of the major group, *Sylviadæ*.

BRITISH BIRDS OF THE ROBIN KIND.

*Sylviadæ Rubeculinæ.*Genus *Philomela*; Nightingale.

The common nightingale *Ph. lusciniæ*

Genus *Rubecula*; Robin.

The robin-redbreast *R. familiaris*

The black redstart *R. tithys*

The common redstart *R. arborea*

Genus *Saxicola*; Wheatear.

The common wheatear *S. ænanthe*

Genus *Rubetra*; Chat.

The whinchat *R. migratoria*

The stonechat *R. rubicola*

BRITISH BIRDS OF THE WARBLER KIND.

*Sylviadæ Sylvianæ.*Genus *Ficedula*; Fructivorous warbler, or Fauvette.

The garden fauvette, or garden warbler *F. hortensis*

The blackcap *F. atricapilla*

The babillard *F. garrula*

The whitethroat *F. cinerea*

The furze fauvette, or Dartford warbler *F. ulicicola*

Genus *Phragmites* ; Aquatic warbler.

The reed warbler	.	.	.	.	<i>Phr. arundinacea</i>
The sedge warbler	.	.	.	.	<i>Phr. salicaria</i>
The grasshopper warbler	.	.	.	.	<i>Phr. locustella</i>

Genus *Sylvia* ; Pettychaps.

The shivering pettychaps or wood wren	.	<i>S. sibilatrix</i>
The garden pettychaps, or willow wren	.	<i>S. melodia</i>
The loquacious pettychaps, or chiff-chaff	.	<i>S. loquax</i>

and one or two other species which will be mentioned in the sequel.

All these various birds together with the wrens, the wagtails, the accentors, and a host of others, were included in the immense genus *Motacilla* of Linnæus and his immediate followers ; and, with the exception of the wagtails, in the genus *Sylvia* of Dr. Latham and M. Temminck. The gold-crests (*Regulus*) and I believe also the accentors, are still generally classed amongst the *Sylvianæ*, but they can hardly be said to range naturally with those birds ; further observation, I have no doubt, will assimilate them more closely than has been done hitherto, and assign for each of these two genera a better and more appropriate situation.

The general systematic arrangement and nomenclature of birds, are yet, I consider, quite in their infancy ; we require a vast deal of information on the habits and general economy of various foreign groups before any attempt can be successful towards forming a good and natural general arrangement. I am far, however, from supposing this to be an impossibility ; time, and a few more such volumes as those of Wilson, and Le Vaillant, and Audubon, are necessary to effect it. The works of these worthies alone have done more towards advancing our knowledge of the feathered creation than all the systematic catalogues that ever were written, and these authors' names will stand high, and be quoted as authorities, when the mass of compilers and mere museum naturalists will have sunk into oblivion. There is no great difficulty in arranging animals when once their general economy and habits are well understood, but without a competent and thorough knowledge of these various particulars, it is of little use attempting to form them into anything like a natural systematic arrangement. Very little is known, at present, respecting the manners and the habits of the feathered inhabitants of various portions of the globe. These have yet to be scrutinised, and studied in their native haunts with the same patience, and diligence, and persevering assiduity which mark the naturalists whose names I have mentioned, and which still distinguish

their adventurous and enthusiastic survivor. The time, perhaps, is not far distant when Australia will produce her Wilson, when the ornithology of that vast distant continent will be explored, and published to the world, and become as familiar to the European naturalist as that of North America has already been rendered; when other lands will send forth their Audubons and Le Vaillants into distant countries, and the wonders of creation in every realm be revealed, and made known to all who take pleasure in their contemplation.

In the minor group or subdivision, *Sylvianæ*, will also rank the polyglot, or arbour bird, (*Horticola polyglotta*; *Sylvia hippolaïs* of Bechstein and Temminck, *S. polyglotta* of Vieillot and Ranzani,) a species 'not uncommon in many parts of Europe, and which, I am inclined to suspect, will be found ere long to straggle occasionally to the south of England. Splendid, however, as the music of this interesting species is described to be, it might possibly for a long time pass unnoticed by people in general, as we daily see to be the case with the blackcap, and the garden-warbler, two of our very finest native songsters; but the "rich intonation, and multitudinous variety of its notes," must, I should imagine, at once excite the attention of any observer of nature, and lead direct to its discovery, should it chance ever to make its appearance in any part of Britain, where natural history is at all attended to. I shall make further mention of this bird when I come to the consideration of the generic division *Sylvia*, with one species of which, the chiff-chaff, (*S. loquax*, Herbert,) it has been so strangely and unaccountably confounded.

It is remarked in the paper on the nightingale, by M. Wichterich, of Bonn (page 225), that "there are two varieties of the nightingale, one which sings both in the night and in the day, and one which sings in the day only. I have found only one that sung in the night out of twenty or thirty caged nightingales. The night singers are considerably larger and darker coloured, that is, not so rusty red as the day singers, and they are, according to M. Bechstein, more partial to high ground, while the day singers frequent valleys and hollow ways," &c. Since reading the above, I have paid particular attention to the nightingales which inhabit this district, and am, as yet, by no means satisfied upon the subject. The majority of them, certainly, do not appear to sing in the night; and in some places where, during the day, the air literally resounds with their melody, scarce an individual is to be heard at night to break the universal silence which, at that time, commonly prevails. I have observed, however, the night singers to haunt low damp situa-

tions, as well as high ground; and I think it will be found that their song is generally more continuous, and not quite so loud as those which sing only by day. I rather, however, hazard this last remark, as I have not, as yet, observed it in a sufficient number of instances to conclude that it is so invariably.

On speaking to a bird-catcher on this subject, who sends every year a considerable number of these birds to the London dealers, he informed me that he had often noticed that, in many places, the nightingales sang only by day; that his house was situate between two woods, in both of which nightingales abounded, but that he never remembered to have heard them in the night excepting in one particular rising ground, where, during the season, they might always be heard at all hours. I employed this man to procure me one of these night-singing birds, and he soon succeeded in catching one. He promised also to bring me some nests and eggs of each, but these I have never received. The bird seemed very different from another (a day-singer), which I had at the time in confinement; it was of a darker and more uniform colour, and rather *smaller* than the generality of nightingales which I have seen; the tail, also, was shorter, and its attitudes, in general, more crouching. It seemed of a remarkably tame and familiar disposition, and took to its food much better than is usual with these birds when newly caught. It died, however, about ten days after it was taken, and very much to my surprise, for it fed heartily, was in good condition, and seemed in every respect to have been thriving. The season at that time was too far advanced for me to have thought of procuring another, and I was compelled, in consequence, to postpone the further investigation of the subject until another spring. These observations may, perhaps, appear rather crude, as indeed they are, but I have been induced to offer them in the hope of calling some attention to the subject. Possibly it may yet be found that two distinct species of nightingale inhabit this country, as similar, or even more so than the chiff-chaff and the willow-wren, the distinctness of which no naturalist pretends to doubt. Nothing, however, has been discovered as yet that can be said to constitute any specific difference, and it is probable that the little diversities which have been mentioned will eventually prove to be mere accidental and individual peculiarities. The matter, nevertheless, is worthy of further investigation, as marked varieties are extremely rare among animals in a state of nature; those which have been described as such having, in almost every instance, been proved, by closer research, to be in reality different and distinct species.

It would be of little use here to particularise, in detail, the characters of the genus *Philomela*. Those who know the nightingale will be at no loss to recognise its generic peculiarities, and to those who are unacquainted with the bird, the most elaborate technical description would convey but an imperfect idea. The form is very similar to that of a robin, excepting that it is in every way rather longer and more slender. In manners, also, and general economy, the nightingales very closely resemble the different species of *Rubecula*. As in that genus, the young are at first mottled, each feather of the upper parts having a whitish spot at the tip, and those of the under parts being edged with black: this may be observed in all the British *Rubeculinæ*, but not in the *Sylvianæ*. The plumage of the adults is sombre, of different shades of brown, without spot or streak; and (as in the other *Rubeculinæ*), the feathers are thick, long, and puffy, but smooth, and very pervious to water. They subsist *entirely* on living prey; their food, consisting of worms, and almost every description of insects; especially beetles, both in the grub and in the perfect state, and various large moths (*Tryphænæ*, &c.), which they find on the ground. The nest is of very loose and simple construction, placed on the ground, or sometimes in a ditch bank, but always under covert of a thick bush, and very difficult to discover: it is formed of decayed leaves, generally of the oak (which, in such situations, frequently cover the ground), and lined with dry grass, and sometimes horsehair. Their habits are truly sylvan, their disposition shy and retired, and were not the retreat of our British species always made known by its unrivalled song, it would probably be considered rare, as its presence would scarcely be suspected. As far as is at present known, the genus *Philomela* will contain but two species, the *Ph. luscinia* and *Ph. magna* (*Sylvia philomela*, TEM.) for from what M. Temminck says of his *S. sericea*, it seems probable that that species will rank more naturally in some other genus, perhaps in *Horticola*; but it is impossible to judge without having examined a specimen.

The robin-redbreast and the different species of redstart constitute another small, but very natural, genus, and which, though by different names, has already been described as such by several authors: for reasons already mentioned, I prefer the designation *Rubecula*, and have termed the redbreast (*Sylvia* or *Phœnicura rubecula* of authors), *R. familiaris*, a name to which none can object. The common redstart, also, I should propose to distinguish by the *specific* name *arborea*, rather than by *ruticilla*, or *phœnicura*; terms which have been affixed

to this species, but which are applicable alike to almost every member of the genus. The form of these birds is too well known to require a description; it is intermediate between the nightingales (*Philomela*) and the chats (*Rubetra*). It presents itself, however, under two slight modifications, which differ a little in their habits; one, exemplified in the common redstart of this country; the other, in the robin: their respective peculiarities are, however, united in the black redstart (*R. tithys*), which species may accordingly be selected as the standard of the genus *Rubecula*. These birds are all very partial to the vicinity of man, a fact which, in the common redstart (*R. arborea*), is rather singular, it being, nevertheless, one of the shyest birds we have. The different species are remarkable (see page 290), each for a peculiar tremulous movement of the tail; and there are but few persons, I should imagine, who have not often noticed the jerk, or rather, *bowing* motion of the robin-redbreast (accompanied often with a loud *tit tit*), when he sees any object of distrust: this *bow* I have observed in the black redstart (*R. tithys*), and occasionally also in the common redstart, in the nightingale, in the common wren, and (during the breeding season) in the gold-crested regulus: the magpie, also, has frequently a similar movement. The species of *Rubecula* nidificate in various situations, such as the chinks and crannies of old walls, particularly if covered with ivy or other plants; in the clefts of rocks, in church steeples, or in various out-buildings, &c. The common redstart selects frequently the hole of a tree; and the redbreast usually prefers situations near the ground; in a ditch bank, in the holes and mossy nooks formed by the half-exposed roots of trees, and often in an old basket or a flower-pot, if placed in a secluded situation. It may be observed, however, in all these various locations, that the *Rubeculae* invariably select some little snug recess wherein to rear its progeny; and accordingly, as might be expected, the nest is not of that firm compact structure, which we observe generally in those which are more exposed to the weather. It is composed, in most instances, principally of moss, and lined with horse-hair, but in the redstarts' nests with soft feathers. The young, as in all the other British *Rubeculinae*, are at first mottled, in the manner above detailed of the young nightingales. It would be needless here to describe the redbreast's song: that of the redstart is plaintive and not unpleasing, and it often introduces the notes of other birds: I have heard it imitate the blackcap very correctly, and also the monotonous *stuttering* note of the bunting (*Emberiza miliaria*). As in the robin, its natural song is broken and interrupted, and not very

unlike that of the missel-thrush (*Turdus viscivorus*), only not nearly so loud. Like that bird, also, it frequently sings as it flies from tree to tree. The black redstart's song I have never heard, but have very little doubt of its possessing one, though I have never yet met with a description of it. The species, though common enough in many parts of Europe, has but lately been discovered in Britain, and can only be considered here as a rare and accidental straggler. It is a bird intermediate between the common redstart and the robin; like the former, it is an expert flycatcher, and the sexes are very dissimilar in plumage; and as in the latter, its manners are remarkably familiar and domestic. This bird, together with an Indian species, the *Rubecula atrata*, has been beautifully figured in a volume of the ornithological illustrations, conducted by Mr. Selby, Sir W. Jardine, and other eminent naturalists.

Genus *Saxicola*. It is not without due and careful consideration that I have ventured to divide the chats (*Rubetra*) from the wheatears (*Saxicola*). There appears, however, to be as much difference between them as exists between the generic divisions *Lanius* and *Collurio*, between *Astur* and *Sparvius* (*Accipiter* of some authors), *Tyrannus* and *Tyrannula*, and many others which might be named, and which, as separate genera, have been adopted by various writers of distinction. They moreover differ as much from each other as the two genera which have been just described, *Rubecula* and *Philomela*. The form of the bill, in *Rubetra*, is more that of the fly-catcher than in *Saxicola*; and their respective habits are in accordance. The birds of the former genus are smaller than those of the latter, and they require, at least in confinement, a more nutritious kind of food. The two British species of *Rubetra*, like the nightingale, I have never found to thrive well in the cage without much animal food, but the wheatear will subsist, and thrive, upon bread crumbs and bruised hemp-seed. This latter food, or rather a slight variation of it, crumbled buns being used instead of bread, mixed with a little of the German paste sold in the shops, I have found to be an excellent general food for most soft-billed birds; the redbreast, the wheatear, and many of the warblers (the *Ficedulæ* in particular) will do well on this food only; but the whinchat and stonechat require something more nourishing, and if they have not, every day, a little meat given to them in addition, they will very soon die. The general haunts, also, of the chats are somewhat different from those of the wheatears. The former frequent chiefly commons overrun with furze, and a few (particularly whinchats) may often be observed in the

more cultivated parts, in small inclosures, and along hedges by the road-side, especially if there be a thick growth of weeds on the bank beneath; but the wheatears, the species to which I would restrict the generic term *Saxicola*, are found more upon large open downs, and in mountainous and rocky districts; our British species abounds in many parts of the sea-coast, and at the ebbing of the tide, may often be seen on the sands, in great numbers, feeding upon the various marine insects, &c. thrown up by the sea. A few may also be generally seen about ploughed fields, in gravel-pits, and in the vicinity of old stone-walls; but they never haunt furze-brakes, the true habitat of the *Rubetræ*, unless in the immediate neighbourhood of such situations as are above-mentioned. The nest, in the few species of *Saxicola* (as here restricted) whose nidification is known, is built on the ground, under covert of a stone, or clod of earth; frequently in a deserted rabbit-burrow, or in the hole of a rock, or old wall. It is composed of dry grass and moss, intermixed with wool, and lined with the last mentioned material, and generally (when it can be procured) with hair. The song of our native species is pleasing and varied, and its notes are continuous and unbroken; not, as in the other British *Rubeculinæ*, delivered in short interrupted staves. It is generally uttered as it suspends itself on the wing over the female or the site of its nest. During the pairing season, the manners of this bird are very amusing; with tail expanded, and wings a little spread, he jerks, and bobs, and flirts about, often appearing as though he found it difficult to balance himself upon his perch. A close observer may have noticed somewhat similar manners in the chats, but in these birds they are hardly marked enough to attract particular notice, and would never, perhaps, have been observed at all, had not the attention been excited previously by beholding them in the wheatear. For the standard of the generic division *Saxicola*, might be selected the russet wheatear (LATHAM) of southern Europe, (*S. stapa-zina*, TEM.,) in preference to the wheatear of this country; the latter resembling too much the *Rubetræ* to be considered as the standard species of its genus.

The common whinchat and stonechat of this country seem to be the only European species of *Rubetræ*, the other various *traquets* of M. Temminck appearing all to range more naturally in the wheatear genus. There are, however, I believe, several others found in different parts of the old continent, and I lately saw a specimen of a bird of this genus from New Holland, which excepting in being a little larger, was hardly to be distinguished from the European stonechat. The general haunts

of these birds have already been described. Their nests are placed upon the ground, amongst the grass, or at the bottom of a furze or other bush, very artfully concealed, the entrance not being from above, but often by a long and winding path made through the adjoining herbage; they are composed chiefly of moss, and the dried stalks of grass, and lined with horsehair and grass of a finer texture, and sometimes feathers. Their song, as in most of the *Rubeculinæ*, is interrupted and broken, and the notes of the whinchat closely resemble those of the common redstart*, (*Rubecula arborea*). As in that species, it frequently pours forth from the top of a high tree; a habit which I have never noticed in the only British species of the neighbouring genus *Saxicola*. The *Rubetræ*, when reared from the nest, are remarkable for their talent for mocking, and even in the wild state I have heard them imitate the notes of other birds very correctly. Le Vaillant mentions an African wheatear (*traquet imitateur*) that, in its wild state, imitates the notes of every bird in its vicinity; but it certainly is not a very usual habit among the *wild* birds. The faculty, however, may be more or less observed in most of the *Rubeculinæ*. A very curious fact, in the *Rubetræ*, is the amazing predominancy of females among the young birds; this was observed by the Hon. and Rev. W. Herbert; and out of five young whinchats and four stonechats which I have this season reared from the nest, I have obtained but one male of each species. In the furze-warbler, the white-throat, and some other small birds, there is a similar preponderance of the other sex. I may remark here, that the young cock stonechats may readily be distinguished from the hens, in their nestling plumage, by a large white spot on the wing, which, in the female birds, is of a light brown.

The chats, like the rest of the *Rubeculinæ*, subsist on earth-worms, and insects of all kinds: sometimes, in the manner of a flycatcher, taking their prey on the wing; they feed likewise greedily on small snails, and on some kinds of berries; they are particularly fond of beetles, and perched, as is their usual habit, on the topmost twig of a bush, they can espy one crawling among the grass at a considerable distance. Wilson observed the same habits in the American blue bird (*Sialia Wilsonii*, SWAINSON), and in a note which Sir W. Jardine has appended to his (Wilson's) admirable description of that species,

* They are, however, to be distinguished. Each stave of the redstart's song usually begins with a long drawn, plaintive note, resembling *tyare*. The whinchat's notes commence generally with a sort of *tit tit*.—E. B.

the habits of our British *Rubetræ* are admirably pourtrayed. This note I should have taken the liberty to have transcribed entire, had it not been already cited at page 34. It contains, however, one remark, to which I rather object. Sir William says, that "they alight at intervals, *run* for some distance, and again remount to a fresh station." M. Temminck also observes, "leur nourriture se compose *uniquement* d'insectes, qu'ils saisissent le plus souvent en *courant* avec célérité; leur tarse souvent très long les rend assez agiles *coureurs*." Mr. Selby again remarks, in his "generic characters" of *Saxicola*, (which term has always hitherto comprised both the wheatears and the chats,) that "they *run* with much celerity, being enabled to do so by the great proportional length of the tarsus." These several observations seem to imply, that the mode of progression of these birds, when on the ground, is not by successive hops, but by *running*, in the manner of the larks and wagtails; the latter, however, is not the case; the wheatear, as Mr. Selby afterwards observes, "*hops* with great celerity," and much in the manner of a robin, and the chats also move forward by hopping, though not exactly like the wheatear; they dart forward a considerable space at each spring, and hardly rising from the ground, really appear, at a little distance, to move by running. These minutiae, trivial as they may perhaps seem, are by no means to be disregarded, inasmuch as they often render most essential assistance towards the grouping of animals in a natural and proper manner. In this point of view, the differences in the progressive motion of birds seem never to have been sufficiently taken into consideration.

The Rev. G. White remarks, in the Natural History of Selborne, that "whinchats and stonechatters stay with us the whole year." This, in the whinchat, is very unusual, but a few stonechats may generally be observed throughout the winter on most commons in the south of England. Both species were, however, to be seen upon Mitcham common last January. A few wheatears, also, are sometimes observed during the winter months, and I have been, more than once, informed, that nightingales and redstarts have been noticed so late as in the last week in November. I cannot, however, corroborate this from my own personal observation, but I think it not very improbable. The whinchat and stonechat, in confinement, are rather tender birds, and are remarkable for the curious and *outré* positions which they continually assume; attitudes which, in stuffed specimens, would be declared quite unnatural by such as were unacquainted with the birds when alive. The *Rubetræ* (especially the stonechat) and also the *Saxicolæ* are further remarkable for perpetually flirting the tail.

It will appear from the foregoing observations, that the general similarity which, in a systematic arrangement, approximates these various species together may be traced, not only in their mere external form, as studied in museums, but also in a variety of minute and collateral resemblances; in their mode of nidification, their manners, their actions, even in their notes; in short, in many of the most trivial and minute particulars; unimportant, perhaps, in themselves, considered singly and individually, but which all concentrate and tend alike to show that the arrangement which I have above proposed is not founded merely upon a few arbitrary and artificial characters, like the huge incongruous genera which some writers seem to prefer, but is based likewise on a general consimilarity of habits, economy and mode of life. In all the *Rubeculinæ* it may be observed, that the nest is invariably placed either on the ground or in a hole; never (as in most of the warbler genera, *Sylvianæ*,) fixed among the twigs of a bush, or on the forked branch of a tree, but always resting on a solid and substantial basis. It is mostly of rather loose construction; and the materials and situation vary, in the several genera, according to the different localities which they naturally inhabit. In all the species we may observe a considerable resemblance in form and manners to the robin-redbreast, the standard of the group; a little modified, of course, in the different genera, but in each adapted peculiarly to the particular mode of life allotted to its several species. I might here add a variety of little trivial particulars, as further instances of the resemblance which may be traced throughout these various birds, but enough has been already mentioned to show that the arrangement is quite natural. The peculiar double note, however, which all the species utter when a person is near their nest, is worthy of being noticed: this, in the nightingale, may be expressed by *hweep*; *hweep, carre*: in the redstart, by *hweet, tit tit tit*; *hweet tit tit*: in the robin, by a loud *tit tit tit*, and now and then a long drawn plaintive note (between a whistle and a hiss), which cannot be expressed in writing: the stonechat's note resembles *hweet, jur, jur*; *hweet, jur*: the whinchat's is *yeer, tip*; *yeer, tip, tip*: and the wheatear also has a note analogous, but which I cannot accurately express in writing, from mere memory. The common grey fly-catcher (*Muscicapa grisola*) has likewise a note of this kind, which may be tolerably expressed by *ist, chit*; *ist, chit, chit*.

The general characters of the *Sylvianæ*, or warblers, are well known to every student of natural history, and it would be consequently of little use here to dilate much on their peculiarities. The known

British species are all referable to three generic divisions, one of which, *Ficedula*, has already been described in detail in the No. of this Magazine for July last. The birds of this genus may be distinguished easily (see page 306) by the form of the aperture of the bill, and by the *red** colour of the inside of the mouth, which, in the other genera, is of an orange yellow. Their make is slender and elegant, and presents itself under two slight modifications: one rather more stoutly built, and more strictly and thoroughly fructivorous, of which the blackcap and the garden warbler may be adduced as examples; the other exemplified in the furze warbler and white-throat, more insectivorous, and, though fond of fruit, not so ravenously so as the former, and living, in general, nearer the ground than those birds. The babillard (*F. garrula*), an intermediate species, may be considered the standard of *Ficedula*. The nest, in this genus, is placed *usually* in a low bush; often, in the blackcap and garden warbler, in a forked branch, at four or five feet from the ground; and, in the babillard, sometimes at the height of eight or nine feet, but most commonly near the ground. It is of rather flimsy construction, but firmly put together, composed chiefly of the withered stems of catchweed (*Galium aparine*), formed into a kind of basket-work, and lined with fine dry grass and horse hair, and in some species with small fibrous roots. Their song, generally, is continuous and uninterrupted; in some species very fine, usually beginning low and increasing in loudness as they proceed. Their food insects, and almost every kind of fruit and berry; their habits and manners have already been described in detail, in the article to which I have above alluded, (page 306,) wherein will be also found a notice of the bird described by the Hon. and Rev. W. Herbert, under the name of

The East Woodhay warbler, (*Curruca Bidehensis*, Herbert). This species, I am inclined to suspect, from a careful perusal of the European *Bec-fins* of M. Temminck, will prove to be identical with the bee-fin rubigeneux (*Sylvia galactotes*) of that author. Its superior size to the *Sylvianæ* in general; "as large as a nightingale." Herbert. "6 pouces, 6 lignes." Temminck; (the nightingale *Ph. luscinia mea-*

* I was wrong in stating, in a note to page 307, that the garden warbler (*Ficedula hortensis*) was an exception to this rule. A nest of very young featherless birds had been brought to me for garden warblers, in which the interior of the mouth was yellow; and, on my referring to Montagu's description of his *Sylvia hortensis*, I found it stated, that "the pettychaps of Mr. Pennant seems to correspond with this, except that the inside of the mouth of this inclines more to yellow than red." Hence originated the mistake.—E. B.

suring, according to that author, six inches five lines).* The bright rufous colour of the upper parts, and the "glossy silver colour" (Herbert, "blanc Isabelle," Tem.)* of the under parts, all seem indicative of their identity; and the only particular which is at all at variance in the two descriptions is, that Mr. Herbert mentions "a dark line over the eye," whereas M. Temminck observes, that "une bande brune va du bec à l'œil, et un sourcil blanc passe au-dessus." The *Sylvia galactotes* is described by M. Temminck to be a new species, from the southern provinces of Spain, much resembling in its form the Rousserolle (*Sylvia turdoides*, Meyer;), and he makes the following rather remarkable observations †: "I am not aware that this species inhabits reeds and aquatic situations, but I range it provisionally in this ("the aquatic") section; it is only by means of a knowledge of its manners and habits that the proper situation of this species can be determined with accuracy, in the division of these birds into aquatic and sylvan sections." From this remark of M. Temminck, I think it very probable, that the species will rank neither in *Ficedula* nor in *Phragmites*, but (perhaps with *S. turdoides*) in a separate generic division; and this view is further corroborated by what the Hon. Mr. Herbert states of his East Woodhay warblers, that "they were not in the least shy, but sat very still either on a low branch of an oak tree, or some part of the fence, and were quite mute." This trait in their manners, in the month of May, I need scarcely add, is entirely at variance with those of both the fructivorous and the aquatic warblers, all the species of which are remarkable for their extreme shyness and love of concealment. I may here also observe, firstly, that the general form and structure of the members of these two genera are much too distinct to be ever confounded by any person of the least discrimination; and, secondly, that the habits alone of these birds will *not*, in every instance, indicate the genus to which they belong. M. Temminck says of the grasshopper warbler, (*Phragmites locustella*), that "it frequents the borders of rivers; that it feeds on the insects, &c. natural to such situations; and that its nest is built among the reeds, or in large tufts of herbage." Every syllable of which is either quite incorrect, and demonstrative of

* This tinge of buff (*Isabelle*), probably very faint, was most likely overlooked by Mr. Herbert, who only saw the bird when in a state of liberty.—E. B.

† J'ignore si l'espèce habite les roseaux et les bords des eaux, je la range provisoirement dans cette section; car seulement la connaissance des mœurs et des habitudes peut déterminer au juste la place qu'on doit lui assigner, dans la section des *riverains* ou bien des *sylvains*.

the inaccuracy of all descriptions written from mere analogy, or, what is very improbable, the habits of the grasshopper warbler on the continent differ essentially from the habits of the same species in this country. I could point out, however, a number of other similar inaccuracies in the *Manuel d'Ornithologie*, if there were necessity for so doing, but shall here merely remark, that however high M. Temminck's authority may stand on other points, and I have not the slightest shadow of a wish to detract from his real merits, still what little he says on the *manners* and *habits* of birds, is by no means to be implicitly relied on. The grasshopper warbler, though it belongs most decidedly to the genus of aquatic warblers (*Phragmites*), the habits of which, in most instances, are such as M. Temminck has described those of this species to be, is never found (like its congeners) on the borders of streams and ditches, but upon open moors and commons, overgrown with brambles, furze, and underwood; sometimes, it is true, haunting low damp situations, but not unfrequently places where no signs of moisture are visible.

The aquatic warblers (*Phragmites*) are a very distinct group from the *Ficedulæ*, and resemble more, in their manners, the pettychaps or willow-wren genus (*Sylvia*). They are distinguished by having the forehead and crown remarkably low, and flat; the wings, in most species, very short, and rounded; the tail invariably wedge-shaped; in some instances rather long; the bill strong, often much dilated at the base, and, in some species rather longer than in most of the *Sylvianæ*; the aperture straight, and anterior to the eye—not, as in the *Ficedulæ*, descending with a curvature below the eye. The plumage is generally sombre, of different shades of olive; in some species plain, in others more or less marked with spots of a darker colour, and sometimes a light streak over the eye. The species are pretty numerous, and appear divisible into two or three sections, in one of which might be comprised (with various other species) the reed and sedge warblers of this country; and another might be formed, to contain the grasshopper warbler, and probably, also, the *Sylvia certhiola* of M. Temminck. They chiefly frequent marshy places, and the borders of lakes and rivers; are all, I believe, migratory, and very shy and impatient of being observed. The nest, in the three British species, varies considerably in structure and situation; the birds, indeed, are not what is commonly called very “nearly allied.” Speaking however, of the genus generally, the nest is usually formed of the coarser grasses, and the seed-tops of reeds, with sometimes a little moss, and

lined with fine dry grass and horse-hair. It is placed generally in a low bush, or among the low side branches of a poplar or willow tree near the water; or it is firmly bound (in some species) to a few contiguous reed-stems. The construction is thicker and more solid than in the nests of the *Ficedula*, the quantity of material being much greater; and it is usually very deep, in most species nearly oval. Their song consists generally of a great variety of guttural, grinding notes, by no means unpleasing, and may be heard alike at all hours, by night as well as by day. That of the grasshopper warbler, however (if song it can be called), is very peculiar. Mr. Selby describes it well, as "a sort of sibillant ringing cry." It is a singular, continuous, rattling, or rather thrilling sound*, beginning generally very low, and becoming, in about a minute, loud enough to be heard at a considerable distance: this continues for several minutes without intermission, and is uttered with a kind of ventriloquism, the bird continuing in one place, while the voice would intimate that it was perpetually shifting its situation. This species has been represented as extremely rare in the neighbourhood of London, a statement which does not correspond with my observation, as I have heard, and indeed shot, several within five or six miles of the metropolis. I have known them to *breed* on Streatham Common, and likewise on Penge Common†, within that distance of London; also on Wimbledon Common, and (in great numbers) in a particular part of Coombe Wood‡, where, on a summer evening, the whole place seems in a thrill with them. In this neighbourhood they are amongst the earliest of the summer birds of passage, making their appearance generally about the first or second week in April; and, on their first arrival, are easy enough to procure, as they then often expose themselves, at all hours, on the topmost twig of a bramble or other bush, repeating, almost incessantly, their monotonous, unvaried cry. After a week or ten days, however, (that is, when the female has arrived,) these birds no longer expose themselves, but skulk all day in silence amongst the thickest brambles, rarely commencing

* It bears not the slightest resemblance to the shrill and not unpleasing cry of the common shrew (*Sorex araneus*), the species whose faint chirping cry was once thought by Solitarius to proceed from the grasshopper-warbler. See page 403.—E. B.

† Amongst the brambles and underwood, on the *left* side of the Croydon canal going from town. I have never observed them on the other side.—E. B.

‡ The low ground about Coombe Bridge; I have heard them also in various parts of the wood.—E. B.

their chant until the setting of the sun, but continuing then, with very little intermission, throughout the night. Their note considerably resembles that of the mole-cricket (*Gryllotalpa vulgaris*); and it has been suggested by Montagu, that as it is chiefly uttered at the time these singular insects are about, it may possibly serve also as a decoy to inveigle them to their destruction; had this, however, been intended, it is probable that both sexes would have been endowed with the same deceptive cry; whereas, the female grasshopper warbler is, it is believed, quite mute.

In one of the excellent and original notes to White's "Natural History of Selborne," by the Hon. and Rev. W. Herbert, to which I have already so often referred, is a figure and description of the nest of an aquatic warbler, found by that gentleman in the neighbourhood of his residence, at Spofforth in Yorkshire, and which is now in his possession. The owners having deserted it, there was of course no method of ascertaining the species to which it belonged; but it is, most decidedly, the nest of a bird of this genus, and different from that of any of the species whose nidification is known. It contained one small, acute, white egg. M. Temminck states, but without mentioning his authority, that several specimens of the bouscarle (*Phragmites cetti*, *Sylvia cetti*, MARMORA) have been killed in England, and that it is here probably always confounded with the reed warbler (*Ph. arundinacea*). He infers, also, from this, that the species is probably more widely distributed than naturalists are aware of; but as, excepting in this instance, the bouscarle has never been found but in the south of Europe, it is more than probable that that author was misinformed. All the aquatic warblers whose nests are known, with the exception of the grasshopper warbler, lay spotted eggs*; and I think it extremely probable that the species, the nest of which was found by Mr. Herbert, will turn out to be new, and hitherto undescribed.

The generic division *Sylvia* being now rendered sizeable, and limited to one only of the numerous and dissimilar groups, or natural genera,

* The egg of the bouscarle is of an extremely dark colour, and not very unlike that of the tree pipit (*Anthus arboreus*). This bird, together with its nest and eggs, forms one of the very best of Shintz's coloured engravings of the European *Sylviada*. The colouring of these plates, in most instances, is very correct, but the figures are, in general, most execrable, having evidently been taken from villainously stuffed specimens. Most of the numerous representations,* however, of the nests, and eggs, are admirable.—E. B.

which it was once made to comprise, contains three well-known British species; and I have reason to suspect one, if not two others, which have hitherto escaped the attention of British ornithologists. I have termed the genus by the English name *pettychaps*, in preference to *willow-wren*, the latter not being at all applicable to these birds, and implying that they particularly frequent willows, which is not the case. *Pettychaps* is not quite so euphonical a term as could be wished, but it is well known to most readers of natural history, as having been employed by many writers to denote the garden warbler (*Ficedula hortensis*), and also the chiff-chaff (*Sylvia loquax*, HERBERT), contradistinguished from each other by the appellations *larger* and *lesser*. How the garden warbler came to be so termed is not easy to imagine, as it is one of the strongest billed birds of its genus; and it is as difficult to conceive how the chiff-chaff came to be considered as a sort of diminutive of the garden-warbler, there being no manner of resemblance between them; but chiefly, I suppose, from a disinclination to alter established names, however inappropriate. The terms *greater* and *lesser pettychaps*, have been adopted for these two dissimilar birds by most of the British writers on ornithology. The name *Pettychaps* is certainly very expressive of the delicate little beaks of the *Sylvia* (as now restricted), and I have therefore employed the term as a general appellation for the various members of this genus; it being as well always, I think, as far as possible, to have a vernacular designation for every generic division.

Sir James E. Smith (as quoted by Mr. Loudon) has well remarked, in botany, that "while *Rosa*, *Rubus*, *Quercus*, *Salix*, *Ficus*, *Cypripedium*, *Epimedium*, and *Begonia* exist, it will be in vain to deny that generic distinctions are founded in nature, although botanists may, as yet, be very far indeed from having discovered them all correctly." That this remark applies with equal force to the other branches of natural history, all, who have given them a study, cannot fail to testify. In ornithology natural genera certainly do exist, but as the number of species is not near so great as in botany, so also the several genera are much less extensive. It is, therefore, possible, the generic divisions being small, that the specific names can, in most instances, be rendered significant and exclusively appropriate, each expressive of some peculiarity not to be observed in the other members of the genus. Impressed with a belief in this possibility, I have ventured, together with some other alterations, to change the name of one species of *Sylvia* for a name which I consider better and more expressive of a specific peculiarity,

but, in doing so, I think I have selected a term which cannot give rise to any confusion, because the other known species of the genus do not possess the peculiarity which this altered name implies. The yellow or willow-wren of British authors (*Pouillet* of the French) is particularly distinguished from its congeners by possessing a delightful and truly melodious song, and I have therefore termed the species *Sylvia melodia*, in preference to *S. trochilus*, a name which it has hitherto borne, but which, as it is without any definite meaning, might with equal propriety be affixed to any other member of the genus, which *melodia* could not.

The members of the genus *Sylvia* are beautiful, delicate little birds, so similar to each other in appearance that few common observers distinguish them. They have no varied song like the *Ficedula*, but uniformly, with very little variation, reiterate the same run of notes, which, in the three common British species, is remarkably dissimilar, considering the close resemblance of the birds. They chiefly frequent woods and the neighbourhood of large trees, but one species (the willow wren, or garden pettychaps, *S. melodia*) is found abundantly in almost every other situation, by the road-side, in gardens, and amongst the brambles and furze on commons. Their bills are small and weak, and of the true warbler form; their plumage chaste and inobtrusive, always more or less tinged with green and yellow, with a light streak over the eye, in some species broad and well defined. The nest is built upon the ground, amongst the herbage, or occasionally in a low bush; sometimes, in the wood-wren, against the trunk of a tree; it is of an oval form, with a rather wide opening near the top, composed of dead leaves, dry grass, and moss, and lined with a profusion of feathers; but in that of the wood-wren *invariably* with fine dry grass and horse hair. All the species have a very plaintive cry when any one is near their nest: that of the wood wren is not peculiarly dolorous, it may be expressed by *tee-yip*. The willow-wren's is *hui*, or rather *heu-ee*; and that of the chiff-chaff is extremely similar, though not so much so but that it may be distinguished, being uttered in rather a different key, and it does not articulate the two syllables so distinctly as the willow-wren. The food of the *Sylvia* consists chiefly of aphides, small caterpillars, and the smaller winged insects, which latter are frequently taken on the wing, in the manner of a fly-catcher (*Muscicapa*).

As the birds of this genus have been, and still are, very much confused, I shall conclude this long (and, I fear, tedious) paper, by endeavouring to elucidate the several species as far as I am able. Three species are very common in the south of England; these are

The wood-wren, or shivering pettychaps, (*S. sibilatrix*) ; very easily distinguishable from the others by its broad, well defined, yellow eye streak, by the brighter green of the upper parts, and by the pure silvery white of the belly and under tail-coverts, which latter in the other species are tinged with yellow. The gape of its mouth is wider, and the *tibia* bone of the leg shorter than in the others ; its attitudes are, in general, more crouching, and its wings are longer, extending, when closed, more than half way down the tail. It chiefly frequents oak and beech woods, and is never heard but in the vicinity of high trees, where it may be recognised easily by its remarkable shivering note, resembling *twit, twit, twit, tit, tit, tit, tit, ti-ti-ti-i-i-i*, beginning slow, but gradually becoming quicker and quicker, until it dies away in a kind of thrill. During the utterance of this it shivers its wings in a remarkable manner.

The willow-wren, or garden pettychaps, (*S. melodia*). This is much the most abundant of the genus, arriving in this country early in the month of April, (the wood-wren does not make its appearance till the very end of that month), and haunting alike all situations, the fields and the woods, the road-side, the gardens and the commons. It is eminently distinguished from its congeners, by its charming and truly melodious song, consisting generally of ten or twelve extremely sweet and musical notes, being a repetition of the sound *heu-ee*, delightfully modulated, each succeeding note being uttered a little deeper than the preceding, like running down the notes of a gamut, but laying a greater stress on the concluding three or four ; or, to express it still more minutely, the stress in the first notes is placed more on the latter syllable *ee*, becoming gradually greater upon *heu*. These notes, (or rather this repetition of one note), though they constitute the whole extent of the willow-wren's song, are nevertheless most pleasingly varied, being sometimes extremely loud, at other times uttered in a very soft and low tone ; then, perhaps, they are delivered in a different key, or with a few additional notes ; sometimes two syllables are distinctly articulated, at other times only one ; in short, this little bird, in my opinion, is one of the most pleasing songsters we possess ; and, as in the spring it is one of the first of the migratory birds to greet us with its melody, so also, in the autumn, it is generally the very first to resume its song, having often finished its moult by the first week in July. It is of about the same size as the wood-wren, or perhaps a trifle smaller ; the whole plumage of the upper parts is darker, inclining more to olive ; the eye-streak, though tolerably well defined, is of a more dingy colour, and not so broad and conspicuous as in the wood-wren ; the under

parts, also, are more dingy ; and the under tail-coverts are tinged with yellow, a character by which it may always be at once distinguished from the wood-wren, in which these feathers are of the purest white. The legs (*tarsi*) and feet of the willow-wren are of a *yellow brown*, forming the best distinctive character between it and the chiff-chaff, the legs and feet of which are of a *dark brownish black*.

The chiff-chaff pettychaps, (*S. loquax*). This species, though very well known to the naturalists of this country, seems to have been altogether overlooked on the continent, or confounded with the rufous pettychaps, (*S. rufa*.) It assimilates most closely in appearance to the willow-wren (*S. melodia*), but may be distinguished by being rather smaller, and of a rather darker hue ; but more especially by the different colour of the legs and feet, and by the comparative shortness of the wings, which in this species, when closed, hardly reach to the tail. Its song, also, differs most essentially from that of the willow-wren, and consists but of two notes, resembling *chik, chah, chik, chah, chik, chah*, repeated ten or twelve times in monotonous succession, and which, as the excellent observer White remarks, are often uttered with such emphasis as to cause a distinct echo in hollow woods. These notes, however, are not always exactly as above represented ; sometimes they are nearly monotonous, and at other times they may be expressed better by *tsick, tsing, tsick, tsing* ; and occasionally, but rarely, a note like *chrah, chruh*, is introduced : but that these all proceed from one and the same species I have ascertained by means of the gun. Though this is the smallest of the three common species, the *tibia* bone of the leg is longer than in either the willow-wren or the wood-wren. It is the earliest of the summer birds of passage, (at least, of the migratory *Sylviadæ*,) and in these parts, is generally first heard about the close of the month of March. Like the willow-wren and the wood-wren, it sometimes sings as it flies from tree to tree.

In a monograph of these birds, by the Hon. and Rev. W. Herbert, in one of his notes to White's Selborne, mention is made of a species distinct from either of the above, under the name of the ching-ching, or monotonous wren (pettychaps), which he considers to be identical with the *bec-flû à poitrine jaune*, (*Sylvia hippolais*), of M. Temminck. He adds further, that "it frequents trees in woods, and may be seen very conspicuous upon oak trees, before the leaves are full grown, articulating its monotonous *ching, ching, ching*. I observed and listened to one for a long time last week, on the twenty-eighth of May, on some oak trees in Coombe Wood, near Kingston-upon-Thames, at

which time the hen bird, which I could not perceive, was probably sitting amongst the thick underwood." I have invariably found the measurements and descriptions of plumage in M. Temminck's *Manuel* to be most scrupulously correct, as far as could possibly have been taken from museum specimens; and I have therefore very much wondered that the whole of our British writers on ornithology should have considered the *Sylvia hippolais* of that author to have been identical with the common chiff-chaff of this country. The chiff-chaff (*S. hippolais* of British naturalists) is a *smaller* species than the willow-wren, the latter measuring, as Temminck correctly states, about four inches, five or six lines *; but the *S. hippolais* of the continental writers is a much *larger* bird, and measures, according to the same author, five inches, four or five lines. M. Temminck's description, also, of the plumage of his *bec-fin à poitrine jaune*, does not accord with that of the chiff-chaff, and it is therefore clear, that two distinct birds have hitherto been jumbled together under the one name *Sylvia hippolais*. Mr. Herbert, however, is wrong in considering his ching-ching to be the *S. hippolais* of the continental writers, for I find, by the most careful and minute comparison, that the polyglot (the bird described at page 50 of this magazine, under the name of "the arbour bird," *Horticola polyglotta*,) is the species intended; and I was incorrect, therefore, myself, at page 204, in stating that Temminck's *S. hippolais* referred, not to the *Horticola*, but to the ching-ching. I have now before me a specimen of the polyglot, which corresponds exactly to a feather with M. Temminck's description of *S. hippolais*; it bears not the least resemblance to the different willow-wrens, excepting in the colour of its plumage; its bill is large, and of the nightingale form; longer, and not quite so thick as it is represented at page 52, and the rictorial bristles, also, are not so large and conspicuous as they are there made to appear. The under mandible of the bill, as Temminck states, is white; in the chiff-chaff it is of a dark colour; and the whole plumage of the under parts (in the *Horticola*) is of one uniform pale brownish yellow. Its general structure is much like that of a *Ficedula*, but it differs from that genus in the form of its bill, and in its never feeding upon fruit. Its nest, a fine specimen of which I lately examined, is of a very beautiful and solid construction, and is well represented at page 49. It is the *bastard nactigall* of Bechstein; the *grand pauillot* of Cuvier; and the

* French measure.

Sylvia polyglotta of Vieillot and Banzani. That a bird exists, however, in this country, such as Mr. Herbert has described, I hardly entertain a doubt, though my endeavours to procure a specimen have hitherto been ineffectual. Several gamekeepers and others to whom I have spoken on the subject, recognised the species directly ; but all described it as being very rare, and extremely difficult to procure on account of its shyness. In opposition, however, to what Mr. Herbert has stated, they say that it never mounts up into the trees, like the other species, but skulks about always amongst the thickest underwood, and that it may often be followed for hours together before a momentary view of it can be obtained. Of its nest I have been able to learn nothing, but I very strongly suspect that I have had a young bird of the species in confinement.

Happening in the month of August, last year, to call at a bird-catcher's in London, who deals largely in the various summer birds of passage, I observed, in a cage containing about a dozen young chiff-chaffs and willow wrens, one small bird of this genus which I had never seen before, and what I felt confident was new and undescribed. I purchased it, together with a couple of chiff-chaffs to keep it company, having always observed that these little birds thrive best in society ; but being at the time particularly engaged in business, and not being able to pay that attention to it which it required, I confided it to the care of a man who seemed to understand the management of caged birds, until such time as I could attend to it properly myself. I saw it twice in the course of the following week, and it appeared to be doing well ; but on my calling a third time, a few days afterwards to take it away, I found to my regret that it was dead, and had been unfortunately thrown away. This bird was about the same size as the chiff-chaff, but of a stouter make. It was in its nestling plumage, which very much resembled that of the young chiff-chaff, excepting that the belly was white ; (I may observe here, that the nestling plumage of the *S. loquax* is of a finer yellow, and much more beautiful than that of the adult bird ; and that the same difference is observable in the *S. melodia*). Its manners and actions, however, differed in a striking degree from those of the chiff-chaff, and when held in the hand it always screamed out lustily, in a manner which I have never observed in either of the three common species, all of which I have kept in confinement. This bird, I am almost positive, must have been of the species which Mr. Herbert has described. It was taken in Kensington gardens.

M. Temmiuck, in his account of the rufous pettychaps (*S. rufa*),

alludes to one or two birds which he thinks will turn out to be mere varieties of that species; these I think may possibly refer to our chiff-chaff. I have specimens of both these birds now before me. The rufous pettychaps is shorter and stouter built than the chiff-chaff; its legs and feet are of a very light colour, and the ridge of its bill is more depressed than in that bird. The colour of the upper parts, in both, is nearly the same, but inclining more to brown in the former, and to green in the latter. The whole under parts of the former have a faint but decided tinge of russet brown; and the feathers on the thighs (*tibiæ*), which in the chiff-chaff are yellow, in the rufous pettychaps are of a pale brown. Both species utter the same, or nearly the same peculiar double note. The rufous pettychaps, according to M. Temminck, inhabits large woods, and especially fir and pine plantations, the same is said also of the chiff-chaff, but I cannot corroborate this from my own observation, for out of hundreds of these birds which I have heard, I never remember to have noticed one in a fir-tree. The rufous pettychaps is found in Germany, France, and Holland, and perhaps the birds which in this country are observed particularly to affect fir-trees, will turn out, upon examination, to be of that species, confounded hitherto with the chiff-chaff from the similarity of their notes. The young of these two birds, I am informed, are very dissimilar, those of *S. rufa*, being of a dark ashy brown; but their eggs are hardly to be distinguished.

There is in the British Museum, in a room exclusively set apart for the reception of British specimens, a well-preserved skin of the Natterer's pettychaps (*S. nattereri*), a species which is described as an inhabitant of the south of Europe. Whether or not this really is a British specimen I cannot pretend to determine, but I can find no account of the species ever having been found in this country. Unless it is thoroughly ascertained to have been killed in Britain, it certainly ought not to be placed in a collection of (exclusively) British specimens.

I may remark, in conclusion, that throughout the whole range of ornithology there is not a more natural genus than *Sylvia*, as thus restricted; indeed, I feel confident that the whole of the arrangement here proposed will meet the approbation of all who are acquainted with the living birds. The generic divisions may appear rather small, perhaps unnecessarily so to those who have studied only in museums; but they certainly are not more so than the genera which are almost universally adopted in entomology, and in other departments of natural

history. I scruple not to assert, that they are divisions clearly and distinctly indicated by nature; and if it be agreed that the old genus *Sylvia* is to be divided at all, the British species ought certainly to range in as many separate divisions as are here pointed out. Whether or not, however, these divisions are to be considered as *genera* is a matter of minor importance, about which difference of opinion may exist. The divisions are quite necessary to the establishment of a natural system of arrangement; and, as each is easily distinguishable from the others by decided and marked characters, each, I think, should be considered as a separate genus, and known as such by a particular name. I am of opinion, also, that the various American warblers (*Sylvicola* of authors) should likewise be arranged into several generic divisions. Their habits, as described by Wilson, are much too varied for any one natural genus; but those only who have studied the different species in their native haunts, and who have acquired an intimate and minute knowledge of their several habits, their manners, their nidification, their various notes, and their several respective peculiarities, can be competent to classify them in a natural and satisfactory manner. To attempt such an arrangement from their mere skins, would be little better than a useless waste of time.

Tooting, 18th August, 1833.

NOTES BY RURICOLA.

It has so happened that three wasps' nests have fallen in my way this year, of very different appearances, and in very different situations.

One was discovered in the spring, in April, I think, or May, in an empty bee-box in a bee house. It was fastened to the upper part of the box, and contained two wasps only. It is in my possession still, apparently perfect and uninjured: of a shape approaching to oval, but somewhat imperfect towards the lower extremity, near the opening. It has been remarked as having some resemblance in shape to a peg-

top. In length it is not quite two inches: the diameter of the widest part is about one inch and a half. The structure appears to consist of

two cases, one within the other, and not connected together except at the upper extremity: the material much resembling to the eye a coarse greyish paper, with alternate darker and lighter stripes or bands going breadthwise round the fabric. The figure is represented at A: the dimensions about one-half less than those of the nest itself.

Different from this was another small nest found by a gentleman in my neighbourhood, suspended from a twig in a beech hedge: the end of the twig being woven into the fabric, and serving for its support. This is shaped more like a pear than an egg; perhaps a cabbage rose may be an apt comparison: being broader and flatter at the upper extremity, and verging towards a point at the lower part, which contains the opening. The length of this is about two and a half inches, and the greatest diameter in the other direction rather more. Of this second nest I am not able to send you a sketch.

The third specimen was taken in my grounds this month, August 16th. It is in shape rather spheroidal, the axes being respectively six and seven inches, that from the top to the bottom the greater of the two. As well as I can judge without taking the nest to pieces,

it consists of several cuticles lapped over each other latitudinally, with alternate shades as in the first mentioned. It was found depending from the end of a branch of *spruce* fir, as represented at B, the smaller twigs and leaves being interwoven with the structure: and it contained a large number of insects. The species I suppose to be that of the *Vespa Britannica*, or tree wasp, mentioned in your book on "Insect Architecture," p. 81. It is considerably smaller than the common wasp: the front of the head of a pale yellow; seven narrow bands of yellow round the body, interchanged with others of a dingy or blackish green; the legs of a bright orange; the animal in general covered with grey hairs. I am no entomologist, as you will readily

perceive: but perhaps the foregoing particulars will enable you to identify the animal: and I beg the favour of a marginal note informing me whether this conjecture is right, and to what species it is probable that the two other nests belong.

Dr. Withering in his "Arrangement of British Plants," speaking of individuals of the common mushroom (*Agaricus campestris*) as "differing very much in size," adds, "I gathered one whose pileus measured nine inches over." It may, therefore, perhaps be worth noticing, that one was lately brought to me, measuring *eleven inches* over by the longest diameter, and *ten and a half* by the shortest. The stem was nine inches high, and large in proportion. It grew at the side of a meadow, under the shade of firs and other trees: and on being broiled proved very good for eating.

I should be glad to be made acquainted through your pages with the scientific name* of a small marine animal, called by sailors the *little man of war*. It is in length about an inch and a quarter, and about a quarter of an inch in breadth: consisting of a flat, hardish, glutinous, purple substance, which floats upon the water; and a thin light-coloured membrane, which is capable of being erected, and kept perpendicular to the former. A specimen, which I possess, was found in the autumn of 1831, together with a numberless multitude of others, on the northern coast of the county of Antrim, not far from the village of Ballintoy, and onwards to the little seaport of Portrush. From inquiries on the spot, addressed to various persons in the habit of frequenting that shore, and particularly to a clergyman who had passed many years there, and had been very observant of the natural productions of the neighbourhood, I could not learn that this little animal had ever been noticed there before. A naval officer immediately recognised it as familiarly known to him by the name of the *little man of war*, which, however he said that he had never before seen within three hundred miles of land.

Holywood, Ireland, Aug. 22, 1833.

* Evidently a Medusa. I cannot pronounce with certainty either on the species of this or on those of the wasps.

SIR WILLIAM JARDINE ON MONKEYS. *

WE have hitherto known Sir William Jardine chiefly as a writer on birds. Here he comes before us in a different department of the animated creation, of no less interest both to the naturalist and the general reader. What we regret the most, however, both in the present and the preceding volumes of this publication is, that Sir William is, from the nature of his subject, restricted wholly to compilation, whereas had he chosen some other departments he could have given us good original observations, such as those with which he has enriched his highly valuable edition of Wilson's American Ornithology. The compilation is, notwithstanding, judiciously executed, the drier scientific details being relieved at intervals with interesting anecdotes and traits of character. But the selection of the subject has evidently been made not so much for the display of the author's materials as on account of the coloured figures, which in general do great credit to Mr. Lizars, particularly in the instances of drawings made from nature; for the copies from F. Cuvier and Andebert retain so much of their Frenchified air as to be easily recognisable. The colouring is in most of the figures too bright and showy for nature; as an instance of which we may refer to plate 20, where *Ateles paniscus*, whose colour is jet black, is coloured blueish grey; while the tip of the tail, whose colour is also black, with a thick callous skin like the heel of a negro, is coloured light pink, giving it the look of being thin and tender.

The memoir of Buffon is well written, but greatly too short, and its shortness may probably account for the omission of one of the most instructive passages in the life of the great French naturalist. For the benefit of our younger as well as of our older readers, who may not have met with it, we shall here insert the omitted passage as given by Buffon himself to the Chevalier Aude.

"I was," he says, "a great lover of my bed in my youth. My poor Joseph" (a servant who lived with him more than sixty years) "assisted greatly to conquer that propensity. I promised him a crown every time he roused me at six. The next morning he did not fail to do his duty, but I repulsed him; he came the morning after, and I threatened to turn him out of the room. 'Thou hast gained nothing, Joseph, and I

* The Naturalist's Library. Mammalia. Vol I. Monkeys. By Sir William Jardine, Bart, &c. &c. Coloured plates.

‘have lost my time,’ said I to him at noon; ‘you know not how to manage me; think only of my promise, and do not listen to my threats.’ The next morning he fulfilled my wishes, by forcing me to rise in spite of my ill-humour; and every succeeding day he was indemnified for my cross temper when I awoke by my thanks and a crown, which he received an hour after; indeed, I owe to my poor Joseph ten or twelve volumes of my works.”

We must now pass on to the Monkeys, and shall begin with the general observations introductory to the histories of individual species. The following are some of the just and excellent remarks made by the author upon the striking differences between the orang-outang and man:—

“The parts,” says Sir William Jardine, “allotted for locomotion in the most man-like monkey are unfitted for sustaining an upright attitude, while they are beautifully adapted to perform all the requisites of a sylvan life.

“The first distinction that would undoubtedly strike an observer of an orang and human being placed in the same enclosure would be the positions and attitudes; and a closer attention would soon convince that the corresponding members in each, while beautifully formed for their proper uses, could not be employed to perform similar actions with an equal degree of strength, firmness or ease.

“Few persons in the present era will assert

“—— Men have four legs by nature,
And that 'tis custom makes them go
Erroneously upon but two.’

While the fact that no nation in the world assumes any except the erect attitude, will be sufficiently conclusive without making use of the many arguments which might be drawn from the adaptation of structure. Let us now see how this agrees with the natural gait of the oranges. In man the limbs, the principal organs of progression, and of maintaining the upright position, are equal in length to the head and trunk together, while the upper extremities are comparatively short. The glutei muscles are the largest in the human body, and the gastrocnemi, or calf, are of immense power, and terminate in a powerful cord inserted in the extremity of the bone, forming the heel or os calcis. These, however, would be insufficient without a surface or base on which the trunk itself could rest; and we find this supplied by a broad and capacious pelvis, with which the thigh-bones form a right angle by means of the length of the cervix femoris, or neck of the thigh-bone. In the oranges, on the contrary, and indeed in all monkeys, the lower extremities are comparatively short, while the upper or arms are very long, so as to allow the knuckles to be applied to the ground when the animal is nearly erect, and which is, in fact, the mode of progression always adopted when necessity requires this position. The black orang, noticed by Dr. Tyson, advanced in this manner, and that dissected by Dr. Trail was observed never to place ‘the palms of the hands on the ground.’ Dr. Abel’s red orang performed the progressive motion by placing

his bent fists upon the ground and drawing his body between his arms.' The narrowness of the pelvis, and the short neck of the femur, forming an acute angle with the spine, also render the erect position impossible for any time and always irksome, which is farther confirmed by the weakness of the muscles. The glutei are scarcely visible, and the calves are very weak.

"The extensors of the knee are much stronger in the human subject than in other mammalia, as their operation of extending the thigh forwards on the leg forms a very essential part in the human mode of progression. The flexors of the knee are, on the contrary, stronger in animals, and are inserted so much lower down, even in the monkeys, that the cord which they form keeps the knee habitually bent, and almost prevents the perfect extension of the leg on the thigh. 'The motion of the knee-joint in the black orang was free backwards, but the animal does not seem capable of perfect extension of this joint from the contraction of the posterior muscles of the limb.'

"The most remarkable muscle about the top of the thigh has not been noticed by Tyson, Camper, Cuvier, or the older anatomists. It is a flat triangular muscle, arising from the whole anterior edge of the ileum to within half an inch of the acetabulum, and is inserted just below the fore-part of the great trochanter, between the head of the crurales and vastus externus, a little below the origin of the former. It is thin and fleshy through its whole extent, except where it is inserted by a very short flattened tendon. At its upper part it is united by cellular substance to the iliacus externus. The action of this muscle appears to be intended to assist in climbing. On this account we intend to name it scandens, or musculus scansorius; and we are disposed to regard it as one of the principal peculiarities in *Simia satyrus*."—DR. TRAIL. *Account of Black Orang*. Wern. Soc. Trans. Vol. iii. p. 29.

"Continuing the organisation of the lower extremity, we shall now examine the foot. In man the whole surface of the tarsus, metatarsus, and toes rests upon the ground, and the os calcis forms a right angle with the leg. In the oranges this bone begins to form an acute angle with the limb, and consequently does not rest upon the ground. The sole of the foot becomes narrower; and in all the attempts at erect progression exhibited by the oranges which have been shown in this country the foot was never observed to rest on its outer edge. The plantaris muscle also, which is very fleshy among quadrumanous animals, instead of terminating, as it does in man, by insertion in the os calcis, passes over that bone into the sole, and is there connected with the plantar aponeurosis; an arrangement incompatible with the erect attitude, as the tendon would be compressed and its action impeded if the heel rested on the ground. But the most marked peculiarity in the foot, and one which is instantly perceived, is the great length of the phalanges or toes, and the position of the great toe, which is placed nearly in a line with the ankle, and does not reach at the nail within an inch of the first metatarsal joint, having the appearance of a thumb and hand, whose office it in reality performs. Nor is the internal conformation less remarkable; the whole arrangement of muscles is much nearer to that of a hand; but the thumbs of both the fore and hind extremities have no separate flexor longus (long flexor), but receive tendons from the flexors of the fingers. 'Hence the thumbs in these animals will generally be bent together with the other fingers; and they are less capable of those actions in which the motion of

the thumb is combined with that of the fore and middle finger—a combination so important in numerous delicate operations.’

“The upper extremity approaches much nearer to the human form, and in its similarity points out the unfitness of these animals for a constant quadruped motion. The inferior structure of the hands, and particularly the thumbs, show them fitted for grasping alone, and incapable of performing any nice mechanical operation, while the great comparative length indicates their utility in climbing, and therefore their fitness for an arboreal life.”

It appears to us not a little singular, seeing that Sir William Jardine thus unequivocally and justly shows there could be no *passage* from the orang-outang to man by means of ages of gradual improvement—(a most absurd fancy, though extensively promulgated); yet in other parts of his work he uses the very terms and language of those who adopt this wild opinion, the terms and language namely of the Lamarckian School, as modified by Mac Leay into what is called the circular system. We shall not stop at present to point out the tendency of this highly objectionable language, but refer to the Introduction to the second edition of Montagu’s Ornithological Dictionary for ample details, while we pursue the more pleasant task of selecting what we can better approve of from the interesting details with which the volume abounds. We dip at random, and find the following account of the hoolock (*Hylobates Hoolock*, HARLOW), from a letter of Dr. Burrough.

“The specimens,” says the Doctor, “of the ourang-outang, or Gibbons, furnished you, were obtained by me during my late excursion into the interior of Bengal. They were presented to me by Captain Alexander Davidson, of the Honourable East India Company, stationed at Goalpara, situate on the Burampooter river, in Assam. This district of country was formerly attached to the Burmese Empire, but at present is in possession of the East India Company, and constitutes the north-eastern limits of their territory in this quarter.

“The ourang, of which I am now to speak, called by the Assamese ‘hoolock,’ is to be met with on the Garrow Hills, in the vicinity of Goalpara, between latitudes 25° and 28° north; and the specimens brought to this country by me were taken within a few miles of the town of Goalpara. The full grown one, which at this time you have prepared, was in my possession, alive, from the month of January to May, when it died, from a blow it received across the lumbar region, inadvertently inflicted with a small stick by one of my servants at Calcutta. They inhabit more particularly the lower hills, not being able to endure the cold of those ranges of the Garrows of more than 400 or 500 feet elevation. Their food, in the wild state, consists, for the most part, of fruits common only to the jungle in this district of country; and they are particularly fond of the seeds and fruits of that sacred tree of India, called the Peopul-tree, and which, on the Garrow Hills, attains a very large size. They likewise take of some species of grass, and also the tender twigs and leaves of the peopul and other trees, which

they chew, swallow the juice thereof, and reject the indigestible part. They are easily tamed; and when first taken show no disposition to bite, unless provoked to anger, and even then manifest a reluctance to defend themselves, preferring to retreat into some corner than attack their enemy. They walk erect; and, when placed upon a floor or in an open field, balance themselves very prettily by raising their hands over their head, and slightly bending their arm at the wrist and elbow, and then run tolerably fast, rocking from side to side; and if urged to greater speed, they let fall their hands to the ground, and assist themselves forward, rather jumping than running, still keeping the body, however, nearly erect; if they succeed in making their way to a grove of trees, they then swing with such astonishing rapidity from branch to branch, and from tree to tree, that they are soon lost in the jungle or forest.

“The individual in question became so tame and manageable in less than a month, that he would take hold of my hand and walk with me, helping himself along with the other hand applied to the ground, as described above. He would come at my call, and seat himself in a chair by my side at the breakfast-table, and help himself to an egg or the wing of a chicken from my plate, without endangering any of my table furniture. He would partake of coffee, chocolate, milk, tea, &c.; and, although his usual mode of taking liquids was by dipping his knuckles into the cup and licking his fingers, still, when apparently more thirsty, he would take up the vessel from which I fed him with both hands, and drink like a man, from a spring. His principal food consisted of boiled rice, boiled bread and milk, with sugar, plantains, banana, oranges, &c., all of which he ate, but seemed best pleased with bananas. He was fond of insects; would search in the crevices of my house for spiders, and if a fly chanced to come in his reach, he would dexterously catch him in one hand, generally using his right hand. Like many of the different religious castes of this country, he seemed to entertain an antipathy to an indiscriminate use of animal food, and would not eat of either the flesh of the cow or hog; would sometimes taste a little piece of beef, but never eat of it. I have seen him take dried fish, which he seemed to relish better than almost any other description of animal food, with the exception of chicken, and even this he would eat but very sparingly of, preferring his common diet, bread and milk, with sugar, fruit, &c. In temper he was remarkably pacific, and seemed, as I thought, often glad to have an opportunity of testifying his affection and attachment for me. When I visited him in the morning, he would commence a loud and shrill whoo—whoo—whoo—whoo, which he would keep up often for five or ten minutes, with an occasional intermission for the purpose of taking a full respiration, until finally, apparently quite exhausted, he would lie down and allow me to comb his head and brush the long hair on his arms, and seem delighted with the tickling sensation produced by the brush on his belly and legs. He would turn from side to side, first hold out one arm and then the other, and when I attempted to go away he would catch hold of my arm or coat tail, and pull me back again to renew my little attention to him, daily bestowed. If I called to him from a distance, and he could recognise my voice, he would at once set up his usual cry, which he sometimes gradually brought down to a kind of moan, but generally resumed his louder tone when I approached him. This animal was a male, but showed no particular marks of the sex, and by a casual

glance might readily, if not examined more closely, have passed for a female. I have no idea of his age; but, judging from the size and length of his canine, suppose him to have been advanced in life.

"The other large 'hoolock,' of which you have the cranium, was also a male, and full grown. He was likewise obtained from the Garrow Hills in Assam, and presented to me by my friend Captain A. Davidson, of Goalpara. He came into my possession in the month of April, and died at sea in July, just before getting up with the Cape of Good Hope, of a catarrhal affection. His death probably might have been hastened from want of proper food, such as is not procurable on long voyages. This animal was similar in habit and general characters to the one already described, and may have been eight or ten years of age, or perhaps older, as I am informed by the natives of Assam they live to the age of twenty-five or thirty years.

"The young specimen was also alive in my possession: this is a female, and was brought to me by a Garrow Indian at the same time the first was received, but died on the way from Goalpara to Calcutta, of a pulmonary disease following catarrh. This poor little creature, when first taken sick, suffered great pain and oppression at the chest, for which I prescribed a cathartic of castor oil and calomel, and a warm bath, which seemed to afford it some temporary relief; but she died after ten days' illness. The animal appeared delighted with the bath; and when I removed her from the vessel, she would run back again to the water, and lie down again until again removed. She was, like the others in my possession, gentle and pacific in disposition, very timid and shy of strangers, but in less than a week from the time she was taken, would, if put down in an open place, quickly run to me, jump in my arms, and hug me round the neck. I supposed her to have been from nine months to a year old. I fed her on boiled milk, goat's milk diluted with water and sweetened with sugar-candy. She also would sometimes partake of a little bread and milk with the older one. She soon learned to suck the milk from a small bottle, through a quill covered with a piece of rag."—Page 102.

It may be said, we have only extracted a quotation, and not a portion of the author's own description; but in this we give the most correct view of the book, whose staple material is quotation; and this, so far from deteriorating, enhances its value in our estimation, inasmuch as the very words of an original observer are far preferable to any abstract or abridgment thereof.

FIELD SCRAPS.

BY SOLITARIUS.

I HAVE often observed that many animals, naturally of a timid disposition, do not fly from man when they observe him motionless, but presuming from his stillness that he intends them no harm, they approach close to him, and continue their operations quite fearless of

his presence. The smaller animals in particular, when they observe a person silent and motionless, seem to regard him with as little indifference as they do the stump of an old oak, and this is particularly the case in secluded places, seldom visited by man, the terror of the brute creation. I have had many instances to confirm me in the truth of these remarks, besides the one I now note. The other day I stood for many minutes down at Laytonstone, vis-à-vis to a rat, who, in a ditch about five yards from me, washed his face, as leisurely as though no curious naturalist were by. On my first approach he was startled, but as soon as I drew myself up and continued silent and motionless, his fears were subdued, but he was off and down his hole with quick speed, directly that I moved to leave the spot.

On Hampstead Heath, about three weeks ago, upon looking into a gravel-pit, I was somewhat surprised to observe a toad and a shrew mouse both peeping out from the same hole, which was so small that the former, whose body was much compressed, seemed greatly inconvenienced. So squeezed indeed were they for room, that the mouse could not, without some difficulty, enter his dwelling by forcing a passage between his singular companion and the sides of the door-way. The mouse having got out of his dwelling, I jumped down into the pit and caught hold of him, in doing which I unintentionally killed him. Upon turning round to see whether his fellow-lodger had decamped, I found him in the same situation as before, his head and shoulders poked out of the hole, and his eyes directed upwards to the sky, as though he were Sir Isaac Newton himself, studying the stars. Having removed away the hard sand that imprisoned him, he crawled out, but his movements betokened that his legs, from long inactivity, had become nearly unable to perform their offices.

Squirrels, though common in Kensington Gardens, are not generally to be seen within any short distance of London; I saw one, however, last Friday, running down a lane near Belsize House, Hampstead.

Ducks, and other web-footed birds, usually rest upon the ground, but a remarkable exception to this is known to occur in the summer-duck or tree-duck (*Anas sponsa*) of America, which perches upon trees, like a sparrow; but a friend to whom I mentioned this fact, assures me that his father had some Muscovy ducks (*Anas moschata*) which frequently perched upon the branches of the trees, upon which they also roosted during the night. When we consider the aquatic habits of ducks, it appears rather singular that they should die merely from staying in the water rather longer than usual, but this however has

been the case with some little ducklings belonging to my friend at Laytonstone, which have lately come to a watery grave in consequence of their having got into their bathing tub when the water within it has been too low to allow of their walking out again.

Some of my friends, who have read my "Rural Gleanings," and have had a laugh at the anecdote contained therein, concerning a cock fanning his wings to blow a piece of bread across the water to a hen, who on the opposite side was longing for it, differ from me in considering it an instance of sagacity, and pronounce it as being merely an odd coincidence. I am ever ready to renounce an opinion when I perceive the propriety of adopting another which is better founded; but in the instance alluded to, there were many movements observable, but not easily to be described, which seemed to evince that the birds were summoning all their faculties of reasoning (or whatever that power is which assists animals upon extraordinary occasions, when instinct, which is limited in its performance, and adheres to a certain course from which it never deviates, fails them,) to devise some means to overcome the difficulty, which otherwise would have prevented them from obtaining their desired object.

In Edwards's "Discourse on the Emigration of British Birds," published in 1814, the author in speaking of the cuckoo says, "Many are the conjectures how it preserves itself in winter; some say that it hides itself in our island, and continues in a dormant state; and it has been asserted, that cuckoos have been discovered in the midst of winter, not only in holes of trees, but under ground in sandy soils, also in the caverns of rocks, antique buildings, old walls, outhouses, and the like. I have heard it affirmed, that an old hollow tree being cut down in a certain village in Wiltshire, and laid on the fire, a cuckoo, revived by the warmth, jumped out of the fuel, and began repeating its usual note with great energy, to the admiration of the beholders; but I think this relation is too extravagant to deserve credit." I agree with the author that this savours of extravagance, or at least of exaggeration, but I think there are too many instances of cuckoos being found concealed in places during the winter, to warrant our entire disbelief, and he himself, it will be seen in the following passage, says, "it is indisputable there are instances of cuckoos appearing in winter, but they are very rare and uncommon; and we may reasonably suppose, that when a straggler is seen in that severe season, it was either *bewildered* in its passage, or hatched *too late* to take its flight with the rest of the genus." Yet, notwithstanding this, our author doubts that they are ever found in a torpid state in trees. In the course of casual conversation with a

gardener at Laytonstone, who was quite unaware of this being a matter upon which all heads are not agreed, and who consequently could have no object in telling me an untruth, he assured me that he knew of an instance of a cuckoo being found in the hollow of a tree during a severe winter in Dorsetshire, and that it was apparently lifeless, until restored to active animation by artificial warmth.

I think it is stated in books that none of the swallow-tribe ever perch upon trees *, but an instance to the contrary came under my notice some weeks ago, when walking in a garden I observed a chimney-swallow (*Hirundo rustica*), resting upon a dead branch at the top of a walnut-tree. It now and then left its station to take a short flight, but it returned again and perched upon the same branch to which it seemed to have taken a fancy. Speaking of swallows, I cannot refrain from returning to the subject of their attacking the owl, the truth of which I have called in question at page 358, where in a note you tell me that if I try the experiment I shall be convinced of the correctness of the assertion. The result of the experiment, in a case like the present, would not satisfy me. I must see the occurrence happen in nature, and that more than once before I shall alter my opinion, and conclude that the swallow and the owl are *natural* foes, the one having cause to fear the other. It may be, however, that the owl being a night-bird, is so rarely seen by the swallow during the day, that when he does appear among them, his nature not being familiar to them, they look upon him as a suspicious character, and treat him as alleged. The appearance of a camel or a dromedary in our streets from a similar cause of unfounded apprehension, will excite fear among horses, although *naturally* they are not enemies.

Since my mention of *Hipparchia mægera* (at page 360) being scarce about London, I have taken some specimens near Belsize-house Hampstead, yet they are but partially distributed about the fields, for, although where one is found there are numerous others, yet their localities are wide apart.

At Hampstead, about three weeks since, I observed one of the common nettle-butterflies (*Vanessa Urticæ*) upon a flower, off which I several times pushed it by means of a blade of grass, but it as often alighted upon it again, and had not an impudent wasp appeared and rudely turned it away, I dare say that she would have stood her ground for some time.

* Nothing is more common than the perching of Swallows. — ED.

Upon a wall at Layton I found a live beetle (*Blaps obtusa*) with deep, wide, and irregular indentations in its elytra, arising apparently from its having been pressed or jammed in somewhere.

At Laytonstone there is a species of black beetle, the scientific name of which I have not been able to ascertain, which is called by the collectors about there the spider-beetle, from its being usually found in the nests of spiders, which, according to their account, it preys upon.

I found a common fly (*Musca domestica*) the other day, the legs and body of which were so covered with a small red acarus as to disable it in its flight; and upon Epping Forest I captured a small white moth, similarly attacked; and since then a friend has shown me a larva, apparently that of the fox-moth (*Lasiocampa rubi*) to whose body numbers of these parasites were adhering.

Ants, it is said, find their way back to the place from whence they came, by means of a peculiar smell which they leave behind them in their course, and of this I, some weeks since, convinced myself by rubbing the epidermis off the bark of a tree, up and down which they were continually running. By doing so, I flung them into some confusion, as they hesitated for some time to cross the part that had been so treated, until one of them less scrupulous than the rest walked over it, and then they followed.

ON THE BURROWING OWL.

BY R. H. L.*

I do not now recollect whether in your architecture of birds, you have stated that the food of the burrowing owl, (*Strix cucularia* of Molina,) consists entirely of insects, but having seen it said in another publication of the Society for Diffusing Useful Knowledge, on the authority of Charles Lucien Bonaparte, a naturalist of high authority, that this was supposed to be the case, as on the examination of its stomach, nothing but the parts of the hard wing cases of insects were found, I would wish to record the fact of its being a feeder on other birds, in your Magazine, where it will be more likely to secure the attention of naturalists, than in the miscellany I am noticing. My experience has been acquired during two years' travelling in St. Do-

* Any other communication from so well informed a correspondent will be highly acceptable.—*Editor*.

mingo, (Haiti), where the burrowing owl is known to be an inhabitant as well as about the neighbouring Continent of Central America. I shall beg leave to transcribe the note I made in these travels, in which you will find other incidents respecting the bird in question, hitherto unnoticed, but deserving to be recorded.

“During my travels I had frequent opportunities of observing the habits of the burrowing owl, (*Strix cunicularia*) ; my attention was first drawn to it by its invariable habit when emerging from its burrow of rapidly hopping, or rather jumping two or three paces, then stopping short and bobbing down. The effect of this coming forth, very much reminds a person familiar with the theatre of the hasty shuffling sort of run with which dancers start out from the side scenes, and make the bow with which they prelude their intended ballet. A careless unobservant person might pass unnoticed this curious habit in the case of a single bird,—but, should he chance to see the attitudinising of a pair of owls dodging out from two neighbouring burrows at the same moment, the effect of posturing first to the right, and then to the left, and bowing simultaneously like a couple stepping out to a minuet, is so truly grotesque, that he is not likely to be otherwise than forcibly struck with it. It is said, indeed, as a joke on the Haitiens, whose national dance, the charraibiné, is a posture dance, mingling the lubricity of the waltz with the stately courteousness of the minuet, that Dessalines, who first brought it into vogue, owed the happy thought of adopting it as the national ballet to the casual sight of a pair of burrowing owls posturing in this way. I must confess, whether it be mere satire or not, the resemblance is very great between them.

“To return, however, to the habit of owls ; before I was aware that this owl burrowed in the ground, I had been struck with excavations in the low earthy cliffs about the ravines and hillocks of the country, particularly of the prairies or savannas, which much resembled rabbit holes, and concluded that they were the haunts of the agouti (*Dasyprocta acuti*) ; knowing that this was the only large animal of the Rodentia order here, likely to dig such a hole, but not considering that this particular rodent did not excavate a burrow, but contented itself with hollowed rocks, and niches of fallen trees. The casual meeting with a large egg translucent as alabaster, at the mouth of one of these excavations, and the scattered feathers of some of the smaller birds with which I was familiar, soon taught me, however, that these were habitations of the burrowing owl. At Fort-Dauphin, when the waters of its splendid basin sweep into loose low cliffs of zoophitic marl, and

from patches of shallow swamps, the frequency of the burrows of the *Strix cunicularia*, might be mistaken for the holes of the millions of crabs, that crawl through the contiguous morass, if it were not that beside being high and dry in the perpendicular breaks of the ground, they wanted the ridge of recent mud which encircled the crab holes. It was here, indeed, that I first remarked that this species, like its congeners, preys on the lesser birds. I collected, scattered at the entrance of their burrows, feathers of the golden banded oriole, of the boat tailed grackle (*Gracula barita*) and of the ground dove (*Turtur passerina*) all birds that frequented the vicinity of their haunts. That difference in their owl nature, which adapts them for revelling like birds of day in the luxury of sun-light, is as striking a circumstance, when they have once caught the attention of a common observer, as their burrowing propensities. It is certain that in the island of Haiti, they are the elaborators of their own cavern home. There is no animal there of equal size which has the same habit. In the ravines where clusters of shrubs overhang the steeps, so as to supply the wonted leafy covert to a small, very diminutive, but brilliantly green sort of muscicapa, with crimson breast, called by the Spanish Haitiens the barráncali*, and by the French the perroquet de terre, a bird that burrows in the earth also, the excavations of both may be found together, notwithstanding the certain fact that the burrowing owl is predacious."

Sept, 16, 1833.

R. H. L.

CHAPTER OF VARIETIES.

FAULTS IN ZOOLOGICAL NOMENCLATURE.—Though nomenclators, who take a *pride* in the manufacturing of names, and fight among themselves, as to which of them shall have the *honour* of appending his name to them, hoping that by thrusting a Jack Scroggins-of-a-name into notice, it will be handed down to posterity, may be inclined to consider it as presumption in one not quite as learned and ambitious as themselves, to call for a repeal of the following generic appellations, so

* This bird called barráncali by the Spaniards, from barranca, the name for an earthy ravine cliff, is thus described by Drouin de Bercy, "Le perroquet de terre est ainsi nommé, parcequ'il fait son nid dans la terre; il est gros comme une *fauvette*: il a le dos vert comme une émeraude, la gorge rose, le ventre gris de lin, légèrement rosé, les pattes noires, et le bec rouge brun en forme de lancette."

that they may be rendered sufficiently distinct from one another as to prevent the possibility of their causing that confusion which they are at present calculated to create, yet some readers who, like myself, only wish to see science advancing, will, perhaps, second my call for the removal of these clogs to the student's progress. The only use of a name is to distinguish one object from another. This admitted, it cannot then be denied, that a name ceases to be useful in distinguishing one object from another, if that name is also conferred upon other species. The following list is composed of names which, instead of being restricted to one species, are conferred upon others also, and although it will be observed, that some of them are not exactly similar, yet they are so nearly so (many of them only differing by a letter), that they are very likely to be the cause of leading students, particularly those who are not acquainted with the languages from which they are derived, into errors, to prevent the occurrence of which they require some alteration. In the alteration of any two similar names applied to different objects, the rule, I think, ought always to be to preserve the older and discard the newer, and bestow another in place of it.

Aphidius (in Hymenoptera),	Papilio (in Entomology),
Aphodius (in Coleoptera),	Plithiria (in Diptera),
Auchenia (in Quadrupeds),	Phthirus (in Anoplura),
Auchenia (in Entomology),	Philanthus (in Hymenoptera),
Anomala (in Coleoptera),	Philanthus (in Coleoptera),
Anomalon (in Hymenoptera),	Psylla (in Homoptera),
Chrysopa (in Neuroptera),	Psila (in Diptera),
Chrysops (in Diptera),	Psilus (in Hymenoptera),
Ephyra (in Lepidoptera),	Rhagio (in Diptera),
Ephydra (in Diptera),	Rhagium (in Coleoptera),
Laridæ (in Entomology),	Rana (in Erpetology),
Laridæ (in Ornithology),	Rana (in Botany)
Lycus } (both in Coleoptera),	Zachina (in Diptera),
Lyetus }	Zachinus (in Coleoptera),
Metopia (in Diptera),	Zachys } (both in Coleoptera).
Metopius (in Neuroptera),	Zrachys }
Notaris } (both in Coleoptera),	Zychus } (both in Coleoptera).
Noterus }	Zychius }
Papilio (in Ornithology),	

The compiler of the "Systematic Catalogue of British Insects" has very properly refused to admit into his work many entomological names, on account of their being previously engaged in other sciences. Thus,

he rejects the term *Cephalotes* on account of there being a genus of *Mammalia* of that name ; *Chætophora*, because of its also being a genus of *Fungi* ; *Dascillus*, *Phycis*, and *Zygæna*, because of their having been bestowed by the ancients upon certain species of fish ; *Nanodes*, *Gryphus*, and *Lagopus*, on account of their being the names of ornithological genera ; *Liparis*, because of its being a genus in *Ichthyology* ; *Cerastis*, because of its being a genus in *Erpetology* ; *Lissa*, because of its being a genus in *Crustacea* ; and lastly, *Scoparia*, because of its being a genus in *Botany*. Proceeding upon equally justifiable grounds for the alteration, as those presented by the compiler of the above work, Professor Burnett, in his excellent "*Outlines of Botany*," has introduced "*Term-affines*" as a preferable botanical name, to *Term-ites*, on account of that word being already bestowed upon a genus of tropical insects, erroneously called white *ants*. In conclusion, I hope that this paper may not be unproductive of the object of its writer, as above stated.

SOLITARIUS.

London, August, 1833.

ON THE MAY-FLY LARVA BEING THE CADIS-WORM.—Your correspondent "*D. M.*" of *Devizes*, states that it is a popular notion that the cadis is the larva of the may-fly (*Ephemera*). I have never heard any person speak of the may-fly otherwise than as being the grub of the cadis-fly ; and in books upon angling, besides those upon natural history, it is spoken of as such. Had "*D. M.*" (who I infer belongs to the angling fraternity), read Sir Humphry Davy's "*Salmonia*," he would have been gratified by an account of the proceedings and transformation of the cadis to a fly. He is decidedly incorrect in stating that a cadis-worm is never found "in a greater state of forwardness than another, excepting as far as regards its size." Now it so happens that the larva within its moveable case is by and by transformed to a pupa *, in which state it bears a greater resemblance than it did previously to its perfect state as a fly. The cadis-fly (*Phryganea*) may be found during the spring months, resting upon palings near water, and to a common observer has somewhat of a resemblance to a moth. It is by no means a new piece of information to entomologists to be told that the may-fly, instead of coming from a cadis-worm, comes from a grub answering to the description your correspondent has given of it.

SOLITARIUS.

London, August, 1833.

* Figured in "*Insect Transformations*," p. 321.

TO WHAT MODERN GENUS DOES THE BRAMBLING BELONG?—Mr. Blyth (p. 354) says, that he is unable to learn what the modern generic name of the bramblingfinch is. Is not *Pyrgila* the modern name? *Pyrgila montana* is synonymous with *Fringilla montifringilla*, *Linaria montana*, and *Passer montanus*, all which superfluous names have been bestowed upon this bird to gratify the whims and fancies of different nomenclators, who, for the love of name-making, are never pleased to be unanimously agreed upon the propriety of any single one.

London, August, 1833.

SOLITARIUS.

REDBREAST'S NEST.—On my garden chair, in an ivy-clad arbour, I accidentally left on the close of the evening a piece of writing paper from which I had taken Romana melon seed for sowing. On the morning succeeding the evening I visited the arbour for the purpose of replacing in the paper the seed not sown, but was somewhat surprised to find the paper gone; the situation of the arbour rendering it very improbable that human visitant had been there after me the previous evening, or before me the succeeding morning. Looking round with an impression that a gust of wind had whirled the paper to a resting place amongst the ivy, I espied the identical paper high up in the ivy, bearing the inscription "Romana melon seed, 1829;" and on nearer search ascertained that it formed part of a redbreast's nest. The exterior of this nest was composed of dried ivy leaves, paper, string (the refuse of flower-tying bands), and straw. A few weeks ago the nest of a song-thrush was brought to me which had been lined with touchwood; it was partially so lined when I saw it. The touchwood was not cemented with cohesive earth, but with garden mould *, the inefficiency of which as a cement caused a portion of the touchwood to deposit itself on the floor of the nest. A gate-post hard by was the source from which this bird obtained the touchwood part of its building material. Thus, it appears, at least in the foregoing instances, that the redbreast and the song-thrush do not confine themselves to a particular kind of material for the construction of their nests, but use that kind which is suited to their purpose, and obtained with readiness in the vicinity of their architectural labours.

R. F. C.

Shouldham, 1833.

* And also, I should think, with saliva, as I have shown in "Architecture of Birds."—ED.

NATURAL HISTORY OF THE BIRDS OF AFRICA.

TRANSLATED FROM THE FRENCH OF LE VAILLANT.

THE CROW MAGPIE (*Pica Ventralis*, CUVIER).

La Pie à Culotte de Peau, *Le Vaill. Ois. ii. p. 20, pl. 55*; *Corvus rufigaster*, *Lath. Ind. Orn. Sup. xxvi.*; *Shaw, Zool. vii. 377*; *Corvus octopennatus*, *Daud. ii. 243*; Rufous-bellied Crow, *Lath. Gen. Syn. Sup. ii. 118*; *Id. Gen. Hist. iii. 40.*

As the manners of this bird, which is entirely new to us, are unknown, I place it by the side of the African magpie, a species which, in my opinion, it most closely resembles in the form of its bill and wedge-shaped tail. As its bill, however, is more feeble than that of the magpies, it appears to belong rather to another genus of birds, whose species are exceedingly numerous in Africa, and have been generally

but carelessly examined by scrupulous systematists, who have confounded them with blackbirds and thrushes, birds totally different in their habits, which ally them more closely to starlings and martins, whose manners and kind of living they in reality adopt.

This bird is drawn from the superb collection of M. Ray de Breukelerwaard, and I never observed it in any other place. It is reported to be found in the South Sea Islands. Its bulk is nearly equal to that of our common blackbird; but its tail, which is exceedingly long and wedge-shaped, is half as long again as the bird's body, and has only eight quills. Such a character, to the best of my knowledge, is not found in any other bird, and led me to suspect that two of its tail-feathers had fallen off: but after a most scrupulous examination, I felt convinced that their number was complete, and that the individual never had more. All the under part of its body, head and scapulars, as well as the breast, are of a shining black, over which, in particular situations of light, bluish tints appear. Two of the medial feathers, situated in the middle of the wing, have their outer barbs of deep red, and the rest are absolutely black, as well as those of the tail. The feathers which clothe the sides, the belly, and the thighs, are of the same clear red as that of our *huppe*: the lower tail-coverts are of this same tint, but have also some blackish-brown shades. The bill, legs, and claws are of a deep black.

NEW FACTS ON THE MIGRATION OF VARIOUS BIRDS AND INSECTS.

BY EDWARD BLYTH.

THE following very interesting intelligence has been communicated to me by a neighbour, an excellent observer of nature, who has just arrived by sea on, board a trading smack, from the vicinity of Aberdeen.

On the voyage from London, northward, on the 16th of September, when off the coast of Yorkshire, and about ten or twelve miles from Redcliff, several small birds alighted on the vessel. They were of various species; tree-pipits (*Anthus arboreus*), willow-wrens (*Sylvia*

*melodia**), whin-chats (*Rubetra migratoria*†), and a single female red-start (*Rubecula arborea*‡).

On the following day, (September 17th,) other species made their appearance; several wheatears (*Saxicola Enanthe*), robins (*Rubecula familiaris*), and one male stonechat (*Rubetra rubicola*). All these birds migrate by night; and they all left the vessel on the first night after their appearance, excepting two robins, which remained for some time, being fed by the passengers, and which, with the characteristic effrontery of their species, stationed themselves, the one at the front of the vessel, the other at the stern, and fought on the least intrusion into each other's territory. The robin is constantly migratory in all parts of the Continent, and, I believe, in the Orkney and Shetland isles, but stationary throughout Britain.

On returning southward, however, the greatest number of species was seen. When off Whitby, about fourteen miles from land, on the 7th of October, a flock of gold-crests (*Regulus auricapillus-minor*§), settled on the ship's tackle; the little creatures, being much exhausted, suffered themselves to be taken with the hand; as did also a solitary chiff-chaff (*Sylvia loquax*||), which, together with nine gold-crests, it was attempted to bring alive to London; but they all died on the passage. On the same day two female chaffinches (*Spiza leucoptera*¶), two song-thrushes (*Turdus musicus*), some field-fares (*T. pilaris*), starlings (*Sturnus varius*), and tree-pipits (*Anthus arboreus*), alighted on the vessel, many of which were taken alive. An eve-jar (*Nyctichelidon Europæus*), also followed the ship for some time, and settled more than once upon the bowsprit: perched lengthwise, (as is its constant habit,) its wings drooping, its head lower than the body, and panting with fatigue, it presented, I am told, a very curious and interesting spectacle. A woodcock (*Rusticola Europæa*), likewise flew about the vessel for some time on this day, and alighted twice on the deck.

October 8th. A flock of tree sparrows (*Passer arboreus*), settled on the ship, and others of this species continued to arrive during the whole day as the vessel passed the Norfolk and Suffolk coast, particularly when off Haisborough, Yarmouth, and Harwich. Their numbers

* *Motacilla Trochilus*, LIN.

† *Motacilla rubetra*, LIN.

‡ *Motacilla Phœnicurus*, LIN.

§ *Motacilla regulus*, LIN.

|| *Sylvia hippolaïs* of British authors.

¶ *Fringilla cœlebs*, LIN.

increased at length to upwards of a hundred, and they remained on board until the vessel almost entered the Thames. The exact direction from which they came could not be very well ascertained, as they descended from an invisible height in the air to the call of those which were in the ship; and after wheeling two or three times round the vessel to reconnoitre, joined their companions on board. They appeared to arrive from the English coast, and there can be little or no doubt but that they did so.

This last species, I believe, has not, heretofore, been known to migrate; in fact, attention has never, perhaps, been directed to the subject, it having probably been supposed, from analogy, that the species was resident in this country throughout the year. I have long, however, had some suspicions on this subject, from their being so frequently taken by the London bird-catchers about Michaelmas, in situations where, I am confident, they are never found during the summer. I have never heard of their being taken near the metropolis at any other time of the year, though I know of one locality, within ten miles of London, where a few pairs annually breed. After the ocular testimony, however, which is above related, there can be little doubt but that the tree sparrow will prove to be a bird of passage.

The fact, also, of redbreasts, and of starlings, crossing the German Ocean is curious and new. An astonishingly vast migration of the gold-crested regulus has been described by that admirable observer, Mr. Selby, who saw them arrive by thousands on the sand-banks of the Northumbrian coast, and the flight was traced throughout the whole length of the coasts of Northumberland and Durham. Is it not astonishing, after such direct testimony has been recorded of the actual migration of so delicate and tender a little creature as the gold-crest, that persons should yet be found who doubt that swallows ever cross the sea? What would not White of Selborne have given for such direct evidence of migration as is here recorded?

The number and variety of the species, which my informant observed, are, indeed, so extraordinary, that if I did not know my source of information to be respectable, I should have felt great hesitation in thus making it public. I have seen, however, several of the birds which were taken on board, and can quite safely vouch for the accuracy of all that is above stated. It is worthy of notice, that the captain of the ship remarked, that he had never known so many birds to alight on his vessel before. What opportunities for observation must these men have, if they were to devote but a little attention to natural history!

The extent, also, to which insects migrate, or rather wander, seems never to have sufficiently engaged the attention of entomologists. Most persons must have remarked, on perusing an account of the localities of our rarer strong-winged insects, (such as the *Sphingidæ*, many of the butterflies, &c.,) how very many of them have been principally taken on the eastern and southern coasts of the kingdom. My friend, to whom I am indebted for the above information on birds, mentions having seen several small moths flying out at sea, when about ten miles distant from the Suffolk coast; one only of which was captured, which I find to be the *Lampetia defoliaria*. Mr. Stephens, also, records an instance of the death's-head hawk-moth (*Acherontia atropos*) being captured four miles at sea; and I have myself observed numberless instances of diurnal moths, and butterflies, flying at a considerable distance from land. I have repeatedly seen the humming-bird hawk-moth (*Macroglossa stellatarum*) fly straight out to sea; also, on two or three occasions, the clouded yellow butterfly (*Colias Edusa*,) the small copper butterfly (*Lycaena Phlæas*,) and once, the wall butterfly (*Hipparchia megæra*). I have picked up, also, in the isle of Jersey, amongst the rejectamenta of the sea, a drowned specimen of the large rhinoceros beetle (*Sinodendron cylindricum*,) and I could here enumerate various other instances of insects being captured in the Channel; but the species, in which, of all others, I have most frequently observed this wandering propensity, is the beautiful painted lady butterfly (*Cynthia Cardui*).

There is not, perhaps, any lepidopterous insect whatever, the natural history of which would comprise so many curious particulars as that of the interesting and elegant butterfly, *Cynthia Cardui*. All the insects, it will be observed, whose names are above mentioned, are known to possess a wide geographical range; but the painted-lady butterfly may be even said to be an inhabitant of the world at large. Mr. Rennie informs me, that he has seen specimens from America, from the Caucasus, and from China; I have seen them from North America: the species is said, also, to occur in Otaheite and Australia, and it is undoubtedly found in Africa. Reports, however, of this kind must be received with some degree of caution, as, without actual and careful comparison, distinct species may have been confounded together. Many birds (particularly of the order *Grallatores*) were once thus said to inhabit all parts of the globe; until it was shown, by careful and minute comparison, that different creatures had been confused together: I allude to the species of *Scolopax*, *Charadrius*, *Thalasi-*

droma, &c, which, though closely resembling each other, are now proved, by various and constant characters, to be distinct. There can, however, be no doubt but that the painted-lady butterfly has an amazingly wide range of geographical distribution, and I think it may be fully accounted for by the strange wandering propensities of the insect.

Of this I have just witnessed a very remarkable example. I had often observed this species to fly straight out to sea, and I have noticed it at a considerable distance from land; but, until within this last fortnight, I never knew them travel in immense flocks. On the 8th of this month, (October, 1833,) this beautiful butterfly abounded in all the gardens about this place; upwards of twenty were counted on one clump of dahlias; and, at the same time, they were noticed in equal abundance in a garden about half a mile distant from that in which those dahlias grew. None had been previously observed in the neighbourhood, and all that were seen on that day were very much rubbed and injured, so that they had evidently been long excluded from the chrysalis, and had perhaps travelled a considerable distance. I was unable to ascertain the direction from which they came, neither could I discover the route which they pursued; for a single day the species appeared every where in abundance, and the day after not one was any where to be seen. On the morning of the tenth, however, I observed a single one flying swiftly to the eastward; and since that time several others have been seen; but, as these last were all perfect and uninjured insects, I do not consider that they formed part of the immense flight which passed this place on the eighth. It will be remembered, also, that this same butterfly is the species which passed in such incalculable multitudes through Switzerland some years ago; an occurrence, the description of which must be familiar to every student of entomology.

Does not this ascertained fact, of insects thus travelling in enormous flocks from one district to another, explain, in some measure, the sudden appearance of a particular species in vast numbers, in a neighbourhood where it is usually considered rare? It certainly does seem, in many instances, to account for this phenomenon; but still, it will not equally apply in all. It would be wandering, however, from the present subject, to treat on the wonderful irregularity of insect appearance; some curious facts concerning this I will reserve for a future opportunity; but it is nevertheless worthy of being observed here, that the painted-lady butterfly, which is remarkable, in most

places, for the extreme irregularity of its occurrence, is equally remarkable in others, (as in some parts of the west of England, and in Jersey,) for appearing with great regularity.

A very singular circumstance is also related of the *Cynthia Cardui*, by Mr. Knapp, in his amusing and excellent "Journal of a Naturalist." After some other remarks on the species, he observes that "some years ago a quantity of earth was raised in cutting a canal in this county (Gloucestershire); and in the ensuing summer, on the herbage that sprang up from the new soil on the bank, this butterfly was found in abundance, where it had not been observed for many years before." Might we not reasonably expect, if the soil about Hampstead were to be turned up, on any occasion, to some depth and extent, that the extraordinary and distinctly marked butterfly, *Cynthia Hampstediensis*, would reappear, although so many years have now elapsed since it was last seen?

To return to the subject of migration; nothing is more easy, in the spring, to a person acquainted with the voices of our native migratory birds, than to note down the periods of their respective arrivals, as they all then announce their approach by their perpetual loquacity; but, in the autumn, it is no such easy matter to ascertain the exact time of their several departures. The following observations, therefore, may not be altogether without interest. The last willow-wren (*Sylvia melodia*), which I noticed in this neighbourhood this autumn, was on the 18th of September; the morning was cold and frosty, and it was hopping about on a large dunghill, attracted, I believe, chiefly by the warmth. The same morning I observed a blackcap (*Ficedula atricapilla*), and shot a babillard (*F. garrula*). The arrival of this last bird, in the spring, was observed by Montagu (in Wiltshire) to be for many years, from the 21st of April to the 10th of May. In the spring of 1831, I had a nest of this species brought to me, containing four eggs, so early as on the 23rd of April; the first babillard which I noticed this year was on the 6th of May. Grey fly-catchers (*Muscicapa grisola*), continued plentiful here until about the 20th of September; the last I observed was on the 25th. I heard a blackcap on the 27th; and on the 26th a wryneck (*Yunx torquilla*), was shot. Several ring-ousels (*Petrocincla meruloides**), appeared during the Michaelmas week; they were extremely shy, and difficult of approach.

A species of creeper, also, hitherto undescribed, has been two or three

* *Turdus torquatus*, LIN.

times seen in this neighbourhood, in the spring and in the autumn. The following description is from a person who has seen it twice, in the spring of 1831, and on the 8th of September last, when he was enabled to get a very close view of it. In its make, its plumage, and in its manners it closely resembles the common brown creeper (*Certhia familiaris*), and its bill, also, is similarly curved; but it differs in being about double the size of that bird, and in having a forked tail; possibly, however, in the individual from which this description was taken, the middle feathers of the tail may have been wanting. The attention of my informant was first attracted by the novelty of its notes, which he describes to be much varied, and totally unlike those of the common creeper, or of any other small bird with which he is acquainted.

Tooting, October 16th, 1833.

THE BRITISH MUSEUM.

BY E. G. BALLARD, ESQ.

To the general visitors of the British Museum, the Synopsis published by that institution, though admirable in its scientific arrangements, and absolutely necessary to the diligent inquirer, by the nature of its construction, as a catalogue, fails to convey a variety of particulars relative to its contents, which would, if embodied in separate essays, be highly useful to the student in natural history. In my own visits to the Museum I have constantly felt the want of some condensed information of the several specimens of zoology, many of which are extremely curious, and naturally excite inquiry and stimulate investigation. As a reader in the library I had the opportunity of gratifying these desires, and accordingly pursued the study with considerable ardour, and made rather extensive collections from the works of various authors on the several species in the zoological department; but the immense extent of the collection at length baffled my patience, and I was compelled to abandon my labours. The effect, however, served to convince me of the utility of the inquiry; and I shall venture on the experiment of submitting some of my notices of the most curious specimens to the pages of the Field Naturalist's Magazine, since the works which describe them are not in the possession of every student; and though to the professor the descriptions may be familiar, the tyro

may find them acceptable. I shall take the several objects as they are arranged in the Synopsis, and intersperse the descriptions with such original observations or gleanings from various sources as may serve to elucidate the subject, and comply with some, at least, of the requisitions on the cover of the early numbers of the Magazine.

THE MUSK OX.

This animal has many striking peculiarities which appear to give it an alliance with the goat rather than the ox. The singular secretion of musk, which so strongly pervades and taints its flesh, particularly the heart and kidneys, not only indicates a similarity in secretory organs with the species of deer which yields that drug, but may, from these circumstances, lead to a reasonable inferential conjecture that the concrete substances both of musk and civet, and, perhaps, ambergris, may owe their origin to the action of some secretory ducts connected with the heart and kidneys of the animals which produce them. The silky texture of its hair again nearly resembles that of the Cashmere goat; while its habitat on the tops of mountains, its facility in running, and its dexterity in climbing rocks, are all indicative rather of the goat than the ox: the identity, however, of general figure and size will warrant the naturalist in placing it in the bovine tribe.

ARBORESCENT FERN (*Alsophila Buenoniaria*, WALLICH).

This, which stands on the staircase, between the musk ox and polar bear, is one of the most curious and interesting specimens in the Museum. We, who in this country are accustomed to see the fern only as a small ramose herb, springing on our heaths and commons in the early months of the year, like the tufted varieties of the acanthus, and gradually expanding its leaves till, in the autumn, it covers the ground with its luxuriance, and affords shelter to the hare and partridge, can have no conception of a tropical species, which, like the present specimen, rises on a trunk forty-five feet in height, rivalling the most lofty palm, and bearing on its summit a frond as clearly defined as the most minute species of this singular genus. On examining this curious specimen, I observed it possessed several very remarkable peculiarities. It has been cut into two parts for the convenience of placing it. That on the right hand is the lower part of the trunk; the other is the upper portion; and above is placed the frond. The whole appears a botanical phenomenon. It seems that the first leaves (if they may be so called) are of the nature of scales, proceeding from the *cortex*, or outer bark, as there is no vestige of *liber* or inner bark. These leaves

fall off and leave the wood exposed ; and nature, in order to protect the wood from injury, has furnished the plant with a power to produce an artificial covering for the denuded wood in a kind of net-work which appears (on the lower portion of the trunk) to shoot, like crystals of salt, and cover the cortex. This peculiar reticulated production is visibly commencing in every part of the trunk where the leaves had been, but is most conspicuous towards the root.

Islington, 26th September.

ON THE INCREASE OF THE ROOTS AND THE STUMP IN THE SILVER FIR LONG AFTER IT HAS BEEN FELLED.

BY M. DUTROCHET, MEMBER OF THE INSTITUTE, PARIS*.

WHEN a tree has been felled, and when no shoots arise from the stump, this stump, as well as the roots which fix it in the ground, fail not in a short time to die. The cause of this phenomenon is found in that well-known law of vegetation by which the leaves are produced from the effect of the sap, the latter being essential to the life and growth of the tree, both in the branches and the root. When the stump reproduces stems after the tree has been felled, the roots may continue to flourish to an indefinite period. Thus, in coppice-woods, the roots of the same trees live through an indefinite number of centuries, and their existence may be prolonged to an indeterminate period.

It is well known that the coniferous trees never reproduce stems when the tree has been felled ; and that the stump and roots which fix it in the earth usually die, and are quickly decomposed. There is, however, a very remarkable exception to this fact in the silver fir, (*Pinus picea*, LINN., *Abies pectinata*, DE CAND.) The stump and roots of this tree continue to live, and even grow, during a great number of years. This singular fact was pointed out to me by my brother inspector of forests, one of the most intelligent men connected with the forest administration ; though I must confess I doubted the fact till I was enabled to verify it myself. I have observed in the forests of the Jura, that all the stumps of the silver fir, whose branches had been many years felled, were still vigorous as well as their roots ; while all the stumps and roots of the Norway spruce, (*Abies excelsa*, DE CAND.,) were dead, including those which had been recently felled.

* Translated by Miss H. G——, Lee, Kent.

I have seen old stumps of the silver fir which, according to certain marks, had been felled forty-five years before, still full of life. The interior was entirely decayed, but the outer wood and the bark presented signs of life. These observations were made in the spring; the stump and the roots being full of sap, the bark, separated from the wood by the effusion of the pulp, (*cambium*), was easily detached. This bark, and the wood adjacent, had all the appearances which these parts present when in a flourishing state. The existence of the pulp (*cambium*) indicated that the stump was increasing in diameter. This point I was also able to prove, which I did in the following manner. I perceived that a kind of enlargement was formed between the bark and the wood of the stump, and that this swelling, consisting of the wood and bark which had been produced since the tree was felled, had again covered a portion of the transversal section of the stump, so that the section of the sap which limited the central system of the tree at the time of its being felled, was in perfect preservation. The traces of the axe on this sap, transversely divided, removed all doubt on this point. I have also seen on all these stumps an increase in the diameter from the production of new pulp, the thickness of which, in the old branches which I examined, was about two-fifths of an inch, so that these stumps, during the space of forty-five years, had acquired a total increase of four-fifths of an inch, or eight lines in diameter.

The phenomenon which the silver fir presents in such circumstances appears at first sight to invalidate the theory which supposes the sap furnishing the materials of growth to be derived from the leaves or the umbrageous parts of the vegetable. But the extreme scantiness of the increase in the diameter of the stump of the silver fir, on the contrary, confirms this theory; for the stump which continues to live during so great a number of years increases thus slowly from the want of leaves, which are peculiarly the productive organs of the nutritive pulp. It appears that the roots of this tree possess the faculty of producing a small quantity of crude sap, and of converting it into nutritive pulp, which preserves life in the roots and stump, and contributes to their scanty growth during a great number of years. This faculty is wanting in the Norway spruce and the Scotch fir, (*Pinus sylvestris*), of which the stump and roots die soon after the tree has been felled. Whence arises this difference? This is a question not easily decided. However this may be, the fact is very remarkable which proves that the roots of trees, and the small portion of the stem which is left when they are felled, do, in certain cases, live a long time and increase, though not surmounted by any foliage.

THE ALLIGATOR OF THE ANTILLES.

BY R. H——L.*

GOING down from Puerta Plata, a town on the north eastern coast of Haiti, to the bay of Isabella, to trace the remains of the first settlement made by Europeans in the new world, I was particularly struck by the multitude of alligators, or caimans, that infest the Bajabonico, a considerable river, watering the plain in which that ancient city stood. This feature in the scenery leading me to insert in my journal a note on the habits of this reptile, which I think may serve, if not to correct some vulgar errors respecting it, at least to set old truths in a new light, I send you the extract of it, as a trifling addition to what is already known of this curious monster.

I must premise, that the ancient city of Isabella stood a little away from the Bajabonico. A good trackway winds among low thickets along the stream. The plain expands, marshy, green, and grassy, a sort of lake being made by a broad reach of the river, called the "*Vuelta Larga*." The mixture of meadows and water is pleasing, but wild, and not a little of this wildness is increased by the swarming alligators there, the largest I have any where seen. * * * * When the hard toils, the privations and mortality which attend a new settlement in the wilderness, with a multitude of morbid and irritable passions, spread a curse over the scenes of this first city of the Europeans, till its green fields seemed all pestilence, and its sunny waters the Stygian bourne that separated the dead from the living world, it became desolate and deserted as soon as the golden harvests to be reaped in the luxurious lap of the Vega Real, a finer and more fertile plain of the interior, induced them to build another and more splendid city there. From that time till now the alligator has had an undisturbed possession of the wastes and wilds.

I have never understood why the early Spanish writers in noticing these events, overlooked so remarkable a feature in these wild, marshy, river scenes, as this peculiar animal. Peter Martyr, who has given in his *Decades* *, so full and so spirited a summary of the natural characteristics, as well as the productions of Haiti, after mentioning

* We are exceedingly obliged by R. H——L's very interesting communications.—EDITOR.

† P. Martyr, *Decad.* 3, lib. xi.

that the season of flowers, and seed-time and harvest, are a perpetual spring-tide and summer, expressly excepts from its scenes all ravenous animals and noisome reptiles. "There is no province," says he, "nor any region, which is more notable for the majesty of mountains, the fruitfulness of vales, the pleasantness of hills, the delectableness of plains, with abundance of fair rivers running through them. There *never was any noisome animal found in it*, nor yet any ravening four-footed beast, but all things blessed and fortunate." The Indians, I take it, must have made war on these gigantic reptiles, and they thus became not so obtrusive as at present; yet in these marshes they must have been always remarkable. I saw the cows and horses feeding in the sedges in which they prowled, without any apprehension of danger, though I know the nature of this animal to be fierce and mischievous; but like all the cold-blooded reptiles, it requires to be roused either by a sense of danger, or the impulse of hunger, to an attack. In the calm, long-enduring quality of its nature, the alligator is really a timid animal. With the advantage of an impervious armour, in its hard impenetrable covering of scales, strength of limb, commanding shelter of the water, and jaws, whose clasp is an inextricable hold, it fears to attack an animal it is unused to devour. The inhabitants, aware of its timidity, fearlessly cross the stream, even when numbers are swimming around; but this is not done without some *ruse*. The alligator, they say, is greedily partial to dogs, and surprises them often when they come to drink at the river. The voice of the dog will always draw them away from an object when prowling. Those who would cross the river without any risk from their attacks, send a scout down the stream to imitate the canine bark, yelp, or howl, when away swim the alligators for their prey, leaving an unmolested ford to the traveller higher up. Instinct has taught the dog to secure himself by a similar expedient. When it has to traverse a stretch of water, for the Hatero's* dog wanders alone a good deal, it boldly goes some distance down the stream, and howls and barks. On perceiving the alligators congregating in eager cupidity to the spot, it creeps gently along the banks higher up, and swims over the water without much fear of being pursued.

This fact is universally asserted, and is unquestionably true, but I doubt the conclusion. The well known habit of the alligator, never to eat its food until in a state of putridity, negatives the supposition that it has any particular choice in the flesh of its victim. The fish it

* Hatero,—the colonial Spanish for a herdsman or breeder of cattle.

probably devours immediately after catching them, but all other things else, as soon as they are slain, are torn, and mangled limb by limb, and left to putrify in the mud of the river or the sedge about its lurking place. It can have no particular preference, therefore, for the dog as food. I am disposed to ascribe this susceptibility to be roused at the canine yelp to the similarity of that sound to its own peculiar cry under any species of excitement; to the fact that it is the impassioned voice of their young; to maternal solicitude of the female for its progeny, when it hears that voice; and to the ravenous appetite of the male on the same occasion; for, like many of the rapacious animals, the male of this tribe preys upon its own offspring.

It is not very clear whether the male parent, after it has sought the attachment of the female, in which its passion is fierce, violent, and jealous, assists her in the office of disposing the eggs in the earth. It is much more likely, from the necessity of her after watchfulness to guard against his reprisals, that he does not. After burying the eggs in the soil to be there matured, the female visits from time to time the place in which they are secreted, and just as the period of hatching is completed, her eagerness is exhibited in the anxiety with which she comes and goes, walks around the nest of her hopes, scratches the fractured shell, and by *sounds which resemble the bark of a young dog*, excites the half extricated young, in their broken covering, to struggle forth into life. When she has beheld, with this sort of joy, fear, and anxiety, the last of her offspring quit its casement, she leads them forth into the plashy pools, away from the river, and among the thick under-wood, to avoid the predatory visits of the father. In this care and watchfulness over them, she is ferocious, daring, and morose, guarding with the inquietude of the hen her brood wherever they wander; turning when they turn, and by whining and grunting showing a particular solicitude to keep them in such pools only as are much too shallow for the resort of the full-grown reptile. When I was in Yasica, a river district of that name, as many as forty had been discovered in one of these secret resorts; but in half an hour, when the boys who had found them out returned to visit their hiding-place, they saw the traces of the coming and going of the watchful parent, who had led them away to some further and safe retreat. In this period of infantile helplessness, the mother feeds them with her masticated food, disgorging it out to them as the dog does to its pups. It is not frequently it is seen otherwise than crouching with its belly to the earth, and crawling with a curvilinear motion, as the eft, or water-

newt swims, or the cox cleaves the flood; but at this time it may be seen firmly standing on its fore feet. This is the attitude of anger and attack, and its spring is quick, a sort of agile leap, by no means short in distance. During all this time of protection and dependence is heard the voice, by which the young makes its wants known, and the parent assures its offspring of its superintendence. It is the yelping bark of the dog, and the whining of the puppy.

From all these facts, I take it, that when the sound of the dog's bark is heard, the caimans press to the spot from which it issues, agitated by two several passions, the females to protect their young, and the males to devour them; and to this, and not to their predilection for dog-meat, are we to ascribe the eagerness with which they scud away, agitated by that voice, which in the one case is the thrilling cry of danger, and in the other the exciting hope of food.

This susceptibility to be excited by hearing a cry associated with peculiar instincts and appetites, has other parallels in other animals. A very striking analogy is to be found in Wilson's anecdote of the cat bird.

"In passing through the woods in summer," says this distinguished ornithologist, "I have sometimes amused myself with imitating the violent chirping or squeaking of young birds, in order to discover what different species were around me; for such sounds at such a season in the woods are no less alarming to the feathered tenants of the bushes, than the cry of fire or murder in the streets to the inhabitants of a large and populous city. On such occasions of alarm and consternation, the cat bird is first to make his appearance, not singly, but sometimes half a dozen at a time, flying from different quarters to the spot. At this time, those who are disposed to play with his feelings, may almost throw him into fits, his emotions and agitation are so great at the distressful cries of what he supposes to be his suffering young. Other birds are variously affected, but none show symptoms of such extreme suffering. He hurries backwards and forwards, with hanging wings and open mouth, calling out louder and faster, and actually screaming with distress, till he appears hoarse with his exertions. He attempts no offensive means; but he bewails, he implores, in the most pathetic terms with which nature has supplied him, and with an agony of feeling which is itself affecting. Every feathered neighbour within hearing hastens to the place, to learn the cause of the alarm, peeping about with looks of consternation and sympathy. But their own powerful parental duties and domestic concerns soon oblige each to withdraw. At any other season, the most perfect imitations have no effect whatever on him."—WILSON'S AMERICAN ORNITHOLOGY.

The alligator swims with scarce conceivable velocity. * * * I once

eat of the flesh roasted; it is white, the fat as transparent and colourless as glass, and the taste that of veal, but sweet as if cooked with sugar.

Mr. Heneiken, a gentleman of great experience in tropical natural history, who accompanied me in my rambles in Yasicá, confirmed the common tradition that the caiman swallows sticks and stones for the purpose of keeping the stomach distended. In a multiplicity of instances in which he examined it when killed, he found these substances in its stomach, an instinct it has in common with another of the amphibious tribes, the phocæ, or seals.

ADDITIONAL NOTICES OF THE AURORA BOREALIS.

BY RURICOLA.

IN pursuance of the historical notes, inserted in the *Field Naturalist's Magazine*, p. 362, and following, concerning the AURORA BOREALIS, I take the liberty of submitting the following supplemental remarks.

This phenomenon was observed in England several times in the reign of Queen Elizabeth. Of these the earliest seems to be that which was seen at London on January 30th, 1560, and which is recorded under the appellation of "Burning Spears," in a book entitled "A Description of Meteors," reprinted at London in the year 1654, signed W. F., D.D.

By the testimony of Stow, the historian, the same phenomenon was observed on the 7th of October, 1564.

By the same historian, and his contemporary Camden, the like appearances are described to have occurred for two successive nights, namely, the 14th and 15th of November, 1574. On the 14th, the former records in his annals, that there "were seen in the air strange impressions of fire and smoke to proceed forth of a black cloud in the north, towards the south. The next night following, the heavens from all parts did seem to burn marvellous ragingly, and over our heads the flames from the horizon round about, rising, did meet, and there double and roll one in another, as if it had been in a clear furnace."

Subsequent to this date are no instances on record as having appeared in Britain, though some are mentioned to have been seen during the interval in Brabant, Wirtemberg, and France, at several periods, under circumstances which make it probable that they must have been visible

in this kingdom likewise: however, in this kingdom, subsequent to the date of 1574, are no instances on record, till September or October, 1706, when an appearance occurred in England, which was transiently noticed by Mr. Denham, in a communication to the Royal Society of London, inserted in the Philosophical Transactions for 1709, No. 320.

The same communication contains the account of the "Northern streaming," which was observed by Mr. Neve in Ireland, November 10th, 1707; and of which an account was introduced in my former letter, p. 366. This appears to have been the first particular description inserted in the Transactions of the Royal Society.

Soon after this appearance another took place, but of short duration, having been seen near London, a little before midnight, between the 9th and 10th of August, 1708, by the Right Reverend Philip, Lord Bishop of Hereford, and by his Lordship communicated to the Royal Society. This communication is noticed by Dr. Halley, in his "Account of the late surprising appearance of the lights seen in the air," inserted in the Philosophical Transactions for 1716, No. 347. The appearance, which is described very minutely and copiously by that eminent professor, I presume to be the one intended by Collins's "Young Aurora,"

"In the first year of the first George's reign,"

stated by Collins's editor to have "happened about the year 1715:" in fact the phenomena occurred on Tuesday, March 6, (old style) 1716. Dr. Halley, speaking of his great desire to witness this particular sort of meteor, says, "This was the only one I had not as yet seen, and of which I began to despair, since it is certain it has not happened to any remarkable degree in this part of England since I was born; nor is the like recorded in the English annals since the year of our Lord 1574; that is above 140 years since, in the reign of Queen Elizabeth. Then, as we are told by the historians of those times, Camden and Stow, eye-witnesses of sufficient credit, for two nights successively, namely, on the 14th and 15th of November that year, much the same wonderful phenomenon was seen, with almost all the same circumstances as now." The foregoing position of Dr. Halley, that the appearance of this meteor is "not recorded in the English annals *since the year of our Lord 1574*," may possibly have given occasion to the opinion, that it has not been recorded in the English annals at all. It is evident, also, that although, as the Professor says,

“the phenomena had not happened *to any remarkable degree* in his part of England since he was born,” later writers mistake in describing this as its “first appearance” at that period, since it had certainly appeared in 1706 and 1708 in England, not to mention its appearance in Ireland in the intervening year.

I trouble you with these observations in consequence of having recently procured access to the Philosophical Transactions, to which I could not refer at the date of my former letter. With reference to the noise which is said to be at times an accompaniment to this meteor I would add, that in “Observations on the Lumen Boreale, or Streaming, on October 8, 1726,” communicated to the Royal Society by the Rev. W. Derham, and inserted in the Philosophical Transactions for 1727, No. 398, it is noticed, that “several persons who viewed this appearance, heard a hissing, and in some places a crackling noise, in the time of streaming.”

Killeshandra, Ireland, Sept. 27th, 1833.

NOTES FROM LOUGH ERNE,

BY RURICOLA.

HAVING availed myself of a very obliging invitation to take advantage of being in the neighbourhood, for visiting the magnificent mansion of CRUM or CROM Castle, now building on the estate of the Earl of Erne, on the upper lake of LOUGH ERNE, in the county of Fermanagh, I beg leave to notice two or three things which took my attention as fit matters for communication to the Field Naturalist's Magazine.

Of these, the most remarkable is a YEW TREE, of great age and proportionate expansion, situated in a curious, old-fashioned, terraced garden, adjoining the fine ivy-mantled ruin of the old castle, which was burnt down fifty or sixty years ago. The stem of the tree is upright and undivided, being by measurement eight feet and a half in circumference, at about three from the ground. The highest point, as near as we could compute, is eighteen feet. Six feet from the ground, the boughs project horizontally round the stem so as to cover a space nearly circular; the diameter of which is about twenty-seven yards, or eighty-one feet; and the circumference, of course, about eighty-four yards, or 254 feet. No particular date can be assigned to this tree: but local tradition, as well as internal evidence, attributes to it a far-off origin.

It appears, however, to be in a very healthy and flourishing condition : no symptoms of decay are observable upon it ; on the contrary, its foliage is perfect, and I noticed many of its bright scarlet berries gleaming through its dark green leaves. It may seem somewhat derogatory from the dignity of this noble tree, if I observe, that a mushroom, with its stem and pileus magnified to the before-mentioned dimensions, would give no very inaccurate idea of the form and arrangement of the yew : however, as a compensatory comparison, I would add, that occasion having been taken, from fear of the boughs being injured by their excessive length and weight, to support them in their horizontal position by numerous props, the tree has been thence remarked to bear a resemblance to the *Ficus Indica*, or Banian Tree, so beautifully described by Milton.

“ The fig-tree, not that kind for fruit renown’d,
But such as at this day to Indians known,
In Malabar or Deccan, spreads her arms
Branching so broad and long that in the ground
The bended twigs take root, and daughters grow
About the mother-tree, a pillar’d shade
High overarch’d, and echoing walks between ;
There oft the Indian herdsman shunning heat,
Shelters in cool, and tends his pasturing herds,
At loopholes cut through thickest shades.”—*Par. Lost*, ix. 1101.

Not to commend our yew-tree, however, hyperbolically, the extent over which I have above described it as expanding, would evidently suffice to accommodate no small party of herdsmen or herds, though it would hardly be capacious enough for a regiment of soldiers, which tradition alleges to have taken shelter under it ; at the same time that the deep umbrageous foliage of its gigantic branches would serve as an impenetrable protection against the most powerful summer heat.

My excursion to Crum Castle enables me to add another *Heronry* to those which I have on former occasions mentioned as existing in Ireland. Of the beautiful and almost innumerable islands, which are scattered over Lough Erne, one was pointed out to me as containing a large number of *herons*, or *cranes*, as they are commonly called in this county. They were reported to me as building and breeding on that island in the spring : but in answer to my inquiries concerning their forsaking it in winter, as I mentioned in a late letter to be the case with Lord Downshire’s Heronry at Hilsborough, I did not learn that such was their habit. On the contrary, my informant, an inhabitant of the

immediate vicinity of the island, stated that the birds continue there throughout the year, living for the most part in the wood during the days, but coming out for food in the evenings and mornings. He added, that he continually saw them at such times, a dozen together, on the edge of the lake, catching the pike, bréam, and other fish, with which those waters abound. Admitting the fact, which there appears no reason to question, of the habits of these birds, as to their winter residence varying in different places, may it not be accounted for by supposing that they can easily find a larger supply of food in some inland situations than in others?

The shores of Lough Erne abound with a fossil production, which is called by the inhabitants, *petrified reeds*. I brought away with me a specimen, which seems to answer that description. It consists of a congeries of pipe-like substances, filled with crystallised matter, and consolidated into one mass of great weight and hardness, with an intermixture of indurated clay.

Killeshandra, Oct. 8, 1833.

P.S. The Heronry which I noticed in the Field Naturalist's Magazine, p. 320, as being in the county of Cavan, is at Farnham, the seat of Lord Farnham, near the town of Cavan. I have been lately told by a gentleman who knows the spot, that there is another at Horetown, near Taghmon, in the county of Wexford, the property of Mr. Goff.

NATURAL HISTORY OF THE REED BIRD.

(*Ripæcola arundinacea*, RENNIE.)

BY ROBERT SWEET, ESQ., F. L. S*.

THIS is a very variable bird in its colours, some being very pale, and others altogether as dark, while those that are pale one season frequently become dark the ensuing one. It is a curious little lively bird, known often by the name of reed wren. It generally makes its appearance with us the beginning of April, and leaves us in September; its early or late departure seems to depend a good deal on the warmth or coolness of the season. It is a very merry bird, almost continually singing, and will sing by night as well as day, sitting amongst the reeds, or in some bush or tree near the water, where it feeds on gnats and other insects, which abound in moist situations. It is very fond of flies, spiders,

* From the notes to White's Selborne, 8vo. edit. 1833.

small caterpillars, grasshoppers, crickets, moths, and many other insects, and will swallow a larger one than could be imagined for so small a bird. In confinement it will feed readily on the general food of its congeners, and is very fond of the yolk of an egg boiled hard, so that it may be crumbled, on the top of the other food, or put in the cage in an empty egg-shell. It should also be supplied with a few insects occasionally, such as flies, spiders, small caterpillars, moths, or butterflies. Being an inhabitant of the sides of ditches and rivers, it is very partial to washing, which it must not be allowed to do in winter, or it will wash itself till it is so weak that it can never recover, and I lost several of this species by allowing them to wash in winter. I therefore gave them their water in a very small cup, not much larger than a walnut, in which they can only dip their heads; but they even try to wash in this, by throwing the water over themselves, which amuses without hurting them. I have a male bird of this species that has sung occasionally all the winter. The song is very loud and variable, consisting of a great number of notes, and sung with many changes of voice, so diversified as to resemble the song of several different birds. Birds of this species are very courageous, and are sometimes apt to quarrel with each other; and if two are in one cage they must be parted, or one will probably fall a victim to the other.

The nest of this bird is generally affixed to the side of a large tree, such as a pollard willow or poplar, twisted round the young branches with the webs of caterpillars. It is a deep nest, and composed chiefly of dry blades of grass, intermixed with a few bits of moss, all closely and neatly bound tight together, with the strong webs of the gregarious caterpillars that infest the trees and hedges in summer. It is rather a rare bird in this country, much more so than the sedge bird, and only visits particular districts. It is not, however, uncommon in the neighbourhood of London, there being annually several in the Regent's Park, and also on the banks of the Thames, between Battersea Bridge and the Red House Tavern, in Battersea Fields.

ON THE FIDELITY AND ATTACHMENT OF DOGS TO THEIR MASTERS.

BY MISS HUNTER*.

THAT dogs forsake their own species, relinquish their own pleasures, and leave their natural food to become the friends and companions of

* This communication does great credit to the young writer.—EDITOR.

man, is a fact so universally allowed, that it is not my purpose to venture any remarks on a subject which has occupied the attention, and guided the pens of far abler writers than myself. But it appears to me that any illustrations of their noble friendship, their disinterested attachment, and their unshaken fidelity, cannot fail to interest those who study the great volume of nature, and on that account the following is offered.

A particular friend of mine, Mr. J——, resided with his married son and his family, and was beloved by all, but by no one more than an old and valued four-footed friend, called *Sim*. This sagacious creature was more attached to my late respected friend than any one can imagine, for he watched his every look, his every action, and long and patiently would he solicit the long-wished for pat or kind word which frequently was bestowed on him. *Sim* sat at his master's feet the whole day—when he rose from his chair, *Sim* followed gently and unobtrusively: he always was at his side. He ate nothing but from his master's hand, and if he ever spoke sharply to him, he evinced, through the whole day by his subdued demeanour, how deeply he felt the rebuke. If his master went out and did not allow him to follow him, poor *Sim* did not rest, until he had sought out some glove, or book, or something belonging to Mr. J——, which, when he had secured, he laid him down, and woe be to whoever was so rash as to wish to deprive him of it. If Mr. J——'s carriage came to the door, *Sim* was all eagerness the moment its wheels were heard, long before any person in the room with him knew to whom it belonged (for the drawing-room did not command a view of the carriage drive to the house); and what is still more singular, if another carriage drove up to the door before that of his master, *Sim* took no notice of it whatever; but the moment those wheels approached, he was in an extacy of joy and impatience, for he always had accompanied it; but being at the time I speak of too old, his indulgent master took him in, and he always sat at his feet quite upright, as if delighted to show to other dogs his elevation. He always slept at his master's bed-room door, and if his master was ill, *Sim* evinced the greatest grief, sitting by the side of the bed; and if Mr. J—— called to him, leaping on the bed, and crawling very gently, as if fearing to annoy him by being too rough in his caresses, he would lick his hand, and, after a great show of pleasure, resume his station by the bed-side. At length, however, the poor gentleman became worse and worse; *Sim* was grieved beyond measure, scarcely ate any food, and no force or coaxing could induce him to quit the side

of his beloved master. Mr. J—— died ; and amongst those who mourned his loss was Sim, the humblest, the most disinterested, and the most intense mourner ; for he followed the body to the grave, and when it was consigned to its kindred dust, no inducement, no entreaty could prevail on him to leave that master in death, to whom in life he was so tenderly devoted. He lay on the grave day and night, intimating his humble grief by low piteous whining ; and melancholy indeed it was to see this faithful creature testifying after his manner his sorrow at his irreparable loss. His new master finding all endeavours to remove him vain, took Sim in his arms and carried him wet and dirty as he was into his house—but to no purpose ; the creature escaped and ran to resume his station on the grave, where he remained two days and two nights, through storms of wind and rain, which made all other animals forget every thing in the wish to find shelter ! The poor dog on the third day was found dead, having actually pined to death from grief at his dear master's death. Hard and unfeeling that heart must be who could hear such an account and not be touched by so great an instance of devotion. The clergyman of the parish kindly gave a small piece of ground at the foot of the grave, that the poor dog might rest by his beloved friend, and that even in death he might not be parted from him he so fondly loved.

Another instance of fidelity was proved by a large spotted dog of ours : we had long wished to purchase him, as his beauty first attracted our attention, he being at that time the property of a poor man residing in the same place, and who being very fond of the animal, for some time could not be prevailed on to sell him, though frequently urged to do so. At last, however, pressed hard by poverty, and having a very large family to maintain, he consented to sell the dog, which we were glad to buy, and he was accordingly brought to our house, where he found kind friends, both in his master and the coachman, whose peculiar charge he was, as he was purchased for a coach dog, being too large to bring into the house. Still, with every kindness and all our coaxing, he never could be induced to become reconciled to his change of abode, nor could he forget his former master. If he was chained but for a moment, he ran away to his old home, and could only be brought to remain with us by force ; and if we went out, he was obliged to be tied under the carriage to make him learn to follow it. We left the place at which we resided, and went to Ramsgate, and we imagined that being so far removed from the home he so loved, he would cease to think of it ; but far from forgetting his former friends, he thought

of them as much as ever ; and the very first time he was unchained we missed him, and the coachman asserted he saw the animal running at a fast gallop along the road we came by into Ramsgate, and gave it as his opinion he would run home. That day passed—another, and another, and the dog returned not. We wrote to his former master, and to our astonishment, received an answer from him, saying, that as he was at breakfast, the dog all tired and exhausted, dirty and splashed, rushed into his house, and seemed quite overjoyed to see him again, having travelled alone, a distance of *seventy-eight* miles, and passed the city of Canterbury and Maidstone, besides numerous smaller towns, without a guide, to return to his former master : what renders it more singular is, that a period of a month had elapsed since the time he arrived at Ramsgate and his being at liberty.

Exmouth, Devon, Sept. 29th, 1833.

ON THE SPECIES OF INSECT POPULARLY CALLED MOSQUITO.

BY THE EDITOR.

IN *Insect Miscellanies*, I remarked that numerous species of insects "are confounded under the common names of gnat and mosquito, whereas M. Meigen enumerated more than a dozen European species of gnat (*Culex*) independent of other similar genera which, though readily distinguished by naturalists, appear to common observers to be identical ; and hence it is probable, the foreign mosquitoes are also of several species, though to common observers, they do not appear to differ from the common gnat (*Culex pipiens*)."

When I wrote the preceding passage I had no means at hand of ascertaining the species termed *Mosquito* in foreign countries, either in specimens or figures ; but I have just received from Vienna an excellent German work which serves to confirm my conjecture ; two very different insects, belonging even to different genera, being indiscriminately called mosquito in Brazil*. The word indeed is a diminutive, and literally signifies "little fly." It is worth remarking that neither of the species alluded to, is the common gnat of Europe, though one is not

* *Braziliens vorzüglich lustige Insecten.* Von Dr. J. E. Pohl und V. Köllar mit illumin. Kupfertafl. 4to. Wien. 1832.

unlike it in form and colour, but rather smaller. I shall here give the figures and descriptions of these two mosquitoes, as curious and interesting to those who, like myself, are fond of such inquiries.

Fig. 1. *Culex molestus*.—*a*, natural size; *b*, magnified. Fig. 2. *Simulium pertinax*.—*c*, natural size; *d*, magnified.

1. *Culex molestus*, KÖLLAR; in Portuguese, *Mosquito*. The colour is dusky brown, the corselet and feet paler, the wings shining, and the wing ribs somewhat indistinct. The corselet is uniform in colour, and the abdomen has the rings grey. The body is one sixth of an inch in length. The wings are finely fringed, the wing ribs being darker and hairy. The antennæ have fourteen joints and are beset with tufts of hair disposed in whirls at the joints, these being much longer and thicker in the male. The beak (*der rüssel*) is composed, as in other gnats of several pieces, namely a fleshy, semi-cylindrical lip, terminating in a divided tip, another grooved lip of a horny texture, and four fine bristles, two on each side.

Parts of the mouth in a gnat, magnified and separated.—*a*, *b*, the upper lip and upper jaws carrying the jointed feelers; *f*, *c*, *d*, the under jaws and tonguelet; *e*, the under lip.

It is the female only which is troublesome as a bloodsucker, causing a burning pain followed by an inflamed swelling produced by the poisonous fluid she instils into the wound for the purpose of rendering the blood thinner and more easily sucked. The species is so annoying both to men and cattle, that some districts, where they are unusually abundant, have been quite abandoned by the colonists. This will not appear

wonderful when we find that Stedman and his soldiers were forced to sleep with their heads thrust into holes made in the earth with their bayonets, in order to escape from their tormenting bites; while Baron Humboldt tells us, the wretched inhabitants are accustomed to stretch themselves on the ground and pass the night buried in the sand three or four inches deep.

2. *Similium pertinax*, KÖLLAR; in Brazilian, *Boraxudo*; in Portuguese, *Mosquitto*. The colour is black, the wings translucent, the antennæ and the legs pale yellow, the shanks (*tibiæ*) of the hind legs and all the feet (*tarsi*) blackish. The body is one twelfth of an inch in length. The wings in some lights have a reddish gloss, and are exceedingly thin and furnished with delicate wing ribs. The poisers (*halteres*) are yellow. The female, as in the former instance is the most troublesome, and the blood flows copiously from the wound she inflicts. This, which is about the size of a pin's head, ought to be squeezed firmly to expel the insect poison.

Our authors report that there are many other species of *Similium* in Brazil, which are similarly troublesome. They add that the Brazilians call every species of troublesome fly *Mosquitto*.

Lee, Kent, 7th Oct. 1833.

ON THE GEOGRAPHY OF PLANTS.

BY BARON HUMBOLDT.

THE numerical relations of the forms of vegetation are capable of being investigated in two very different modes. Supposing that the natural families of plants are studied without reference to their geographical distribution, the question will arise as to which form of organisation it is after which the greatest number of species have been created. Are there most Glumaceæ or Compositæ in the world? Do these two tribes together constitute a fourth part of phœnogamous vegetation? What proportion is borne by monocotyledones to dicotyledones? Questions of this kind refer rather to the science of vegetable organisation and of mutual affinities. But if, instead of studying natural groups of species in this abstract manner, we view them with reference to the relations they bear to climate or to the distribution over the surface of the globe, other questions of a more varied nature will arise. Which families, for instance, are more predominant in the torrid zone than in the polar circle? Are Compositæ more numerous in the same parallel of latitude or in the same isothermal line in the old world or the new? Do those forms, which are found to diminish in retreating from the equator to the pole, follow a similar law of decrement in rising from the plains into the mountains of the equator? Do the proportions

borne by one family to another vary on the same isothermal line? and are such proportions the same on either side of the equator? These are, properly speaking, questions of geographical botany: they are connected with the most important problems of meteorology, and the physics of the globe in general.

In studying the geographical distribution of particular forms, we can pause either at a consideration of particular species, genera, or natural families. It often happens, that, a particular species, especially of those kinds which I have called social, covers a vast extent of country: such, for instance are, in the north, the heaths and forests of pines; such are, in equinoctial America, the assemblages of multitudes of *Cactus*, *Croton*, *Bambusa*, and *Brathys*, of the same species. It is curious to examine such instances of multiplication and organic development. We may enquire what species, in a given zone, produces the greatest number of individuals? and we may mark the families to which the predominant species belong in different climates.

In a northern climate, where *Compositæ* and ferns are to phœnogamous plants in the relation of one to thirteen; and of one to twenty-five, one single species of fern may occupy ten times as much land as all the *Compositæ* put together. In such a case, ferns would exceed *Compositæ* by their mass, by the number of individuals belonging to particular species of *Pteris* or *Polypodium*; but they would not exceed them if a comparison were instituted between different forms exhibited by the two groups of *Compositæ* and ferns, and the sum total of phœnogamous species. As the multiplication of all species does not follow a single law, and as these do not all produce an equal number of individuals the quotients obtained by dividing the total number of phœnogamous plants, by the number of species of different families, do not by themselves determine the aspect, or, it might almost be said, the nature, of the monotony of vegetation in different quarters of the world. A traveller is often surprised at the continual repetition of individuals of one species, and of the masses of such individuals which are continually occurring; but he has equal reason to wonder at the rarity of other species which are useful to mankind. Thus in countries where whole forests are formed by *Rubiaceæ*, *Leguminosæ*, and *Terebinthaceæ*, the cinchonas, logwood, and balsam trees are comparatively very rare.

In the consideration of species, the subject may also be viewed in an absolute manner, with reference to the number of species which prevail in particular zones. This interesting kind of comparison has been made in M. De Candolle's grand work, and M. Kunth has carried it into effect with more than 3,500 *Compositæ* now known. It does not, indeed, indicate what families predominate, in a given degree, over other phœnogamous plants, either with regard to the number of species, or the mass of individuals; but it determines the numerical relations of species of the same family in different latitudes. The most varied forms of ferns, for instance, are found in the tropics; it is in the mountainous, temperate, humid, and shady regions of those parts of the world that the family of ferns produces the greatest number of species. In

the temperate zone there are fewer than in the tropics, and the total number continues to decrease as we approach the pole; but as a cold country, Lapland for instance, produces species that have a greater power of resisting low temperature than the great mass of phœnogamous plants, it happens that, in Lapland, the relative proportion borne by ferns to the rest of the Flora, is greater than in France or Germany. The numerical relations which appear in the tables which I shall produce, are entirely unlike the relations indicated by an absolute comparison of the species that vegetate under different parallels of latitude. The variation which is observable in proceeding from the equator to the poles is consequently different in those two methods. In that of fractions, which is adopted by Mr. R. Brown and myself, there are two causes of variation; that is to say, the total numbers of phœnogamous plants do not vary in passing from one parallel of latitude, or rather from one isothermal zone to another, in the same proportions as the number of species of a given family.

If from species or individuals of the same form, which reproduce themselves in conformity to certain fixed laws, we pass to those divisions of the natural systems which are abstractions of different degrees of importance, we may either confine ourselves to genera, or orders, or sections of a still higher degree. There are certain genera and families which belong exclusively to certain zones, and a particular combination of the conditions of climate; but there is also a great number of genera and families, of which we find representatives under all zones and at all elevations. The earliest researches upon the geographical distributions of forms were those of M. Treviranus, published in his ingenious work on Biology, and the object of these was the stations of genera upon the globe. But it is more difficult to obtain general results from such a method than from that which compares the number of species of each family, or the great groups of a particular family to the whole mass of phœnogamous plants. In the frozen zone, the variety of genuine forms does not diminish in any thing like the degree of decrement of species; a greater number of genera, in a given number of species, is always to be found in such countries; and so it also is with the summits of high mountains, which are colonised by a great number of genera supplied by the more abundant vegetation of the plains.

It is very instructive to study the vegetation of the tropics and of the temperate zone between the parallels of 40° and 50° , in two different ways: first, in determining the numerical properties of the Flora of a large extent of country, including both mountains and plains; and, secondly, in ascertaining those proportions for the plains only of the temperate and torrid zones. As in our herbaria we have indicated, by barometrical measurement, the elevation of each plant in more than 4000 cases above the level of the sea in equinoctial America, it will be easy, when the account of the species is completed, to separate those which grow at or above an elevation of 6000 feet from such as are inhabitants of a lower region. This operation will affect most sensibly

those families which abound in alpine species ; as, for instance, Gramineæ and Compositæ. At 6000 feet of elevation, the mean temperature of the air, on the back of the equatorial Andes, is $62^{\circ} 6'$, which is equal to that of July at Paris. Although, upon the table-land of the Cordilleras, we find the same annual temperature as in high latitudes, yet it is not right to generalise too much, such analogies between the temperate climates of equatorial mountains and low stations in the circumpolar zone. These analogies are not so great as is supposed ; they are much influenced by the partial distribution of heat in different seasons of the year. The quotient does not regularly change, in rising from the plains into the mountains, in the same manner as it does in approaching the pole ; as happens with monocotyledones in general, ferns, and Compositæ.

We may, moreover, remark, that the development of the vegetation of different families depends neither upon geographical nor isothermal latitude alone ; but that, on the contrary, the quotients are not in accordance on the same isothermal line of the temperate zone in the plains of America and of the old world. Under the tropics, there is a remarkable difference between America, India, and the western side of Africa. The distribution of organised beings over the surface of the globe depends not only upon very complicated conditions of climate, but also upon geological causes, the nature of which is wholly unknown, but which are connected with the original state of our planet. In the equinoctial zone of Africa, palms are not very numerous, if compared with the much greater number in South America. Differences such as these, far from turning us from a search after the laws of nature, should, on the contrary, excite us to contemplate those laws in their most complicated forms. Lines of equal heat do not follow the parallel of the equator ; they have convex and concave summits, which are distributed very regularly over the globe, and form different systems along the eastern and western sides of the two worlds, in the centre of continents, and in the vicinity of oceans. It is probable that, when the globe shall have been more correctly examined, it will be found that the lines of maxima of grouping will be isothermal lines. If we divide the globe into lines of longitude, and compare the numerical proportions of those lines under similar isothermal latitudes, the existence of different systems of grouping will at once be evident. From such systems can be distinguished, even in the present imperfect state of our knowledge, those of the new world, of western Africa, of India, and of New Holland. As we find that, notwithstanding the regular increase of heat from the equator to the poles, the maximum of heat is not always identical in different countries in different degrees of longitude ; so there exist places where certain families attain a greater degree of development than elsewhere ; as is the case with the Compositæ in the temperate region of North America, and especially at the southern extremity of Africa.

MISCELLANIES.

BY SOLITARIUS.

WHEN the swallow and other birds at evening suspend their entomological researches, the bat comes forth to commence a sharp and fatal attack among the nocturnal insects, and very pleasing it is to observe with what extraordinary agility he performs his swift aerial gyrations, for the purpose of capturing the little gnats and moths that have attracted the attention of his quick and observant eye. It is said that burs, if whitened with chalk, and thrown up into the air where bats are flying, will attract them, owing to their appearing like white moths, and from their sticking to their furry bodies prevent them flying, and cause them to drop upon the earth, a prey to those who practise this artifice. Though this plan may not fail in its purpose, yet the success of it I do not think depends upon the bats mistaking the whitened burs for moths, but consider that it results merely from their accidentally coming in contact with them. At the back of my residence bats fly almost every evening, and from experiments which I have tried with them, I have been induced to form a much higher opinion of their sagacity than to suppose that they would mistake inanimate substances for living prey. When they have been passing and re-passing by my window at dusk, I have flung out small pieces of white wool, which, when borne upon the breeze, more nearly resembled white moths, than would burs when ejected into the air; yet I never once saw the bats, although they flew close to them, take the least notice of them, but, upon exchanging these dead baits for live moths, they instantly pounced upon them. On the 2nd of this month I was very much amused by watching a bat flying about some trees in a field near Camden Town, which frequently descended from aloft, and skimmed along the grass in the manner of a swallow, the object of its doing so being, most probably, to capture the smaller insects flying near the earth's surface.

In the "Habits of Birds" is a chapter upon the longevity of certain species, but as I do not see any instance of this kind respecting the swan, I beg to introduce the following account into the pages of your Magazine, the fittest place for it. "The other day a male swan, which had seen many generations come and go, and witnessed the other mutations incident to the lapse of 200 years, died at Rosemount. He was brought to Dun when the late John Erskine, Esq. was in infancy, and was then said to be 100 years old. About two years ago he was pur-

chased by the late David Duncan, Esq., of Rosemount, and within that period his mate brought four young, which he destroyed as soon as they took the water. Mr. Molleson, Bridge-street, (in whose museum the bird is now to be seen,) thinks he might have lived much longer, but for a lump or excrescence at the top of the windpipe, which, on dissection, he found to be composed of grass and tow. This is the same bird that was known and recognised in the early years of the octogenarians in this and the neighbouring parishes, by the name of the 'old swan of Dun.'"—*Vide Morning Chronicle, Sept. 25, 1833.*

In support of the probable truth of the two accounts given in my "Field Scraps" (p. 457), I bring forward other instances on record. At page 102 of the Kaleidoscope (a Liverpool periodical) for 1822, an account is given from the Dublin Journal, of a farmer having found, during March, a cuckoo, apparently lifeless, enclosed in furze and bog, which, upon exposure to the sun's heat, showed symptoms of life, and flew away. In a number of the same instructive work, for March 25th, 1823, is an account copied from the Derby Reporter, which, if true, not only confirms the assertion of cuckoos being found after the usual time, but shows that, with proper attention, this bird will live through the winter in confinement, thus disproving the popular notion to the contrary. "During last summer a cuckoo was taken out of a sparrow's nest, in Locke Park, at a time when the period of migration was past. It lived, and has been brought up during the winter with considerable care, the cage in which it was kept being wrapped up every night and placed in the butler's pantry."

Swallows have engaged much attention, and have been described at great length, but no ornithologist seems to have written a word in refutation of the popular belief, that they cannot perch upon trees, a notion which I for some time credited, until I saw an instance to the contrary, as related at p. 458, where I have to thank you for informing me that the circumstance is one of very common occurrence. I have often observed with surprise, that swallows, when wounded by shot, make towards trees, to which they cling and hang when dead. I do not find it mentioned by Pennant, White, Edwards, and other authorities, that during the time of migration, swallows, at evening, collect in hundreds roosting all night upon the open plains. Returning from an excursion with a friend, on the 14th of last month, we were amused by an immense concourse of swallows assembled upon Wormwood Scrubbs, which place seemed to have been selected by general consent, as the place of rendezvous for all of the species in the neighbourhood, for we could not

discover any resting elsewhere. I have recorded a somewhat similar instance, respecting a number of swallows hidden in a long creek, near a streamlet's bank, being put to flight upon my approach.

It should be the endeavour of every naturalist to gain the confidence of the animals that venture to draw near unto his dwelling, instead of giving them cause to fear him. It is my practice every morning to throw the bread that has been soaking all night in that very *inebriating and fattening* beverage, known by the name of toast-and-water, on to the roof of an abutment at the back of the house for the food of the sparrows and other birds that choose to come hither for a breakfast. This practice affords me matter for amusement even before I am up, for whilst in bed I can watch them hopping about, not only on the chimney tops, but on the window-sill, where, by their clamorous chirping, they signify in very plain terms, their readiness for their usual gratuitous meal. The sparrows constitute the greater part of my little pensioners, and they are rather desirous of appropriating all the food to themselves, and once, but not without some provocation, made a very ferocious attack upon a crow, who was in the habit of arriving every morning punctually at the time of feeding, and giving a most practical proof of the sharpness of his appetite, by swallowing the whole of the breakfast, to the great disappointment of the rest of the company, who, considering him more free than welcome, gave him at length to understand that his visits would be no longer countenanced, by their making a simultaneous attack upon his sable person one morning when he made his usual appearance. Since then, I do not think he has ever honoured them with his presence. But in his stead a more welcome and less selfish guest has come, who, for what he receives, requites me with a song. A young female relation has enabled me to address this latter bird, the robin, and also the sparrows, in verses, which breathe sentiments felt by all who take compassion upon these little commoners when pinched by hunger, and consequently, perhaps, will not be altogether unacceptable to some of your readers.

When breaks, in fog, the autumnal morn,
And hoar frost glitters on the thorn,
And winds blow hard and chill,
The redbreast then the forest leaves,
And joins the sparrows from the eaves,
Upon my window-sill :
By hunger pressed he hither comes
To pick the freely scatter'd crumbs,
Till he has pick'd his fill.

No noble e'er, to pomp a slave,
 To peers a sumptuous breakfast gave,
 With half such joy, as I
 Scatter the crumbs with lavish hand,
 And watch the little feather'd band,
 And mark each sparkling eye;
 Until my little guests at length
 By gathering crumbs have gather'd strength,
 To spread their wings and fly.—E. F.

One of the greatest proofs of the insensibility of insects to pain is afforded by the fact, that many will live for months with pins stuck through their bodies. Having *set* a specimen of *Blaps obtusa*, I shut it up in a box, quite confident that I had killed it, but, to my surprise, on opening the box three weeks afterwards, I found that it was still alive and sufficiently strong to turn itself round upon the pin. He probably simulated death in the first instance, as many other insects are in the habit of doing when impaled. Such instances as these tend to establish that which I strongly believe to be the case, namely, that beetles and other animals exposed to constant danger are not subject to the usual agonies of death. Shakspeare said that “the beetle that we tread upon in corporal sufferance feels a pang as great as when a giant dies.” Upon which passage the critic has observed, “Ah! and a great deal more too, for he feels no pang when the giant dies.” From the many facts of which we are in possession, and from the numerous papers which have been written upon the insensibility of insects to pain, it appears that the meaning Shakspeare intended to convey, of the pain felt by a beetle when dying being comparatively as great as though it were a giant under the suffering of death, is most probably devoid of truth, and if so, the criticism is as far from being correct as the passage to which it relates.

The revival of animals from a state of inactive torpidity into a state of reaction presents many singular facts to the contemplative philosopher who muses upon the extraordinary wonders of nature, to the physician who endeavours to discover more respecting either the materiality or the spirituality of life, and to the naturalist who, not satisfied with a mere detail of facts, labours to trace effects to their causes. It is stated in the Kaleidoscope for 1822, at page 106, that Mr. Beddome, a chemist in Tooley-street, London, thus writes to the editor of the Times:—“Sir, having lately read in the very interesting Introduction to Entomology, by Messrs. Kirby and Spence, of the

great tenacity of life which some insects possess, it has brought to my recollection a fact that occurred three years ago, which I confess I could not have credited had it not passed under my own observation. I had purchased twenty large hives and a hogshead of Dutch honey in the natural state, not separated from the wax, which had been in my friend's warehouse above a year; and after emptying my hives as well as I could, I boiled them for a considerable time in water to obtain what honey remained between the interstices. A considerable number of bees that had been mixed with the honey were floating on the surface of the water, and these I skimmed off and placed on flag-stones outside my laboratory, which was at the top of the house, and then exposed to a July meridian sun. You may imagine my astonishment when, in half an hour, I saw scores of these same bees that had been for months in a state of suffocation, and then *well boiled*, gradually come to life and fly away. There were so many of them that I closed the door, fearing that they might be disposed to return and punish me for the barbarous usage they had received at my hands." A friend at Laytonstone informed me that upon pulling down part of his cottage during the winter some time since, a wasp was discovered, seemingly dead, but of a very fresh and bright appearance, and which, upon being held to the fire, became re-animated, as did the bees in the above instance.

Last Friday I found two specimens of some species of Phryganea, attached to the branches of an osier, on the banks of the river Wandle, near Merton. Is it not very late in the year to find any species of these flies?

The snail of which *Ruricola* speaks (p. 320), as having been introduced from Spain into England, is most probably the *Helix pomatia* of Linnæus, which Sir Kenelm Digby and Da Costa consider as having been imported hither, and which Turton, in his Manual of British Shells, considers as the species mentioned by Sallust, as having been "so instrumental in the capture of the castle near the river Malacha, in Spain, and which effected the termination of the Jugurthan war." A coloured plate of this species he will find in the above work, where it is described as being "two inches long and as many inches high, rather solid, with the body evolution extremely large and inflated, the others very little rounded, strongly striate across, and minutely so in spiral direction; colour whitish, with the bands hardly visible, or pale tawny, with usually four darker bands, two of them penetrating the aperture at the pillar: aperture somewhat orbicular, longer than broad,

with the margin thick, and reflected at the pillar, so as in general to cover the umbilicus or nearly so; the inside of a pale violet brown." It is also stated to inhabit "chalky or gravelly counties."

A friend took me, a few weeks since, to see a very beautiful and lofty oak, standing down a lane near Mill Hill, Hendon. The most obvious peculiarities of this tree consist in its branches not being like other oaks, crooked and irregularly disposed, but perfectly straight, and directed slightly upwards, giving the tree a most elegant appearance and a well preserved outline. I regret that my ignorance of botany prevents my rendering a phytographical account of this tree, by which it would stand a better chance of being recognised by the botanist, either as a species or a variety.

Paddington, Oct. 12th, 1833.

NOTES.

BY RURICOLA.

I am at present visiting at a house, in the pleasure garden of which there is a small piece of water overhung with some fine beeches, as well as Portugal laurels and other shrubs, where a party of *Water Hens*, or *Moor Hens*, (*Gallinula Chloropus*, LATHAM,) have long made their abode. The party consists at present of about six, having been but little increased for some years, in consequence of accidents, as it is supposed, for care is taken not to molest them intentionally. But rat-gins have been known in more than one instance to prove injurious to them; and last summer a young brood of four chicks, having been led by the mother a little distance below the water-dam, appear to have been prevented by the fall from returning, and were found dead beyond it by a labourer, who had endeavoured to catch and lift them over the water-dam, but they ran from him into the crevices of the stones, and so perished.

These birds, which belong to a naturally timid species, are apt to take alarm at the sudden approach of a footstep, as I just now witnessed. As I was walking by the side of the water, one hastily rose a few yards before me, and skimming along but a little above the surface of the pool, took shelter in the adjoining bushment. They habituate themselves, however, to the presence of man, when they have assurance that he means them no harm. The gardener informs me

that they seem to have no fear of him whilst he is at work in the garden, and will come without scruple within a short distance of the spot where he is employed. Indeed, the garden is one of their continual places of resort; so that I have been much amused by seeing them roving about, sometimes on the greensward under the canopy of the spreading beech-tree,

“—— patulæ sub tegmine fagi,”

and sometimes on the beds in the flower garden, busily engaged in picking up their food, which consists of worms, insects, seeds, and generally such productions as the common domestic fowls are fond of; which, indeed, they resemble in some of their habits, particularly in the sort of clucking, by which the mother calls her young about her.

I have seen them engaged in feeding on the same spot with the domestic fowls, and apparently in pursuit of the same objects: they did not appear, however, to associate at all with each other; on the contrary, some symptoms of hostility, as resenting the invasion of each other's territories, were observed to pass between them.

I spoke just now of injuries sustained by these birds from gins that had been set for rats, but by which the water hens had unfortunately been trapped. Two of our party have in consequence lost each a leg. On enquiring of the gardener whether this loss affected their swimming or flying, as it evidently must their walking, he thought not. The bird, of which I just now made mention, as rising before me, is one of the mutilated animals; and, so far as I could notice, its flight warranted the opinion of the gardener. I could not, however, be so minute in my observations, as to ascertain whether he is right in saying that, when they fly, they draw their legs up to the body. This is not agreeable to Col. Montagu's Ornithological Dictionary, which says that the *Gallinula* “flies badly, with its legs hanging down.” One of the family, however, testifies to having remarked them passing over the water on the wing, but with the legs depending, and almost touching, and, as it were, walking on the surface. On my further reference to my friend, the gardener, he repeats his former statement, and, at the same time confirms the other, adding in explanation, that when the birds are taking a short flight with intent to alight again soon, they fly with their legs hanging down; but that they gather them up when they are employed in a more distant flight.

These birds are sometimes seen perched among the branches of a Portugal laurel: and not uncommonly creeping amid a bed of “the

weed, the Frenchman's darling ;" for food, perhaps, or for concealment. In the spring, the gardener was continually missing the blossoms of a tuft of hepaticas, which, as they successively flowered, were carried off, nothing but the flower-stalks remaining. On carefully watching for the plunderers, he discovered them to be the water-hens, whose propensity for flowers, however, does not appear to have been observed by him in other instances : but he has noticed them feeding luxuriously on plums that had fallen from the tree.

I have just availed myself of the opportunity of being at this place to visit the Marquis of Downshire's heronry, which I mentioned in a former letter, F. N. M., page 320. But although his lordship's ponds are enlivened by numerous wild ducks, bald-coots, water-hens, &c., we could discover only one or two herons. They return hither early every spring for building and breeding, in March, I understand, and forsake the place in the autumn, about the end of August, for the sea, leaving behind them, as an old labourer near the spot told me, one, two, or perhaps three birds to "keep the ground," or, as another expressed himself, "to guard the place," till their return the following spring. Whether or not this opinion be correct, I am not able to say : but it seems to be the opinion generally prevalent here ; at all events the persons who entertain it, speak positively to the fact of a heron or two being seen "now and again" about the heronry during the absence of the great body of their companions. There is a fancy also that the same sentinels do not remain throughout the winter, but that they relieve each other by turns. The grounds of this do not appear.

Under the trees, and beside the water, we observed a very beautiful fungus, which I mention for a reason to be specified presently. The pileus is circular and slightly convex, becoming gradually flatter, and in the end concave like a bowl, when in a more advanced stage. The diameter of the pileus is, as near as possible, six inches, and the stem rises to about five inches. The colour of the upper surface of the pileus a bright crimson, covered all over here and there with yellowish incrustating spots or blotches of angular irregular forms, at nearly equal distances from each other, of about a quarter of an inch ; the under surface of a rich cream colour. My acquaintance with cryptogamous plants does not suffice for giving a name to this, and I have no botanical work at hand, to refer to : but perhaps the foregoing description may identify the plant to your botanical readers. The circumstance which especially causes me to mention it is this:—For the convenience of making a drawing of it, the fungus had been lodged in an empty water

guggler, the stem occupying the neck, and the pileus resting horizontally on the mouth, and was thus placed at bed-time on the top of a chest of drawers in a bed-room, between the door and a window.

In the morning, the outer surface of the bottle and the top of the chest of drawers were mantled with an uninterrupted and complete coating of white impalpable powder, giving to the bottle much the appearance of being covered by steam, as when a bottle of cold liquid is suddenly brought into a warm room; and extending to a considerable distance, though fainter as more remote, in every direction round the bottle. Towards that end of the chest of drawers which stood nearest the door, this coating reached only a few inches. and then ceased: but towards the other end, which was furthest from the door, and towards the window, it extended quite to the extremity of the chest, a distance of twenty-one inches, and would certainly have been perceived beyond, if there had been a continued surface to receive it: in fact, beyond the chest, with an interval of about a foot, was a wash-hand stand, to which some of the powder had been extended. This difference appears to have been occasioned either by the light, (though, the window-shutters being closed, that is hardly probable;) or, which is more probable, by a slight current of air passing in through the doorway: though, indeed, on examining the passage in the morning, the draught is hardly, if at all perceptible.

Hillsborough, Ireland.

Sept. 21st, 1833.

A METEOROLOGICAL PHENOMENON.

BY RURICOLA.

IN a late letter I communicated an account of a curious little marine animal, discovered at Ballintoy, on the northern coast of the county of Antrim. I have been just made acquainted with a remarkable meteorological phenomenon, which has been observed on the same spot, and which appears to me sufficiently strange to merit being recorded in your pages, for which I beg leave to transcribe it. It may be convenient for your readers to be apprised that the cliffs of Ballintoy rise precipitously from the edge of the Great Northern Ocean, and that at the distance of about sixty feet from the main land is an insular rock, called Carrick-a-rede, frequented by salmon fishers, connected with the mainland by a swinging bridge of ropes during the summer months.

A few miles off is the small island of Raghery, or Rachlin, the most northerly part of Ireland ; and about twenty miles off is the Mull of Cantyre, Campbelltown, &c., in Scotland. The rocks of Ballintoy are a customary scene of resort for tourists ; and it was from them the following appearance was presented to two of my family, one of whom thus describes it :—

“ From Ballintoy we walked to Carrick-a-rede, but there was such a mist that we saw nothing whatever of the coast until we got to the bridge. We were, however, very much amused and delighted by watching an appearance like a rainbow in the mist ; the sun being bright behind us through the mist. The bow was distinct but colourless, except the outside, which had a tinge of violet. It was also more than a semicircle*, which W. attributes to our being on a very high cliff. When we got to Carrick-a-rede we could scarcely see further than across the swinging bridge ; but the mist soon cleared away gradually. While we stood on a high rock, a little to the east of the bridge, we saw each of us his own shadow on the water, which was just visible below us, with an extraordinary effect ; the head of the shadow being surrounded by a halo of very faint prismatic colours : and at a few yards’ distance from this I saw another circle, with my head also for a centre, and also faintly prismatic ; and the bow which we had previously observed, at a yet greater distance, but not quite a complete circle, part being apparently cut off by the rock that we stood on. It seemed that if we had been on a higher rock at some little distance we should have seen the whole circle of this bow ; but before we could get to this eminence the whole gradually but quickly melted away, lasting altogether about five minutes from the time we first observed our own shadows. Soon after the mist cleared off, and we had a fine view of the little rock of Carrick-a-rede ; then of Raghery, Fairhead, and Scotland. The whole phenomenon struck us as extraordinary and curious ; and we thought that you might like to send an account of it to Professor Rennie.”

Holywood, Ireland, Sept. 16, 1833.

* The bow being more than a semicircle would depend upon the relative position of the sun. When I visited the falls of the Rhine in the autumn of 1833, I observed a very bright rainbow on the rising spray, which, from the lowness of the sun on the western horizon, was very little curved, but stretched across in almost a straight line.—EDITOR.

CHAPTER OF VARIETIES.

MICE.—The following singular circumstance happened in the warehouse of the Dublin Custom-house, and as I had it from an eye-witness of the fact, I have no reason to doubt its authenticity. A bag of malt was hung upon the triangle from which the scales were suspended, and having remained some time, on being taken down from that situation, it was discovered that the mice had made this their granary, and many ran out and were killed. They were left dead on the floor, and about four hours afterwards, no one having been in the warehouse during that time, there were but two or three remaining, but several live mice were seen in the room round the dead. The room was again visited in about another hour, when not a mouse dead or alive was to be seen. Much surprise was expressed at the sudden disappearance of the dead mice, when one of the persons present observed, that no doubt they had been buried by their companions. This occasioned a general laugh; but shortly after, on removing some reams of paper in the same room, which were placed more than six feet from the ground, in the opening between the reams was discovered a perfect cemetery, the dead mice being regularly interred, and covered with small particles of paper like a nest. Others were found in the same manner buried in piles of hides.

E. G. BALLARD.

Islington, Sept. 26, 1833.

THE LITTLE MAN OF WAR.—The marine animal which your correspondent, Ruricola, speaks of under the name of the *little man of war*, is the *Medusa hysocella*. The circumstance of his finding it in the British seas, and of his describing it as *light coloured*, would lead me, in the absence of more distinct facts, to refer it to the species *hysocella* instead of the *M. aurita* or *M. pelagica*, these two last being so deeply tinted, that he must have spoken with admiration of their extreme brilliancy of colour had he seen them.

The *Medusa hysocella* (I speak from my own experience), is to be found in the northern parts of the Western Ocean, being conveyed there by the impetus of the gulf stream. In the meridian of the Azores this great current is 550 miles wide, but its course being E. and E. S. E., it would not account for the stray visitants found on the coast of Antrim, if it were not that off Newfoundland the stream separates, and running from S. W. to N. E. reaches by this branch the

higher and colder shores of Europe. It is in the south, in the latitude of Madeira, that the *opaline* coloured mollusca are most common. In consequence of their prevalence in this part of the Atlantic, the English sailors give them the name of *Portuguese* men of war. Humboldt, in noticing them in his Narrative, says, that when he had passed the latitude of 36° he entered the Azores, in which the whole sea was covered with a prodigious quantity of them. The vessel was almost becalmed, but the mollusca advanced towards the S. E. with a rapidity equal to four times that of the current, and continued to pass for three quarters of an hour. Here he recognised three species, the *Medusa aurita* of Baster, the *M. pelagica* of Bosc, and a third which approached the *M. hysocella*, distinguished by its yellow-brown colour, and its tentacula longer than its body. They are one of the sources of the phosphorescence of the ocean. By Humboldt's experiment they emitted light when shaken. Placed on a tin plate, the vibration of the tin when struck was sufficient to make the irritated animal shine. R. H—L.

VEGETATIVE PECULIARITIES IN DURABLE AND SOFT WOODED TREES IN THE TROPICS.—In the temperate zone, those trees which change their foliage with the seasons, shedding their leaves as the winter comes on, and standing with bare branches through a succession of weeks, if hard and solid timber trees, are notoriously of slow growth, and require years, in some cases ages, to mature the texture of their fibres. This is the case with the *oaks* and *elms*. Where, however, vegetation is never checked by hybernation, as in most trees in the tropics, and in the evergreens of temperate climates, woods may be of quick growth, and have all the characters of durability, weight, and compactness. The *Acacia batriaehonda*, which yields a more solid and durable timber than any European tree, arrives at maturity in fifteen or twenty years, and is never leafless; whilst the ceiba or silk-cotton-tree (*Bombax pentandra*), a very giant of the forest, and the gomier (*Buscra gummifera*), a tree of good size and bulk, showing their golden foliage every year, are the softest of all tropical woods used for domestic or constructive purposes. The one is scooped into canoes, for which its large growth and light texture admirably adapt it; the other is formed into bowls and small gamelles, for which its facility of being worked, and its clean whiteness render it highly suitable. The dye woods, which are all woods of hard flinty fibre, suffering no hybernation, are of rapid growth; such are the logwood (*Hematoxylum Campechianum*), the fustic (*Morus tinctoria*), and the braziletto (*Cesalpinia vesicaria*),

&c. ; but the balsamiferous or resinous trees, though they do not cast their leaves, are comparatively slow growers. R. H—L.

INDICATIONS OF THE QUALITY OF MAHOGANY IN THE GROWING TREE.—Even a passing observation on the trees in the savannahs of St. Domingo, very contrary to common opinion, cannot be made presenting those peculiarities in the form, ramifications, and leafage of the mahogany, which indicate a superior quality of wood. What constitutes a relation between the texture of the wood and the leafage, the bark and the branching, may be explained by considering the circumstances in the situation and the growth of the tree.

Trees standing detached and exposed to a free expansion of the branches on all sides, have those branches acted upon by the wind. Working with the power of a lever, it endeavours to twist the trunks round, and in reality does effect this so much, as to give twirls and contortions to the fibres. The mahogany throws out two or three main branches, from which subordinate stems expand all round. These expose it to a forcible action of the breeze on all sides. The continual action produced by these means on the fibres, creates those beautiful curls and wavy lines, which, through the whole bulk of the tree, gives that variety as the light glances on the polished surface, by which its value is so much enhanced with the cabinet-maker. In close situations, as in forests, the force of the wind scarcely acts at all in this way. The tree shoots up strong and straggling, and the fibres, less disturbed, seldom possess much variety. It is for this reason too, that the trunk of a mahogany tree growing in any situation, is less mottled and waved than the branch wood.* R. H—L.

October 7th, 1833.

ON THE HOODED CROW.—I was glad to observe that my remarks on the pairing of the hooded and carrion crow attracted the attention of Mr. Blyth, who evinces in all he says an intimate acquaintance with the feathered creation. He corroborates the fact which I mentioned of the hooded crow pairing with another crow having a different appearance from it,—a black crow. “As to its being of the carrion crow species,” he however subjoins, “I cannot for a moment suppose it: several of the crow genus approximate most closely in size and ap-

* I have mentioned this effect of the wind on the external twisting of trees in the “Companion to the Almanac.” The internal effect is to me quite new and highly interesting. EDITOR.

pearance, but are nevertheless most decidedly distinct ;” and he refers to eminent-naturalists being unable to distinguish between individuals of the crow species in appearance, though their habits are widely different *. Not having acquired the natural history of birds with sufficient accuracy, I would not positively assert that the black crow which paired with the hooded crow in the instance I described, was a carrion crow (*C. Corone*). But I can safely say, that I had a very favourable opportunity of remarking any difference in the appearance and habits of the carrion crow and the black crow which paired with the hooded crow ; for a carrion crow and its male built their nest in the same row of large beech trees, within fifty yards of the nest of the hooded crow. I watched the two pairs of birds very attentively at all times of the day, and I could not perceive the least difference in the shape, gait, general manner, cry, on the ground or on the tree, or mode of flight in the air, between the carrion crow and the black crow. The common crow, or rook, chased both on the wing, and both swerved from the attack in the same manner, and with the same indifference.

In regard to hooded crows mixing with black crows, I never saw the former with any black crows but the rook, except in the case of pairing. I never saw the black crows in flocks, but the hooded crows so every season. The hooded crows used to follow the plough every spring, in company with the rook, in search of food when the lea was turned over ; but the black crows were never so occupied. The hooded crows live in numbers on the sea shore in winter, but I never saw the black crows with them in that situation. In short, were it desired to be ascertained what the black crows are, they should be described as being much more nearly allied, in every respect of external appearance and habit, to the carrion, than to the hooded, crow.

H. S.

Edinburgh.

ON TAMING WILD DUCKS.—I have heard it often remarked, that wild ducks, though hatched by domestic ducks or hens, will fly away from the poultry yard whenever they can take wing. Whether this observation is true or not I do not know ; but that full grown wild ducks can be so tamed as to permit the person who feeds them to approach quite near them, is an undoubted fact. A gentleman, whose property was bounded on one side by the river North Esk, in Forfar-

* Field Naturalist's Magazine, vol. i. p. 279.

shire, used to amuse himself by laying down handfuls of corn, and watching the wild ducks regaling themselves on it. He continued this practice so long, that at length, whenever he made his appearance near the river, the ducks would fly about him in such numbers, that the whole wild ducks in that part of the country seemed collected around him. He would then throw down the grain, which he kept loose in his coat pockets for that purpose. The ducks would alight and run to his very feet to gobble up the corn. He would bow down and lay hold of a duck or two and thrust them into his then empty pocket; and in this way he supplied his hospitable table with wild ducks, fed plump fat with his own hand, for many years without firing a gun. He would not allow any body to fire a gun near the fields which were frequented by the ducks, and which were always kept in grass, in consequence of the overflowing of the river. The ducks would not come near any person else, though he should have been habited in a similar dress, and dispensing his cereal favours as bountifully as their real friend. The old gentleman died, and with him died all the hopes of protection, and the enjoyments of good living for the poor ducks.

Edinburgh.

H. S.

SINGULAR ROOSTING-PLACE FOR A CANARY.—So many canary-finches are kept by different persons in the neighbourhood, that during the late summer, it has been no uncommon occurrence to see one that had escaped from confinement flying at large, enjoying the sweets of liberty. Their habits, when thus in a manner wild, closely resemble those of the goldfinch: they frequent gardens and orchards, passing their time on the fruit-trees, and they contrive to pick up a plentiful subsistence: their colour, however, renders them so conspicuous, that they are sure before long to attract the attention of somebody, and they have generally been entrapped, before passing many days, or at most weeks, in a state of freedom. A fine cock has just been captured here in the following singular manner. A few evenings ago, when it was getting dusk, as two persons were walking along the side of a wide ditch containing but little water, they observed a canary bird pass and fly direct into a deserted rat's hole in the bank. Eager to obtain the bird, one of them leaped across and secured the entrance with a wisp of grass, and the next morning it was dug out alive, and unhurt, from its strange subterraneous retreat.

E. BLYTH.

Tooting, Oct. 23rd, 1833.

NATURAL HISTORY OF THE BIRDS OF AFRICA.

TRANSLATED FROM THE FRENCH OF LE VAILLANT.

THE BENTEOT (*Phrenatrix Temia*, HORSFIELD).

Le Temia, *Le Vaill.* Ois. d'Af. ii. p. 22, pl. 56 ; *Daud.* ii. 244 ; *Shaw*, Zool. vii. 372. *Corvus varians*, *Lath.* Ind. Orn. Sup. xxvi. *Phrenotrix Temia*, *Lin.* Trans. xiii. p. 165 ; *Horsf.* Zool. Res. No. 1., plate of the bird ; *id.* plate of bills, N. a. b. Changeable Crow, *Lath.* Gen. Syn. Sup. ii. 119 ; *Id.* Gen. Hist. iii. p. 34 ; *Lesson.* Dict. Class. xiii. 437.

HERE again is a new species, which, according to the form of its bill, claims particular alliance with our magpies. It appears, indeed, to be more closely allied to this genus than the bird of the preceding article, to which we have applied the name of Mustachio Shrike. Its manners, habitudes, mode of living, number of eggs, &c., and even the part of India it inhabits, are absolutely beyond our knowledge*. It is a bird of extreme rarity in our cabinets of natural history, and forms a part of the magnificent collection of M. Temminck, treasurer of the India com-

* It is now known to inhabit Java.—ED.

pany, Amsterdam. To this amateur, so zealous for the advancement of natural history, I owe the greatest obligations; he had not only the kindness to allow me to take a description of all the rare birds in his collection, but ordered engravings to be made of them, which I shall communicate to the public in the course of this work, in proportion as I shall find occasion to speak of African birds, to which they are analogous; I here publicly offer him my best thanks. I am also much indebted to Messrs. Ray de Breukelerwaard, Holthuysen, Ameshof, Gevers, Arnst, and W. S. Boers, &c., &c., &c., who have all contributed to the completion of this ornithology, by furnishing me with the new species, which will form a supplement to this work, which was, at first, intended only to treat on African birds.

The bird, which I have called *Temia*, has the body of the size of that of our song thrush, but is rather larger; its tail, composed of ten feathers, is very long, and much wedge-shaped; the four middle quills are successively rather shorter. The bill, legs, and claws are black; all the feathers on the body are long, delicate, and provided with silky barbs, which are exceedingly soft to the touch; in a bad light they appear black, but in certain situations present a greenish or purple appearance. The forehead, and space comprised between the eye and the bill, as well as the throat, are clothed with small feathers, which are united so intimately together as to appear like a dull black mat, and resemble velvet in particular points of view. The tail-quills are blackish; the four feathers, situated in the middle of the tail, are greenish; the rest have only their outer barbs of this colour; so that the tail underneath is black, and, on the upper surface, of a dull green.

This bird was sent from Batavia to M. Temminck; but as that city is the general entrepot of all vessels trading to the Indies, it might possibly have been conveyed thither from some other part of the world.

ANGLING, &c.

BY L. W. CLARKE.

WHEN a youth, my time was partly occupied with a hook and line, and many have been the days that I have sat bank-emperehed above the stream of the silver Tame, conning the lore of my countryman, honest Izaak Walton, my float diving unheeded by me; and as you mention the delight you experienced in being enabled to "*make out*" the speedwell on the mountains of Caledonia, I often dwell with similar pleasure on the recollection of the joy experienced by me in

being able to discover, to me, a new fish, by an Encyclopædia (I forget whose) in my father's library. It was a barbalus, or barholt, as inland fishermen call it; the largest I ever took, or heard of having been taken,—weight $24\frac{1}{2}$ ounces,—(not *barbel*). Speaking of fishing recalls to my mind an occurrence of by-gone years. I was trolling one sunny day in a stream at the bottom of our own garden, a small ditch or branch being between me and it; all around was silent, excepting the splash of some playful roach, or the plunge of a pike after its prey, when my attention was arrested by the dabbling of something in the ditch, then about four to six inches deep of water. It was our old tortoiseshell cat quietly wading through it. She came and sat by me for about ten minutes, probably in anticipation of a share; but as I did not pay the most courteous attention to her wants, she skulked along the grass on the margin to a shallow, where young chub, roach, and dace were basking themselves, or, as they seemed, sleeping. One, larger than the numerous fry around, had sought rest still nearer the bank, where the water was but a few inches deep; the artful puss with her prying eyes discovered it, stood, or rather set it for a few seconds, then making a plunge seized it, and after some little scuffling in the water, she bore off her prize, dabbling through the ditch as before, and taking her prey, now out of danger from escape, to an arbour at the bottom of the garden, she devoured it at her leisure. From the known antipathy that cats have to water, I considered this a rather singular anecdote in their history; but I had often an opportunity of seeing her, half drowned, bearing away the finny tribe, yet never saw but this one exhibition of her prowess: the fish seemed to be about six ounces' weight. She would also take the water rat from its native burrow, or plunge into the stream after it and devour it. I never saw or heard of another cat that would touch them. Her habits were invariably filthy: no chastisement would correct them, though her skin was ever spotless. Bred and nurtured contiguous to the water, and being but half domesticated as it were (since she scarcely ever entered the house, excepting to sleep before the kitchen fire on a winter's night; in the summer sleeping under the trees, in them, or some out-house), she felt no dread in fording a stream, of which she probably knew the deeps and shallows as well as I did myself. This history of a cat, perhaps, may be more tedious to you to read than it is to me to write; but a scribbling propensity I have is not easily overcome, therefore must entreat your kindest construction upon my scrawl, resting assured I should not wish to annoy, though ever happy in contributing to your amusement.

But to return once more to the subject of natural history, not of cats, dogs, or red-breasts, but of insects,—*bond fide* insects.

We have long expected the appearance of your conspectus of two-winged flies, and hoped for one on beetles.

I have sent you specimens of *Nilidula grisea*; *Plinus ovalus*; and also of the *Cryptorhyncus Lapalhi* (ILLIGER). They are not set, as I captured one hundred and fifty-eight one morning in a shrubbery here, on the bark of poplar trees. I know not whether they are common with you, but here they are not, and I do not meet with any other trees in this neighbourhood infested with them. I took them in all stages, eggs, grub, pupa, and perfect insect, at the same time and place. I do not know what else to put in the box, or I would fill it; but I entreat your acceptance of the specimens it contains,—would they were better worthy your notice. I have since thought of mentioning to you that I have taken this summer six specimens of a curious architect, that you do not mention in your work, a caddis worm, with an onisius-shaped envelope; formed of small particles of sand cemented together; many of a spiral cylindric kind formed of grass; and one of small grains of sand, like a horn, open at one end and broader at the other, slightly bent or curved. At the end of the cylindric ones is a sort of net-work, with meshes * like bobbin-net, about .01 wide; they burrow into decayed branches of trees, &c. under water, and there assume the pupa state. I found some hundreds of the empty cases in a pool recently drained. I know not whether you have met with them, but I send you a specimen of the first and second kind. In the history of the *Ephemera vulgata* I do not recollect having read of a fact connected with their history, that is, after emerging from the water, they seek the grass or stems of trees, often flying to a considerable distance, and there cast their skins, wings, &c. I took several of them in the act, besides many cast skins or sloughs.

Birmingham, Sept. 30th.

REMARKABLE INSTANCE OF ATTACHMENT IN A WILLOW WREN (*Sylvia trochilus*) TO ITS NEST.

BY A LADY.

IN the spring of last year, 1832, walking through an orchard, I was attracted by something on the ground in the form of a large ball, and composed of dried grass. I took it up in my hands, and upon exami-

* I have figured this in "Insect Transformations," page 221.—ED.

nation found it was a domed nest of the willow wren (*Sylvia trochilus*). Concerned at my precipitation, I put it down again as near the same place as I could suppose, but with very little hope that the architect would ever claim it again after such an attack.

I was agreeably surprised to find, next day, that the little occupier was still proceeding with its work. The feathers inside were increased, as I could perceive by the alteration in colour. Whether this little bird was attracted by the beauty or softness of the guinea fowls' feathers (as there were a number kept about the house), I know not, but they composed the principal part of the tapestry.

In a few days, two eggs were laid, and I thought my little protégé safe from harm, when a flock of ducks, that had strayed from the poultry-yard, with their usual curiosity, went straight to the nest, (which was very conspicuous, as the grass had not grown high enough to conceal it,) and with their bills spread it quite open, displaced the eggs, and made the nest a complete ruin. I now despaired; but immediately on driving the authors of the mischief away, I tried to restore the nest to something like the same form, and placed the eggs inside. That day I was astonished to find an addition of another egg; and in about a week four more. The bird sate, and ultimately brought out seven young ones; but I cannot help supposing it a singular instance of attachment and confidence, after being twice so rudely disturbed.

Rose.

Blackburn, 27th April.

EXPERIMENTS ON THE EXCREMENTITIOUS REJECTIONS OF THE ROOTS OF PLANTS, WITH REFERENCE TO THE ROTATION OF CROPS.

BY M. MACAIRE, OF GENEVA.

[The highly important paper, of which the following is a translation, has been published in the fifth vol. of *Mém. de la Soc. de Phys. et d'Hist. Naturelle de Genève*.—EDITOR.]

FOR a considerable time, M. De Candolle has been led to form a particular theory respecting the rotation of crops, founded on the hypothesis, that the roots were the seat of secretions of an especial nature. Some facts, already given in the *Flore Française* by this learned naturalist, seem to have furnished him with the first opportunity of turning his thoughts to this important subject; he thus

expresses himself, p. 167. "M. Brugmans, having placed some plants in dry sand, saw some small drops of water exude from the extremity of the radicles." And further on, in p. 91: "In fine, the roots themselves in some plants present particular secretions; this may be observed in the *Carduus arvensis*, the *Inula Helenium*, the *Scabiosa arvensis*, several *Euphorbias*, and several of the *Succories*. It appears that these secretions of the roots are only parts of the juices, which not having served for nourishment, are rejected when they arrive at the inferior parts of the vessels. Perhaps this phenomenon, which is not easily perceived, is common to a great number of plants. MM. Plenck and Humboldt conceived the ingenious idea of seeking from this fact the cause of certain habits of plants. Thus, we know that the thistle is injurious to oats, the *Euphorbia* and *Scabiosa* to flax, the *Inula betulina* to the carrot, the *Erigeron acre* and tares to wheat, &c. Perhaps the roots of these plants give out a matter which is hurtful to the vegetation of others. On the contrary, if the *Lythrum salicaria* grows freely near the willow, and the branching *Orobanche* near the hemp, is it not because the secretions from the roots of these plants are beneficial to the vegetation of the others?"

Extending these ideas still further, and applying them to the theory of the rotation of crops, both in his public lectures and in his *Vegetable Physiology*, M. De Candolle admits, that every plant, in ejecting all the moisture that extends to the roots, cannot fail to eject also such particles as do not contribute to nourishment. Thus, when the sap has been spread by circulation throughout the vegetable, elaborated and deprived of a great quantity of water by the leaves, and then re-descending has furnished to the organs all the nourishment it contained; there must be a residue of particles which cannot assimilate with the vegetable, being improper for its nourishment. M. De Candolle asserts that these particles, after having traversed the whole system without alteration, return to the earth by the roots, and thus render it less proper to sustain a second crop of the same family of vegetables, by accumulating soluble substances that cannot assimilate with it; in like manner, he observes, as no animal whatever can be sustained by its own excrement*. Besides, it may also follow that the action even of the organs of a vegetable converts the mixed particles into substances deleterious to the plant which produces it, or to others, and that a portion of this poison be also rejected by the roots. Some refinements

* Yet, the ostrich and cassowary always devour what falls from them.—ED.

which I had formerly the honour of communicating to the Society, have shown that, in fact, vegetables may suffer from the absorption of the poisons which they themselves furnish. The continual elongation of the roots renders the effect hurtful not to the same generation of plants; it is the following of the same species which suffers from it, while it is possible to imagine that, on the contrary, these same excrements will furnish wholesome and abundant nourishment to another order of vegetables. The examples drawn from vegetables here offer themselves again with the force of analogy which is very remarkable. It was still, perhaps, necessary to this very ingenious theory, which accounted so reasonably for most of the facts obtained, to be more clearly confirmed by the results of direct experiments; and by the invitation of M. De Candolle I endeavoured to obtain them. The thing was, however, not very easy, and my first attempts were unavailing. I first strove to obtain the supposed exudation directly from plants plucked up by the roots, but, with the exception of some very doubtful cases, it was impossible ever to obtain any sufficient quantity, and the rapidity with which the plants perished in this state destroyed all chance of succeeding by this means. I afterwards attempted to sow the seeds in substances purely mineral, such as pure siliceous sand, pounded glass, &c. Also on clean sponges, white linen, &c.; but although they germinated well, the existence of the plants was always short and precarious, and when I endeavoured to collect their exudation by the use of earths, I found that the decomposition of the refuse from the seeds gave the same character to the whole of them, and that a sort of vegeto-animal substance was always obtained, of which it was impossible to mistake the source, and which entirely concealed the results of the real exudation, if any were present in plants so imperfectly developed. As a last resource, with the use of rain water, the purity of which I had ascertained by the usual reactives, and which left no residue after evaporation, I endeavoured to preserve plants that were entirely developed. Their roots being taken from the ground with the greatest care, I washed them minutely in rain water to remove all the mould, and when they were entirely cleansed from all impurity, they were dried and placed in phials with a certain quantity of water. I soon observed that they flourished in it, developing their leaves, blossoming, and, after some time, giving by the evaporation of water in which their roots were plunged, and by the reactives, evident marks of exudation by the latter. Much time is required for studying a great number of families, and at present I am able to present to the

Society only a kind of preface to a more complete work. I have, however, seen the phenomenon repeated with a sufficient number of vegetables, and agree with the author whose theory of the rotation of crops is the basis of my observations, in considering it nearly general, at least among all the phanerogamous vegetables.

Vigorous plants of *Chondrilla muralis*, when placed in rain water filtered, having their roots first cleansed as I above described, vegetate and bloom freely. These were thrown away when full blown, and replaced by fresh ones every two days, to allow no time for a change of regimen. After eight days, the water acquired a yellow tint and a strong odour very similar to that of opium, and a bitter and rather a pungent taste; it precipitated in small brown flakes the solution of sub-acetate and neutral acetate of lead, rendered turbid a solution of gelatine, &c., and by slow evaporation deposited a residuum of a brown-reddish colour, which I shall examine hereafter, and which leaves no doubt that the water was perfectly free from any observable substance whatever. In order to ascertain whether this substance was produced or not from the vegetation of roots, I steeped, during the same time, the roots only of the *Chondrilla*, and in another phial, the stalks only, cut from the same plant. They continued fresh and in flower, but the water was not charged with any remarkable colour, had no taste, nor smell resembling opium, did not precipitate the acetate of lead, and contained scarcely any thing in solution. It was now clear to me that the produce obtained from the entire plant was the result of exudation from the roots, which took place only while the vegetable followed its natural course. The same experiments repeated on several other plants produced similar results, as will be seen when I speak of the produce of a small number of families which I have had time to examine. When once assured that plants rejected by their roots the parts improper for their nourishment, it remained for me to ascertain at what time of the day the phenomenon took place. For that purpose I steeped a vigorous plant of the kidney bean (*Phaseolus vulgaris*) with the root in rain water during the day; at night the plant was taken out, washed carefully, dried, and replaced in another jug full of rain water: the experiment continued eight days, the plant continuing to vegetate with great vigour. On examining the two liquids, I found in both evident marks of the excretion from the roots; but the water in which the plant had vegetated during the night contained a considerably greater quantity. Both were clear and transparent; the experiment being repeated many times on plants of different natures, produced always

similar results. I am convinced that by causing artificial night for the plants during the day, the excretion of the roots would be instantly much increased; but in all the plants that I have tried, I always found that it continued slightly during the day. As it is well known that by day the action of the light causes the roots of the plants to absorb the liquid which contains their nourishment, it is natural to suppose that the absorption would cease during the night when the excretion takes place.

It appeared probable that by means of the roots the plants might throw off the substances which they had imbibed, which were injurious to vegetation. To satisfy myself on this point, and at the same time, as the result was another means of verifying the existence of the excretion of roots, I tried the following experiments: some plants of annual mercury (*Mercurialis annua*), carefully taken up, and washed with great precaution in distilled water, were so placed that a portion of their roots was plunged in a slight solution of acetate of lead, and the other portion in pure water. They continued to live very well during several days; after which the pure water evidently precipitated the black hydrosulphate of ammonia, and consequently had received a certain quantity of salt of lead, rejected by the roots which were soaked in it. Groundsel (*Senecio vulgaris*), cabbages, and other plants, placed in the same manner, produced the same results. Some plants, which were placed in a slight solution of acetate of lead, lived very well during two days, after which they were taken out. Their roots were washed in a large quantity of distilled water, carefully dried, again washed in distilled water, which precipitated no hydrosulphate, after which they were left to vegetate in rain water: in two days the reactives demonstrated in the water a small quantity of acetate of lead.

The experiments were made in lime water, which, being less hurtful to vegetation than acetate of lead, was preferable for the object sought after. When part of the roots were steeped in lime water, and part in pure water, the plants lived very well, and the water considerably whitened the oxalate of ammonia which demonstrated the presence of lime. Also, a plant that had been kept in lime water, and washed until the water no longer precipitated the oxalate of ammonia, then transferred into pure water, after some time discharged a great quantity of lime, which was demonstrated by the reactives.

I repeated the same trials with a slight solution of sea salt, and the nitrate of silver also demonstrated that the salt, which the plant had imbibed by absorption, was partly ejected by the same roots which had imprudently admitted it.

When speaking to M. De Candolle of these results, he related to me a curious fact which he had himself observed. The plants that are cultivated near the sea for the produce of soda, sometimes thrive very well at a great distance from the ocean, provided they are placed within the influence of the sea air, which, it is well known, transports the particles of salt with which it is charged to a great distance. M. De Candolle was persuaded that the land where the kali thus placed had grown, contained more salt than the land adjoining, so that, instead of extracting it from the earth, these plants appeared to have furnished it by the exudation of their roots. Reflecting on this experiment, I imagined that I could perform it myself on a small scale with common plants, and I placed the roots with the plants of the groundsel, swine thistle, (*Sonchus oleraceus*,) mercury, &c. in rain water, and proceeded to bathe the leaves with a solution of sea salt. My solution being too concentrated acted forcibly on the leaves, I diluted it with water, and with a pencil touched the lower part of the leaves and stalks, I even moistened all the green part of the plant, but the reactives never indicated any trace of salt rejected by the root, although the plants had flourished. Hence it appears, that either solutions of salt cannot imitate the proceedings of nature, or that perhaps the soda vegetables alone have the power of absorbing the marine salt, and of rejecting a portion of it by their roots. I should like very much to be able to repeat my experiment on a *Mesembryanthemum* or a *Salsola*. There is then no doubt that the plants have the power of rejecting by their roots those soluble salts injurious to vegetation, which are found in the water which they absorb; though but a small portion of these salts appeared in the residuum which I obtained in my own experiments, because the plants, imbibing only pure water and carbonic acid, could reject by their roots only the small quantity of salt which they contained at the time they were taken out of the earth. I could gather little more than the result of the action of their organs on the aliment, not of foreign bodies, which only spread through the vegetable system without being decomposed. I shall now enter into some details on the small number of families which I have examined; each of them has produced results nearly similar in the divers individuals or kinds under experiment, but unhappily the number is very small.

Leguminosæ.—The only plants examined of this family were kidney beans, peas, and beans of the species generally cultivated in this country. These plants exist and develop themselves extremely well in rain water. After they have vegetated in it some time, the liquid, when examined, has but little taste, and the smell is slightly herbaceous; it is

clear, and scarcely coloured by the kidney bean, but turns more yellow with the pea and common bean; it precipitates the acetate of lead, and nitric acid re-dissolves the precipitated gum without effervescence; nitrate of silver gives a slight precipitate soluble in acids (carbonic acid); oxalate of ammonia renders it turbid; the other reactives cause no change. By slow evaporation a yellowish or brownish residuum is obtained, more or less abundant, according to the plant under experiment, increasing in this order: kidney beans, peas, beans. In all other respects these residua are similar to each other. Ether separates an oily substance; alcohol nothing, and a substance remains analogous to gum and a little carbonate of lime.

In the course of the experiments on these plants, I perceived that when the water in which they had been kept was charged with much excrementitious matter, the fresh flowers of the same species that were put into it faded quickly, and did not live well in it. To ascertain if this resulted from the want of carbonic acid, although they might draw it from the air, or from the effect of the matter excreted, which these plants refused to absorb, I replaced the leguminous plants by those of another family, especially that of corn. The latter lived in it, and the yellow colour of the liquid diminished in intensity; the residuum was less considerable, and it was evident that the new plants absorbed a part of the matter excreted by the former. It was a kind of rotation of crops in a bottle, and the result tends to confirm the theory of M. De Candolle, of whom I spoke at the commencement of this memoir. It is not impossible that by trying this experiment on a great number of plants, we may arrive at some results which may be applicable to the practice of agriculture: for example, by supposing, as I feel disposed to believe by my trial, that the exudation from the roots of cultivated legumes contributes to the nourishment of corn, I should be disposed to conjecture, according to the relative quantity of these exudations, that the bean will produce the finest wheat, then the pea, next to that the kidney bean. I am not sufficiently a practical agriculturist myself to know if experience has confirmed this view of the fact.

Gramineæ.—The plants examined were wheat, rye and barley.

These plants do not thrive so well in rain water as the *Leguminosæ*, and I suppose that this difference arises from the great quantity of mineral substances, especially silex, which they contain, and which they do not imbibe from pure water. The water in which they have vegetated is very clear, transparent, without colour, smell, or taste. The reactives demonstrate the presence of salts, muriates and carbonates, alkaline and earthy; and the residuum from evaporation is scanty and

but slightly coloured, containing but a very small proportion of the gummy matter, no oily matter, and the aforesaid salts. I should be led to believe that the exudation from the roots of these plants scarcely tends farther than to reject the saline matter which is foreign to vegetation.

Chicoraceæ.—The plants examined were the *Chondrilla muralis* and the *Sonchus oleraceus*. They live very well in rain water; the latter acquires a clear yellow colour, a strong odour, and tastes bitter and somewhat virous. It precipitates abundantly brown flakes of neutral acetate of lead, and renders turbid a solution of gelatine. Evaporated slowly, the liquor, when concentrated, has a very strong and persistent taste. The residuum of a reddish brown, by boiling absolute alcohol, partly dissolves; the alcohol evaporating leaves a yellow, slightly brown, substance, of a very bitter taste, soluble in water, alcohol, and nitric acid, precipitated in brown flakes from its solutions by nitrate of silver, and appears to be very analogous to the bitter principle of the English chemists. The residuum, re-dissolved in water, has a very strong virous taste, similar to that of opium; it contains tannin, a brown gummy extractive substance, and some salts.

Papaveraceæ.—Plants of the corn poppy (*Papaver Rhæas*) cannot live in rain water; they fade in it immediately.

The white poppy (*Papaver somniferum*) will exist in it; the roots impart to the water a yellow colour; it acquires a virous odour, a bitter taste, and the brownish residuum might be taken for opium. This plant is one of those of which I cut the roots from the stalks, and soaked them separately, and which imparted to the water none of the properties which it acquired from the entire living plant.

Euphorbiaceæ.—The plants tried were the *Euphorbia Cyprisias* and *E. Peplus*. These are the euphorbias on which Brugmans says he had observed the phenomenon of small drops oozing from the roots during the night. Possibly I did not adopt the right method, as I could not verify the fact by my own observations. The euphorbias vegetate extremely well in rain water; the liquor becomes slightly coloured, but acquires a strong and persistent taste, especially after it is concentrated by evaporation. Boiling alcohol dissolves almost all the residuum, which has but little colour, and by evaporation deposits a granulous substance, gummy, resinous, yellowish, white, very acrid, and unpleasant to the throat.

Solaneæ.—The only plant of this family that I had time to vegetate is the potato. It lived well in rain water, and developed its leaves.

The water, not coloured, leaves very little residuum, and the taste is very slight; which makes me think that the plant is one of those of which the excretions are very trifling, and scarcely perceptible. But this conclusion is drawn from a single and very short experiment made on a plant scarcely developed.

In concluding this memoir, which should have contained the examination of more families and individuals had the time permitted, I shall recount that the results deduced are: First, That most vegetables exude by their roots substances useless to vegetation; Second, That the nature of these substances varies according to the families of the vegetables that produce them; Third, That some being pungent and resinous may hurt, and others being sweet and gummy may contribute to, the nourishment of other vegetables; Fourth, That these facts tend to confirm the theory of the rotation of crops suggested by M. De Candolle.

REMARKS UPON ZOOLOGICAL NOMENCLATURE AND SYSTEMS OF CLASSIFICATION.

BY SOLITARIUS.

“WITHOUT names,” it has been truly said, “the knowledge of things perishes.” It is evident, that to distinguish one thing from another, and to point out to which in particular we allude, it becomes absolutely necessary to call it by some name. Hundreds of beings are in existence, which, though found upon careful examination to be widely distinct from each other, pass with the unscientific community under the same denomination. Let us select one instance out of the many that could be adduced. The numerous and beautiful insects composing the order *Lepidoptera*, are spoken of in common parlance merely as moths and butterflies, and when persons are desirous of speaking in less vague and general terms, they endeavour, but in vain, to particularise the sort of moth or butterfly they mean, by describing it, perhaps, as a red moth, a white moth, or a red butterfly, a white butterfly, little conscious that such colours are possessed by a multitude of moths and butterflies, differing materially in their habits from the one to which they allude. I will not at present, however, enter into illustrations of the inconvenience arising from the ambiguity and paucity of terms in our language, relating to the different objects in nature, nor expose the imperfections of common unscientific descrip-

tions, as it is my intention that these matters shall hereafter form the subject of a paper upon English zoological nomenclature. The above illustration alone will be sufficient to make those who complain of the hard words used in science, sensible of the necessity which induced Linnæus and others, who found that it was totally impossible to make known the histories of things without names, to invent a scientific nomenclature.

The Latin and Greek languages, from their being the most universally understood, were wisely selected as the best sources from which to obtain names for nature's productions. Hence every animal, from the huge whale down to the smallest being with which we are acquainted, has its Latin or Greek name. The names of genera are, for the most part, of Greek derivation: whilst the names of species are sometimes of Greek, but more frequently, of Latin derivation. We can rarely ascertain the specific name of any animal or plant, otherwise than by possessing a knowledge of the permanent characters belonging to the genera composing the class to which it relates, or by reference to figures or cabinets. It is less difficult to ascertain the generic than the specific name, owing to there being a less number of the former than there are of the latter, and many species, particularly of the smaller animals, bear so close a resemblance to each other, that their differences, which are often exceedingly slight, frequently escape observation.

It should be the aim of every nomenclator to bestow only such names upon animals, as will express the peculiar forms, habits, &c. of the species to which they respectively apply; if they fail in this particular, scientific names are but of little worth. This important point, however, is unfortunately too much disregarded, for it has long been the absurd fashion to make the specific, and even some of the generic names, bear allusion to men. What benefit does a student derive from knowing that there are certain species, bearing such names as *Clarkella*, *Brownella*, *Harrisella*, *Smithella*, and the like terms, which only serve to glorify those whose paltry conceited minds are gratified at the idea of having obtained a little celebrity for themselves, by the shortest and easiest method. The practice of obtaining names for genera and species from the heathen mythology, is also objectionable, as many persons cannot very readily perceive in what way they are applicable, on account of their not being acquainted with the fabulous narrations related therein. Although the names of animals are never so appropriate and so easy to remember as when they have reference to

their habits, localities, &c., yet, even here some judgment will be necessary, for if an animal frequent several localities, it will not be exactly correct to call it by such specific names as *Sylvaticus*, *Præ-tensis*, &c., unless it be the only one in its genus that inhabits the wood or the meadow.

It is much to be regretted that, whilst chemistry and other important sciences observe an almost rigid adherence to certain conventional terms, the language of zoology and botany is necessarily changing. And what is the consequence? we are overburdened with synonymes, and the language of one naturalist instead of being understood by another, is not comprehended in consequence of their each applying different terms to the same objects. The synonymes create as much, if not more, confusion than did the provincial terms, in the absence of scientific nomenclature. Some of the synonymes, it must be confessed, have their origin in accident, but the majority of them were purposely and unnecessarily introduced, and, in many instances, without any reasons whatever being assigned for the innovation. But, however, as we cannot rid science of her synonymes, it behoves every true lover of natural history to attempt to discover some effectual means of preventing their causing further confusion, and also to devise, if it be possible, some plan for preventing their further increase. Mr. Blyth says, that the confusion arising from the synonymes "may, in a great measure, if not entirely, be prevented, by adding to the approved systematic name of an animal, that also by which it was first known and described in systematic nomenclature." If the vile passion for altering names were once quelled, this plan might do, but while it rages as at present, it is impossible to tell which are the *approved* systematic names. The inconvenience resulting from the synonymes would be materially lessened, if not eventually obviated, if we possessed good dictionaries of natural history, with the various scientific terms duly arranged in alphabetical order. But there is but little chance of our ever having this great desideratum supplied, if persons object, as has lately been the case, to have the scientific names made by them, collected, and disposed in merely a systematic order. Within these few months, the compiler of the "Systematic Catalogue of British Insects," published a new and improved edition of his work; and with the view of rendering it a *complete* catalogue, he, as a matter of course, included in it all the various specific names to be found in other catalogues of indigenous species. In this new edition he has included all the names to be met with in the "Guide to an Arrangement of

British Insects," by doing which he has excited the wrath of its author. Now, as the party who affects to be aggrieved in this case, is notoriously addicted to name-making, and publishes the names he makes for the use and *benefit* of the public, it follows that, like the words in Johnson's or Walker's Dictionary, they become public property. Surely, then, he can have no just cause for complaint, if any one should collect and arrange them in any form which he may think fit. It is rather strange, indeed, for a nomenclator to object to the publication of the terms he has made, in any other work but his own, and particularly, as his own catalogue clearly shows, that he himself did not scruple to copy the names contained in the works of other entomologists, as, for instance, the *Ichneumonologia* of Gravenhorst, which has evidently much added to the extent of his work. If every nomenclator were to deny the world the free use of the terms introduced by him into science, where should we look for these useful and grand compilations, known by the name of Encyclopædias, or for the less extensive compilations of Turton and Blumenbach? However, as the former edition of the "Systematic Catalogue," and also of the "Guide to an Arrangement of British Insects," both professed to supply the student with the various generic and specific names, I will just take the liberty of pointing out the deficiencies, which will give the reader some idea of the importance of our possessing a work embracing all that these contain, and furnishing all that they *ought* to have contained. When I some time since commenced the dry and tedious task of forming a Dictionary of Entomology, I detected in the course of transposing the terms from the above "Catalogue" and "Guide," into alphabetical order, several mistakes and omissions in both, and discovered that many names which were contained in the one were not contained in the other, which was almost an inexcusable fault, as the editions in question were published about the same time. Of genera, whose names commence with the letter A alone, there were no less than fourteen omitted in the "Catalogue" which were to be found in the "Guide;" while, on the other hand, the number of those commencing with the same letter omitted in the "Guide," but contained in the "Catalogue," was much more considerable, treble the number! There being so many under letter A, how many omissions may we not reasonably conceive there were of other words commencing with the remaining letters of the alphabet. Both of these works, however, it must be admitted, are of very great assistance to the entomologist. But we want books of a very different and more instructive kind.

Dictionaries containing all the known species of animals (or of any particular class of animals), arranged in alphabetical order, and furnishing the student with the principal facts connected with the habits and economy of each, and also with the derivations of their technical names, would be a most acceptable work, not only to professed naturalists, but to every one unwilling to remain in ignorance of the habits and properties of animated nature. As Martin's Dictionary of Natural History, the only one in our language, was published so long ago as 1785 (I believe there has been no new edition subsequent to that period), and consisted of only two volumes, it of course does not contain the names of the many hundreds of animals which have been discovered since that time, and, consequently, it frequently fails to supply those who are fortunate enough to possess a copy of it, with the information they seek.

Our Encyclopædias profess to supply every information upon natural history that can be required, but, like a good many other works, they only *profess*; for even the most modern Encyclopædias that have appeared are sadly deficient in point of zoology, many genera (particularly those in entomology), comprehending numerous species, being altogether omitted. The French have two or three "Dictionnaires d'Histoire Naturelle," which far surpass anything of the kind that has hitherto been produced in this country. It is the absence of a good and copious dictionary of natural history, written in the English language, which causes so many mistakes among our naturalists as to the identity of the species, makes them mistake the one species for the other, and commit other blunders equally mischievous and detrimental to the progress of science, which thus becomes retarded by a maze of error and confusion. The synonymes, which constitute the principal obstacle to the advancement of the student, nearly exceed in number the amount of species themselves, and threaten to far exceed them, unless some means be devised to check the existing baneful passion for name-making, among those whose anxiety is to puff their empty names into notice, though they have done but little to promote the welfare of the science itself. Would that our government would select a certain number of our most learned and zealous naturalists, and incorporate them into a society, giving them the *sole* privilege to alter, or increase, when necessary, the nomenclature of natural history, and also giving the power of punishing those who presumed to infringe upon their privilege. Now, this may appear a droll wish, but when we consider how great is the popularity of the study of natural

history at the present day, what an instructive and innocent amusement it affords the people, and the salutary and moral benefits they are likely to derive from it, it becomes a subject as well deserving of the attention of a government as many other matters which have obtained their interference. Government, however, has hitherto done so little to forward science, that naturalists must not expect that natural history will, at any time, be favoured with its patronage. "Legislators," says Fell, when describing the museums of Holland, "are not often philosophers; and while the wealth of nations is exhausted for the destruction of the human species, small are the sums that are expended for the advancement of useful knowledge*."

As we have considered the subject of nomenclature, let us take a general view of systems of classification. The system which first deserves attention is that which arranges animals in agreement with the connection subsisting between their forms and structures.

The popular and favourite notion that the Creator has *purposely* connected his creatures, by bonds of assimilation, to one another, thus constituting what is usually termed the "*Chain in Creation*," and that he has *designedly* made a gentle and easy gradation from the first link of which this is composed, down to the last, has always appeared to me nothing better than a mere fancy. The object of this chain, and also of the gradation in its links, it is said, was the exhibition of order instead of confusion. It must be presumption in any man to suppose himself qualified to explain the purposes of the Creator. Whence did we imbibe our notions of order but from Nature; the only source from which it was possible for us to have imbibed them. Consequently, had the whole economy of nature been very different, even quite the reverse of what it at present is, our notions of order would have varied accordingly, yet they would have been in unison with all around us†. The creation must always appear to us the "*ne plus ultra*" of perfection, because our minds cannot conceive anything more perfect than that which our senses can comprehend, and nothing can be comprehended by our senses but that which exists in nature. To suppose, however, that the said chain was designedly formed, is not more probable than to suppose that it was unintentional; for had the various animals and plants been formed of any other shape whatever, yet still it would have been observable that each individual bore a nearer resemblance, in certain particulars, to another than it did to the rest, and thus would successive

* Fell's Tour through Batavia, p. 90.

† This is a remark to me equally novel as it is profound and just.—Ed.

and similar observations have been made eventually leading to the discovery of a "chain." Naturalists, having observed there exists a connexion between all the species of animals, have attempted to class them according to their affinities, so as at once to exhibit the chain, with all its numerous links, in their relative places. As to the proper situations of the various links, differences of opinion have always existed, and will continue to exist so long as there are wantonly meddling individuals, who cannot be induced to refrain from disorganising the classifications of their predecessors. Systems of classification formed in accordance with the relations animals bear to one another in their outward structures, are undeniably the most simple, the most assistant to the purposes of study, and the most easy of remembrance. The singular methods of classification, designated quinary and septenary, have the least claims to be considered as systems, for besides the very numerous objections attached to them, they are never found to be perfect in the arrangements upon which they proceed. Mac Leay endeavoured to form a quinary system of entomology; subsequently Vigors a similar system of ornithology; but the systems of both were imperfect. Lately another schemist has sprung up, and offered a septenary system for the classification of insects, stating that his own will be found to be the true, natural, and scriptural system, and that all others are unnatural, and inferior. When common sense fails us, perhaps we may be induced to credit his assertion, and award him the palm of merit, for his *natural* system; but while we preserve our judgments we must decide in favour of such systems as those of Cuvier and of Lamarck. With great truth has Professor Burnett remarked, that "Nature's materials may be perverted, and her working plans are often misconstrued; but this is our error, not her fault. Thus we find systems of science, the most unnatural and vague, may be constructed of facts, the value of which may be indisputable and great; just as the materials that were wasted on a Babel would have built a pyramid; and as those same marbles, which to the Turks are merely stones, were statues in the temples of the Greek*." The same agreeable writer, with equal truth, has observed, that the "distinction between a science and the things it treats of, though of primary importance, is too often overlooked; and the means taken for the end to be attained; a fatal error, and one that leads to many misconceptions. For the latter are immutable, the former always changing; that is but the instrument of

* Burnett's Outlines of Botany, p. xi.

knowledge, these the matters to be known." It cannot be denied that an excess of importance is at present attached to matters relating solely to system, whilst the book of nature itself is neglected. Let us, who are pleased to be designated field-naturalists, in contradistinction to the museum and book-naturalists, be careful ever to regard classifications and scientific nomenclature not as the real objects of our study, but as the means of acquiring more information, and of retaining that of which we are already in possession.

Paddington, October 7th, 1833.

NOTES FROM KILLESHANDRA.

BY RURICOLA*.

WITH respect to the heronry at Crum Castle, I omitted to mention a remarkable circumstance, namely, that for a long time the herons had occupied a particular part of the wood, till about four or five years ago; when they were attacked and driven away by a party of rooks, who established themselves on their conquered territory. The herons thereupon removed to another part of the wood at no great distance, which is now their dwelling and breeding place, and where they do not appear to annoy, or to be annoyed by, their former assailants.

A very brilliant *Aurora Borealis* was seen at this place on the night of Saturday, October 12th, and also in the counties of Down and Antrim. I was not so fortunate as to see it myself; but it has been described to me by eye-witnesses, as exceeding in brightness any before observed by them, and as giving the idea of a *great fire*, spreading round the northern horizon, and shooting up into the sky with various fantastical shapes. The following day, both here and in the north, was very wet and stormy: an exemplification of the position of your correspondents in pages 108 and 206, that this phenomenon is a forerunner of storms. By the way, to revert for a moment to the historical notices of this phenomenon, an observation on the subject has been pointed out to me in Sir Walter Scott's curious little volume on "Demonology and Witchcraft." He says, "the *Aurora Borealis*, or northern lights, do not appear to have been seen in Scotland so frequently as to be accounted a common and familiar atmospherical

* With respect to "the little man of war," again inquired about, see p. 504: we are sorry to say that we did not receive the figure of it as said to have been sent.—Ed.

phenomenon, until the beginning of the eighteenth century." But this I take to be explained by the fact of habits of observation being less generally prevalent before that epoch, and of opportunities of communicating intelligence being less obvious.

I have amused myself by poetically arranging some of the principal natural appearances of the delightful season now rapidly drawing to a close, and I submit it to you, if you please, for insertion. It is, in fact, a sketch from nature, and I hope you will think it not unlike the original.

Killesandra, Oct. 30, 1833.

AN OCTOBER DAY'S RAMBLE, A SKETCH FROM NATURE.

BY RURICOLA.

How lovely this October day !
 Mild Autumn still maintains his sway,
 In part controll'd, but not subdued,
 By tyrant Winter's sceptre rude.
 Come, and ere yet the miry way
 Forbids us far a-field to stray,
 Come, well-beloved, forth with me !
 For much thou lov'st to hear and see
 Each rural sound, each rural sight,
 Pure source of innocent delight ;
 Now by the swiftly waning year
 Made to the pensive mind more dear.
 Or, if perchance domestic care,
 Or health infirm, detain thee there,
 Alone I go : the autumnal hour
 O'er all things sheds a soothing pow'r ;
 And grateful to the musing mood
 Is then the rural solitude.
 How bright, and blue, and calm, and clear,
 Appears the unclouded atmosphere !
 About the mountain's viewless head
 The morn in wreathed folds was spread,
 And vainly strained the inquiring eye
 For stream or hedge, for earth or sky.
 But, lo ! withdrawn the misty screen,
 The far-off landscape smiles serene,

And not a speck I see impair
The pureness of the bright blue air.

Yet remnants of that misty screen
Still linger on the meadows green,
On coppice bow'r, and hedgerow spray,
That flaunting skirts the amusive way.
The spider there her mazy line
Suspends, how delicately fine !
Besprent with many a sparkling gem,
From blade to blade, from stem to stem :
Like pleasant thoughts that wait behind,
The bright memorials to the mind
Of ills, that o'er its prospect cast
An early gloom, now clear'd and past !

Climb we yon path, and rest awhile
Inclining on the upland stile !
How deep the stillness all around !
How clearly comes each distant sound !
The schoolboy's shout now mounts the hill ;
And now the ploughman's whistle shrill.
Hark ! 'tis the crowing cock ! and hark !
'Tis now the lonely sheepdog's bark !
Or woodquest's solemn coo ; or cry
Harsh-grating of the watchful pie ;
Or gabbling geese from elmy grange,
That o'er the late-shorn stubble range ;
Or rooks, that crowd the new-turn'd ground,
Or seek the wood with croaking sound.
Such simple sounds, that please the ear
In nature's ample theatre,
Find echoes in the feeling heart
More pure than richest strains of art.

Nor wholly is the thicket mute :
Perch'd by the hawthorn's scarlet fruit,
Or the tall poplar's leaves among,
The redbreast trills his cheerful song.
Sing on, sweet bird ! And if thou come
To cheer our hearth, the frequent crumb
Shall be thy need. Far off are flown
Thy kindred tribes, while thou alone
Sing'st blithe, as in the hour of prime,
Lov'd warbler of the autumnal time.
Of many an early friend bereft,
More prize we those who still are left !

And oft I pause with thee to note,
 Though not like thee of tuneful throat,
 Or breast of ruddy plumage, him
 The bird of graceful figure slim*,
 And robe, and vest, and kerchief pied,
 As to and fro, from side to side,
 With quivering tail and forward head,
 Quick runs he o'er the dewy mead,
 And darts upon his insect prey :—
 Or mark the flocks of linnets grey
 Start from the sheltering hedge beneath,
 And flutter o'er the furze-clad heath.
 See from their white-plum'd fronts are fled,
 And dusky throats, the flaming red,
 Till spring again with love illume
 The lustre of each blood-bright plume.

But stay ! O'er yonder lake the while
 What bird, about that wooded isle,
 With pendent feet, and pinions slow,
 Is seen his ponderous length to row ?
 'Tis the tall heron's awkward flight ;
 His crest of black, and neck of white ;
 Deep sunk his pale blue wings between ;
 And giant legs of murky green.
 His tribe is seaward far away :
 But he remains, as peasants say,
 About, a faithful guard to roam,
 Till genial April call them home,
 On their lov'd oaks' wide spreading crown
 Aloft to build their close-set town.
 So without words, by secret sign,
 Speaks to their sense the voice divine !

And see, alarm'd, with upward wing,
 As near we draw, the wild-ducks spring,
 And through the sky tumultuous stream,
 With outstretch'd neck, and noisy scream.
 With silent flight across the pool
 On wing and foot the gallinule
 For safety flits to lowly bush,
 Or lurks within the sheltering rush.
 Thus nature prompts diverging ways :
 Some soar expos'd to public gaze ;

* *Motacilla alba*, (LIN.) *M. Lotor*, (RENNIE.) Pied Wagtail, or Dish-washer.

More safe to others, as more sweet,
The secret path, the close retreat !

And lo, where dives the hungry coot !
I know him by his sable suit,
Streak'd with his pinion's border white,
And o'er his bill the frontlet bright.
Again he dives : you well might know,
There's store of finny prey below,
Ev'n heard you not the frequent dash
Break the still lake with sudden splash ;
What time, emerging from the deep,
The fish with spring elastic leap ;
Nor saw the rippling motion pass
In circles o'er the wavy glass.

The wavy glass is smooth again :
And mark, nor wrinkle now, nor stain,
Disturbs the crystal mirror's face ;
Where in illusive traits we trace,
Complete as limner's brush can show,
The sunbright sky's cerulean glow.
The margin, that the waters lave,
The flags that on their margin wave,
The sheep, and cows, and pastures green,
And circling hills are pictur'd seen :
Seen is the hill's o'ershadowing pride,
In all its tints diversified,
Which Autumn's glowing touch indues
With richest robe of thousand hues.
Alas ! those thousand hues declare
Corruption's work is busy there,
Forerunners they of winter's gloom :
A victim garnish'd for the tomb.

Too true, too true ! For as we tread
The woodland path, behold, o'erspread
With leaves is all the slippery way,
Unseen consumption's early prey.
Nor flow'r is left to glad the sight ;
Save that its streaks of pink and white
The cranebill here and there displays ;
And mushrooms spread their gill-like rays,
Dispersing wide the powdery seed,
Past by the crowd with little heed ;
While curious eyes admiring view
Their structure, and their varied hue.

Or red, or yellow, white, or brown,
The club-like stem, the pent-house crown,
No mine through nature's wide domain,
But yields, when wrought, a precious vein.

Still ruin spreads. Ev'n now a blast
Has o'er the lingering foliage past,
And round our steps the forest pours
Its gorgeous dress in frequent show'rs,
As full and frequent as the rain,
Which threatens soon to fall amain,
And with a veil the landscape shroud,
Impervious as the morning cloud.
Such oft is life's brief day! At first
'Tis wrapt in gloom, but that disperst,
All radiant does its noontide shine;
In gloom its evening hours decline.
O, for those days, from morn till night,
When all is gladness, all is light!

Enough: behoves we homeward haste,
Content and grateful to have past
Not pleasureless, throughout our way,
Nor useless, this October day.
Blest, who can soften care, or find
Employment for the vacant mind,
In nature's scenes! Thrice blest is he,
Who onward casts his eyes to see,
In all that through the waters move,
In earth beneath, and heav'n above,
The Sovereign Pow'r who nature made,
The Author in his works display'd!

October, 1833.

ON THE BLACK-HEADED GULL (*Larus Ridibundus*.)

BY MR. C. PARSONS.

I RESIDE very near the coast in Essex; and to observe the various species that resort here, and retire at each successive change of season, has been for years a source of pleasure to me.

The black-headed gull is a constant resident with us, but not till last summer have I ever been able to discover a nest in my immediate neighbourhood, although on a small island, about twelve miles further

on the coast, they regularly breed in abundance. I was much pleased last spring on finding a few eggs on a piece of salterns, (waste land which the tide occasionally flows over,) a short distance from where I reside, and on visiting the spot about a week after, I found that a large company of them had taken up their abode there. I procured a few more eggs, for specimens, and left the rest untouched, promising myself much amusement in watching the progress of the young, but was disappointed by some fishermen taking all the eggs, which was done several times before the birds would leave, which, however, they were at last obliged to do, and repaired to another spot not far distant, where, I am sorry to say, they were again plundered; and although they were indefatigable in laying, I do not think one egg ever came to maturity.

They are very social birds, always keeping and breeding together in large flocks, and, when undisturbed, will resort to the same place many years. They make a simple nest; a few bits of sea-weed or rejectamenta suffice; and lay three (I have never found more) eggs, spotted, more or less, with black; the ground colour varies exceedingly, some being of a sea-green, and some a dark brown, with every intermediate shade. The young of the year are brown on the back and breast; after they moult, the wing coverts and other feathers are edged with brown. In the spring they attain their perfect plumage, and have then a beautiful roseate tinge on the neck and breast. As the summer advances, they, in some degree, lose this tint, as well as the colour of the head, which in June becomes a mouse-coloured brown; in July they begin to moult, and are not again in good feather till October. In the winter they intermix with the common gulls (*Larus canus*), and with them resort to the uplands, and follow the ploughs in search of worms.

Southchurch, Essex, Oct. 15, 1833.

AGENDA FOR OUR CONTRIBUTORS, AND FOR THE ZOOLOGICAL SOCIETY.

BY N. N.

BUT few minds, I will hope, are so constituted as to feel pleasure in finding fault: for myself, I can truly say, that nothing is more unpleasant, although I am just going to do this very thing. I cannot but suppose that you would wish your publication to be useful as well as attractive and entertaining; yet must lament that it is not so, in the degree that it might be. Little information is acquired by being told how a cock-

robin, or a cock-sparrow builds its nest, whether with leaves, or moss, or feathers, or flue; or by any information of that kind. But I did expect information of another kind, namely, what new kinds of game, or domestic fowls, water-fowls, singing-birds, fish, deer or stags, had been or might be naturalised, and were adding to the riches of our farm-yards, parks, woods, or fields. Nothing of this kind is to be met with in your *Field Naturalist*. In vain we expect, in every new number, to meet with the best information how to hatch and bring up gold and silver pheasants in large numbers, to turn out in our woods; how to domesticate bustards, argus pheasants, curassows; or to stock our woods and fields with red and black grouse, the large cock of the wood, and the black partridge from the East India mountains; how to domesticate the wood pigeon, cover our ponds with eider and summer ducks, teal, geese of beautiful and new kinds, and our parks with deer, stags, elks, antelopes of every shape and form, emus, kangaroos, &c. &c.; or how to stock our woods with Virginia nightingales, and our orchards and shrubberies with the common nightingale, in those parts of England where they are now never heard; and also to naturalise canary birds, Baltimore orioles, &c. &c. Or how, by some mechanical contrivance, more surely to hatch partridge and pheasant eggs*, which are mown out and destroyed by tens of thousands every year. Information on these heads would be of some use, and enable us really to do much in a few years, if premiums were given to excite trials.

Our Horticultural Societies have introduced a few flowers; they have done something, though very, very little; the Zoological Society nothing whatever, except taking a very great income for amusing the people, but not one animal can I hear of that they have introduced to common use or ornament; I do not mean in a confined state, but introduced to our parks, fields, farm-yards, and gardens. This, I imagine, should be made the criterion of usefulness.

Pray can you tell me how to attract rooks to build,—in other words, how to establish a rookery†?

* I have given the Egyptian and other artificial modes of Hatching in "*Domestic Habits of Birds*," chap. viii. EDITOR.

† This question I am quite unable to answer. It appears to me a task extremely difficult, if not impossible; as difficult as to procure information on many of the points suggested by N. N. EDITOR.

MR. J. S. MENTEATH ON THE GEOLOGY OF THE
SNOWDON RANGE OF MOUNTAINS*.

THE patriotic exertions of Mr. Menteath, in endeavouring to introduce the plan of teaching the principles and practice of gardening into the parish schools of Scotland, must be well known to most of our readers ; and though the paper before us is not immediately connected with the diffusion of information among the humbler ranks of society, we find more than one allusion to the interesting subject which has attracted so much of his attention. In the following note, for example, with reference to slate quarry men in Carnarvonshire.

“ We cannot here refrain from observing, that these quarrymen, though civil and industrious, do not possess the same information and intelligence that the miners of Leadhills and of Wanlockhead, in Scotland, have. While the latter have extensive libraries to instruct them, the slate quarrymen and miners of North Wales are entirely without these valuable sources of mental improvement. It may be remarked, that the miners of Leadhills have a library of 1200 volumes, and those of Wanlockhead, another of 700 volumes. All which books are more thoroughly read, and more anxiously sought after by the industrious miner, than the numerous and splendid collections in many of the libraries in the low country ; hence these people are comparatively well informed.”

The whole paper teems with interesting facts expressed in plain unaffected language, as our readers may see from the following account of “ Carnarvon slate ” to which the note already quoted has been appended.

“ One of the finest and most extensive slate-quarries of this range is that of Dolawen, belonging to Mr. D. Pennant, on the south bank of the river Ogwen, about six miles from Bangor.

“ The quarry is situate on the face of a lofty hill. The vein ranges from south-west to north-east, as do all the slate veins of this district ; and its dip is nearly vertical to the horizon. It is included in a hard blackish greywacke sort of rock. The breadth of the quarry, now working, and which has been opened considerably more than forty years, is no less than 300 yards, and about 100 in depth. In colour it is blue, reddish, and green ; but these varieties occur generally in separate veins, though occasionally passing into each other. The blue, which predominates, is excelled in hardness and durability by no

* Memoir on the Geology of the Snowdon Range of Mountains, as connected with its Scenery, Soil, and Productions. By J. S. Stuart Menteath, Esq. Wern. Trans. Communicated by the Author. -

other slate any where found. It splits readily and easily into the thinnest laminae or plates, and may be obtained of any size ; and almost any kind of architectural article can be made of it, as roofing-slate, flooring-flags, window and door jambs, chimney-pieces, tombstones, and various other articles.

“ This great vein of slate is penetrated about the middle, from south to north, by a hard quartz vein, having occasional traces of sulphuret of lead. The slate in immediate contact with this dike or vein of quartz is much inferior in quality, as it splits less readily.

“ The slate of this quarry cannot be raised without the assistance of gunpowder. Though great quantities are thus separated and brought down, much is shattered and rendered useless by the explosion. Being removed from the quarry, and prepared for architectural purposes, it is then, by means of an iron-railway, upwards of six miles in length, transported to Port Penryn, within a mile of Bangor, where it is shipped for all quarters of the globe.

“ At this quarry a useful piece of machinery, put in motion by water, is employed for sawing and cutting slate into tombstones, jambs, and such like. Near Port Penryn is a writing-slate manufactory. Of the refuse slabs of slate very good fences are made ; some that are long enough are fastened together with iron-nails, like post and rails, and in that form look well, and answer a good purpose.

“ The returns from this quarry in the course of a year are immense, many thousand tons being sold and exported. Nearly a thousand men are daily to be seen at work ; and from the interesting appearance of the various workings of the Dolawen-slate quarry, and the great extent of the operations, few places can afford a higher treat to the practical mineralogist.

“ Were instances wanting to exemplify the vast advantages iron-railways confer in prosecuting great works, at less expense, and with greater expedition, over common roads, repaired and engineered on the best principles, the iron-railway at Dolawen slate-quarry may be adduced. It is said, that, before the present one was laid down, nearly 400 horses were required to convey the slates from the quarry to Port Penryn ; but with the assistance of the railway, twenty horses can do all the carriage.

“ The next slate-quarry worthy of examination is that of Alt Dhu, belonging to Mr. A. Smith, situate on the eastern bank of the lower lake of Llanberris, on the steep declivity of a mountain, rising not much less than 2000 feet above the level of the sea. This slate-vein, which is evidently the continuation to the south-west of Dolawen vein, on the Ogwen, first described, passes along the Alt Dhu mountain. In thickness it is 300 yards, and in height not much less. It consists, like that of Dolawen, of three kinds, the blue, the red, and the green. The blue, being most preferred, is the most valuable to the proprietor, though the other two are equally durable. These veins are included between hard dark-coloured greywacke rocks, and are penetrated through, from the north to the south, by a sparry vein containing pieces of galena, and now and then sulphuret of copper. This dike deranges the structure of the slate near it, and renders it unfit for splitting.

"This quarry surpasses all others in convenience of removal of rubbish. Placed on the high steep face of a hill, the refuse is easily got rid of, and all obstruction in the working of it is prevented. On a railway of iron, seven miles long, extending to the Menai Strait, the slate is conveyed to the shipping.

"In this quarry of Alt Dhu 800 workmen are generally employed.

"The situation of these quarrymen is often exceedingly perilous. In the course of boring and blasting the slate-rock, they have to descend by ropes perpendicularly 100 feet or more; and, in this position, suspended in the air, they fearlessly proceed in their operations.

"Two ropes are employed by these men; the one they coil round their body and one of their thighs; and the other rope they hold in their hands, and with wonderful dexterity, raise or lower themselves at pleasure.

"Good workable slate is raised also in considerable quantities at Clogwyn, on the western bank of the lake of Llanberris, nearly opposite to that of Alt Dhu, and on the north side of Nantle and Llanlyfne lakes. From the latter place an iron-railway has just been completed, nine miles in length, to connect these quarries with the port of Carnarvon. The colour of these slates is reddish, and they are not equal in quality to those of Dolawen and Alt Dhu. The veins of slate being entered from the surface, and sunk into a great depth, considerable more expense in machinery is necessarily incurred in draining and freeing the workings of rubbish in these quarries, than in the two first described.

"Before passing to the consideration of the other minerals of this side of the Menai basin, it may not be uninteresting to remark, that no less a quantity than 200,000 tons of slate is annually shipped from the above described quarries. And when to this we add their value, not much less than 400,000*l.* a year being paid for them, thus enriching the proprietor, and affording, at the same time, a comfortable livelihood to a population of 20,000 people, including wives and children, some idea may be formed of the immense importance of slate to the county of Carnarvon.

"The other transition-rocks, which are found in this portion of the Menai basin, are more curious than valuable. Around the eastern and northern faces of Snowdon, as seen from the pass of Llanberris, hornblende, porphyry, basalt, greywacke, quartz, and micaceous rocks, are observed, as well as on the sides of some others of the higher mountains of this range. The rocks in these places have less of the slaty vertical structure, which is so predominant elsewhere. They often assume, when the basalt prevails, a columnar form. Near the summit of Snowdon, in the hard greywacke, impressions of shells are found, proving, in the clearest manner, that all the rocks of this chain belong to the transition-formation.

"In cutting a new road along the western side of the lower Llanberris lake, fine sections of the hard rocks are exposed to view. We can there trace veins of asbestos, from an inch to three or four in thickness, passing through

a tough asbestine greenish slate rock ; and in other places of this road, in the sections so formed, are great blocks of amygdaloid, and coarse conglomerate puddingstone rock, which, from the extreme hardness of the cementing matter, and from the beauty of some of the imbedded pebbles, might probably be sawed and polished into ornamental slabs for tables."

In the same manner he describes three interesting geological basins : the Conway basin, the Menai basin, the Cardigan Bay basin. We can bear testimony to the accuracy of most of the details, having ourselves in the autumn of 1831, gone over the greater part of the district comprehended in this intelligent memoir.

NOTES FROM THE WEST INDIES.

BY R. H——L, ESQ.

It was my intention to have transmitted you something more than the meagre note which accompanies the nest and drawings now sent you, but being unexpectedly required to depart in the ensuing week for the West Indies, I can do little more than just say what they are.

The nest is that of the Golden-banded Oriole, one of a well-known brilliant family of tropical birds. Its natural song, though varied and well modulated, is said to be improved when the bird is caged, by its mingling with its wild wood notes the melody of regular compositions.

I had heard so much of the hammock which it constructed, twisted of fibrous substances, and so placed as to swing to the breeze; that I

felt eager and anxious in my travels to acquire a specimen of so curious a nest. The only one I possessed myself of, I now send you. The loops by which it was strung up are very inartificially made, and it does not otherwise exhibit much nice labour in its construction; nevertheless, the simplicity of its materials renders it curious.

The twine-like fibres of which it is woven, are the filaments taken from between the folds of the gigantic fan palm (*Corypha umbracula*). These threads break away from the leaf in the process of expansion, and hang like fringes to the magnificent foliage. I found the nest situated, just as the drawing represents it, between the crutches of a low thorny, small leafed shrub, in an open savannah, in the immediate neighbourhood of a forest of these palms. In addition to the sketch

of one of the superb leaves, I send you some of the fibres themselves, collected from the growing tree, that you may see the ordinary length of the threads. The leaf varies from six to nine feet in diameter, a magnificent specimen of vegetation in these gardens of the sun. When passing through the forest of which I have spoken, I was overtaken by a shower of rain, and myself and horse found shelter from the wet under a single leaf of one of the young low trees. I rode under it, and, seated on the horse, remained there secure from the wet for the space

of an hour. The rain spurting off all around me, in the channels of the leaf, was conveyed along the line of each depending filament, between fold and fold, in little streams, so as to fall quite clear away from me.

I shall beg leave to resume my communications with you from the West Indies, from whence I shall take opportunities to transmit you such specimens of natural history as I may procure, capable of being conveniently sent. I look upon this attention, to one contributing so earnestly and well to the information and amusement of the public, as a matter of duty*.

Gloucester Street, Bloomsbury, 2nd Nov.

CHAPTER OF VARIETIES.

NOTICE OF A PAPER BY DR. KNOX, ON THE NATURAL HISTORY OF THE SALMON.— (*Read at the Royal Society of Edinburgh.*)—The object of the author was a careful examination of facts in the natural history of the salmon, which hitherto have been taken merely upon opinion. He watched and carefully observed personally the deposition of the ova or eggs of the salmon under the gravel,—its long confinement in that situation,—its growth into a fish of about an inch in length,—its ascent through the gravel, and rapid growth whilst in the rivers: the journals of observation were partly read to the Society. Twenty weeks was the period from the time of deposition to their bursting the outer shell; for nine days longer they continued under the gravel as fishes, drawing their nourishment from the yolk of the egg, which is of course attached to them by the umbilical vessels, or, more properly, by the ompholo-mesenteric vessels. During this period, they do not eat or grow much, but without doubt acquire strength. When the yolk on which they have been feeding becomes nearly exhausted, they rise from their sandy and gravelly bed, making their way to the surface, through a thickness varying from one to two feet, and at last gain their new habitat in the waters. In ten days they may be caught in the rivers, very considerably grown, and in twenty days have attained a length varying from six to nine inches.

* Our readers, with ourselves, must deeply regret the temporary (as we hope) interruption of the exceedingly interesting contributions of our correspondent. Nothing could be more acceptable than what he so liberally promises.—EDITOR.

An extensive personal inquiry showed that they are never the prey of trout; and a more limited one renders it doubtful if they *ever* become the prey of kelt, or spawned salmon, on its return to the ocean. It is probably to avoid the effects of severe frosts, that the salmon selects the bed of the running stream as the spot for the favourable deposition of the ova. The beds of rivers, he conjectures, must vary somewhat in temperature; and the author supposes, that extreme frosts are less likely to reach the gravel under the stream than under the pool. Frequent experiment has convinced the author, that the opinions of Sir Humphry Davy, Jacobi, and others,—opinions which maintain that the gravel below the stream is selected by the salmon, on the ground of the better aëration of the ova, have no real foundation whatever.

The food of the fry has been determined precisely, and their whole habits, by repeated anatomical examinations made by himself.

The salmon seems to hybernate somewhat in certain seasons; a great number of salmon and trout do not enter into the spawning condition, and consequently may be got in first rate order as food, at any time, provided they have the means of subsistence: now, this the salmon can always get at in the ocean, which is his true feeding ground. He cannot get food in rivers of the kind he desires. The salmon-trout, on the contrary, even at the mouths of rivers, will take to the fry of other fishes, to small fishes, and to worms; and in rivers, he will feed on the larvæ of insects, insects themselves, and, in short, on the ordinary food of trout.

The true salmon prefers a peculiar kind of food, the ova of the echinodermata, and takes, with great reluctance, any other. Hence, the moment he enters rivers, having abandoned his natural feeding ground, he deteriorates constantly, refuses all kind of food, loses weight and flavour, and gets, in short, entirely out of order. Nor can he ever recover from this state, till he has revisited the feeding-ground in the ocean. It is easy to perceive, in these few statements, how entirely they alter the whole question of the salmon-fisheries.

These inquiries led the author to examine into the history of the herling. They resemble in their habits the salmon-trout, haunting the feeding-ground of the salmon; and when fed on the peculiar food of the salmon, their flavour is excellent; but they take readily to coarser food, as small herrings, fry, sand-eels, and the fry of any other fishes. Their stomach and intestines get loaded with putrescent debris, their flesh loses its flavour, and their condition, as articles of human food,

has changed materially. No two conditions can be supposed more opposite than the herling presents, when fed on salmon food, and when fed on fishes. They differ, therefore, from salmon-trout in this respect : that, when feeding on the food of the salmon, they attain almost the flavour of the salmon, which the salmon-trout never does.

The author discovered and exhibited the food of the vendace of Lochmaben, which had never been seen before by any one ; explained the reasons why this fish could not be taken with bait ; proved the vendace to be male and female, and offers suggestions for the stocking of the various lakes in Britain with this exquisite fish, pointing out first the necessity of locating its natural food, without which it cannot live. The discovery of these circumstances, with regard to the vendace, led the author immediately to think of the herring, whose food and natural history generally he believed to be unknown.

It was ascertained that the herring resembles the vendace in its habits, as to food more particularly ; and that whilst feeding on the incredibly minute entomostraceous animals, which it more especially affects, the condition of the herring is excellent, rendering it an extremely desirable food for man. In this state, the stomach seems as if almost altogether empty (as in the vendace), though at the moment full of minute animals, to be discovered only with the microscope, and on which the animal has been feeding. The intestines also seem as if empty ; the tunics of the whole digestive canal are fine and semi-transparent, and as free of intestinal and putrescent debris found in the stomach and intestines of animals, as if the herring actually fed on nothing but air and water. When he approaches the shores, thus quitting the proper feeding-ground, he takes to other and coarser food ; his condition alters, and his flesh becomes soft and tasteless. The stomach and intestines are found loaded with putrescent remains, and gutted or ungutted, this fish could never be brought into the market as equal to the product of the Dutch fisheries.

THE LIBELLULA, OR DRAGON-FLY.—"He," says Dr. Leach, "who neglects the study of insects, or thinks it beneath his notice, cannot deserve our respect as a general observer of nature, or be considered as a scientific naturalist." A few observations upon one of the most beautiful of the British insects cannot, therefore, be considered unimportant. The dragon-fly is by no means an uncommon insect in England. The situations where it is most commonly found are near the water's edge, sporting amongst the flags ; in pasture lands, and in

gardens. I have found this insect frequently among clover and lucerne, where it delights to bask in the hot summer sun. There are several varieties of this insect in Britain, of which six or eight inhabit the counties of Kent and Surrey. The great dragon-fly (*L. depressa*), its body being of a sky-blue colour, may be found often on the heath at Addington near Croydon, where I have collected numerous fine specimens of this and several other insects, especially of the genus *Papilio*. The small varieties may be found on hot days hovering about the hedgerows in the glare of the sun. The great dragon-fly is remarkably rapid in its career, seldom stopping to rest, and is extremely watchful. Every one who pretends to any thing like observation, must have remarked the beautiful and perfect eye of this insect. It forms a beautiful object for the microscope. Although the dragon-fly seems a formidable insect from its size, it is quite harmless. The country folks, however, in some places, have given it the uncourteous name of the horse-stinger, or devil's needle. It has no sting, nor does it infest horses, at least as far as I am aware. I have lately met with two species uncommon in this part of country, I believe, one of which I send with the communication for your inspection. The other specimen was unfortunately destroyed. I hope to be able at some future period to contribute (if thought sufficiently important), some further particulars regarding other insects which have come under my actual observation.

SYLVANUS.

Camberwell, August 3, 1833.

BARON CUVIER'S ANIMAL KINGDOM *.—The work, which in imitation of the quaint conceit of Linnæus, Baron Cuvier entitled "*Règne Animale*," that is, "Animal Kingdom," is well known to naturalists as the only publication since the *Systema Naturæ*, that pretends to embrace a view of the whole animal creation. As such, therefore, and coming from the greatest comparative anatomist who ever lived, it is highly valuable as a work of reference, though from the briefness of detail, it is not at all a readable book any more than the *Systema Naturæ*. In the great lumbering, ill-translated, and ill-digested publication of Griffith, indeed, an attempt has been made to combine the

* The Animal Kingdom arranged according to its organisation serving as a foundation for the Natural History of Animals and an Introduction to Comparative Anatomy. By Baron Cuvier, with coloured plates. In monthly numbers. Henderson, London.

brief notices of Cuvier with popular details chiefly taken from Buffon, but so wretchedly hashed up as to be even less readable than the bad translation. The only redeeming feature, indeed, in Griffith's Cuvier are the contributions and figures of Major Hamilton, which it is a pity to see in such company.

The translation, which we have announced below, has a much better claim to public favour than that of Griffiths; appears to be well executed so far as we have compared it with the original of 1829; and in place of the hash from Buffon, which needlessly swells out Griffiths, it contains a few good notes from Blumenbach and others of recent interest. The cost, also, of this new work, which is a material consideration, is a trifle compared with the other, and even with the original, notwithstanding the comparative greater cheapness of French works.

The coloured plates which accompany the work are taken from the splendid French works of F. Cuvier, Werner, and others, and their origin, indeed, is betrayed by their Frenchified air.

We can, upon the whole, conscientiously recommend this work as well worth the money to every naturalist who does not possess the original.

SHREW MOUSE.—Having read in your Magazine an account of wild animals not being alarmed at the sight of man, provided he remain stationary, I can add to the instance of the rat there mentioned, a more remarkable one in the case of the shrew mouse. In consequence of the bareness of the bushes from the tardy approach of the late spring, the grasshopper warblers were very easy to be seen, and I had several times an opportunity of watching them for a very considerable time, as they were uttering their exceedingly curious note. On one occasion I had been observing one for some time, when I heard some shrew mice squeaking in a bush I was standing by; in a little time one ran out into the clear space with the intention of reaching the next bush, about two feet distant. Without making any noise I put my foot upon it and killed it. Immediately after another came out, and I also killed that: afterwards a third, but this one was too quick for me, and escaped by running back into the bush; in about a minute, however, he came out again, and I then killed the third. I dare say I might have killed another, as I heard more in the bush, but I felt some compunction at my murderous proceedings, and made no farther attempt. As the mice had all come exactly from the same part of the bush, I examined

the place, and found there were runs of the shrew mice, in different directions through the bushes, like those made by rabbits, just large enough to admit their bodies. On the same day I caught a young full-fledged titlark among the furze, by running it down. I caught one the year before in the same place, and if I had had a companion could have captured several more: I soon tired them down, but they hid themselves among the furze. It may not, perhaps, be generally known that robins can be hunted down in the same way by two or more persons, and it forms most excellent exercise on a frosty morning, as it requires some speed; they are, however, soon confused and taken, if once surrounded. The common brown wren, when hunted in the same manner, is very easily outstripped, and attempts to escape by concealment more than by flight: it will creep for a considerable distance along the bottom of a hedge in the most stealthy manner. The hedge sparrow can also be taken in the same manner, but it requires a good deal of exertion in running, and therefore should not be attempted unless you wish for a regular breathing.

Stepney, Nov. 4, 1833.

C. W. S.

P.S. I should like to know whether it is possible to breed any particular sort of insect, such as earwigs, &c. for the purpose of feeding the summer birds*.

WILD HAUNT OF THE WINDOW SWALLOW.—Two fine examples of immense masses of basalt are afforded on the hills of Penmaen Bach and Penmaen Mawr. The cap or summit of the latter, in appearance, resembles much a volcanic crater. It is curious to observe that the north-west front of this last hill is the favourite resort of multitudes of many of the common house-swallow, whose clayey nest covers in many places the rock.

“ This guest of summer,
The temple-haunting martlet does approve
By his loved mansionry, that the heaven's breath
Swells wooingly here; no jutting frieze,
Buttress, nor coigne of vantage, but this bird
Hath made his pendent bed and procreant cradle.
Where they most breed and haunt, I have observed,
The air is delicate.”—SHAKSPEARE.

J. STUART MENTEATH.

* Meal worms may be bred in thousands.—ED.

HOUSE BUG.—While in Poonah, East Indies, finding that immense quantities of domestic bugs were in the rooms, I diverted myself with observing their history and economy. Bingley says, if I recollect right, that they remain twelve days in the egg state. To prove this, on the 23rd of May, 1826, I placed eight eggs, deposited by a female the same morning, in a small box, and on the 28th the young insect emerged from its confinement, having been but five days, instead of twelve, encased in the egg.

Most insects that suck the blood of animals refuse that of the unhealthy, but these seem not to regard such a circumstance. I knew them prey on men in every stage of sickness, and even where mercury and antimonials had been introduced most freely into the system.

L. W. CLARKE.

Birmingham.

GROWTH OF STONES.—The celebrated French naturalist, Tournefort, inferred that rocks grow, from the circumstance of names which are cut in the famous grotto of Antiparos, in the Grecian Archipelago, appearing a few years afterwards in *alto relievo*. Linnæus also laid it down as a first principle, that “stones grow;” while “vegetables grow and live;” and animals grow, live, and feel.” But except in the case of depositions of stony matter from an aqueous solution, such as occasions the *relieving* of names cut in the rock at Antiparos, and the incrustation of wigs, birds’ nests, birch-brooms, and other things exposed to its influence at Matlock, in Derbyshire, stones and rocks may more correctly be affirmed to decrease than to increase, subjected, as all those which are uncovered must be, to the repeated action of rains and frosts. In the beds of rivers, and the basin of the sea, the incessant motion of the water must, in the same way, produce a constant wearing down into sand of the hardest rocks and stones which are there deposited.

TRUFFLES.—We discovered many years ago an immense stock of very small truffles, crowded together under a young cedar tree upon the lawn near the house at Highclere. Mr. Gowen tried successfully the experiment of transplanting several of these, and setting them under beech trees, marking the spots where they were planted. They increased in size, and became much finer than those which were left.

HON. & REV. W. HERBERT.

THAW.—In the neighbourhood of Spofforth, when a very sudden and mild thaw takes place, with perfect calm, after a severe frost of some duration, I am able to prognosticate that a most violent gale of wind will come on in about twenty-four hours. Numbers of times have I prophesied this, and I do not remember having been once wrong. So invariably have I found this to occur, that I have acted upon it; and I remember particularly surprising my groom on a very still and mild day, after a frost, by telling him that I would not ride the horse he proposed to have ready for me the next morning, on account of its being very skittish in a gale of wind: and the next day it blew a hurricane, as I had expected. I apprehend that it is occasioned by the volume of cold air from Craven and the moors, which rushes down upon our lower regions, when the temperature is suddenly relaxed, and becomes unusually warm.

HON. & REV. W. HERBERT.

THE LAMPLIGHTER INSECT.—This astonishing insect is about one inch and a quarter in length; and, what is wonderful to relate, she carries by her side, just above her waist, two brilliant lamps, which she lights up at pleasure with the solar phosphorus-furnished her by nature. These little lamps do not flash and glimmer like that of the fire-fly, but give as steady a light as the gas light, exhibiting two perfect spheres, as large as a minute pearl, which afford light enough in the darkest night to enable one *to read print by them!* On carrying her into a dark closet in the day time, she immediately illuminates her lamps, and instantly extinguishes them on coming again into the light. But language cannot express the beauty and sublimity of these lucid orbs in miniature, with which nature has furnished the queen of the insect kingdom.

E. J. BALLARD.

Islington.

CHRYSLIS OF THE DEATH'S HEAD HAWK MOTH.—Those who endeavour to rear these often fail after the insect has passed into the chrysalis state. I have been informed by a person who has several times bred them, that his method is to moisten the chrysalis every morning with warm water, and then place it in the breeding-cage, near the fire, by which means the fluids of the body are preserved, and the case is not too strong for the perfect insect to penetrate. He also says, that if they be placed in a bark stove with plants, and covered with the earth, they will not perish, as is the case with those generally exposed to the temperature of our climate.

L. W. CLARKE.

Birmingham.

LUMINOSITY OF THE SEA.—On the evening of the 6th June, 1824, not having been able to cross the bar with a full tide, we coasted on the outside of the harbour of Bombay, when I observed a remarkable luminous appearance of the sea. The whole ocean around us was as a mass of flowing molten gold. The soft balmy breeze propelled us forward at about five knots an hour; the night warm; the moon hid beneath a dark cloud, but a countless host of stars shone with all their radiance, brilliantly sparkling, seeming to allure the eye from gazing on the splendour of the rolling waves to behold their humbler beauties. Instead of the pale phosphoric light that danced before the prow of the vessel, in those tiny stars pillowed on the foam of the ocean, this had all the rich hues of metallic lustre. I resided upwards of six months afterwards in Bombay, but had not the opportunity of again indulging myself with such a sight. Perhaps some of your correspondents may be able to describe the cause of these “ruddy flames.”

At different periods of the voyage, about nine or ten at night, several of us were accustomed to go to the prow of the vessel, and bathe ourselves, when the weather permitted, by drawing water up in buckets, throwing it over each other; the sparks of liquid fire would attach themselves to the skin, and in an instant their light was extinguished, unless occasionally, in applying the towel, a few solitary ones seemed to be re-ignited. But one circumstance occurred in this practice, that led me to consider the cause, not as a phosphoric matter contained in the water, as some have conjectured, but a living creature: as in using soap, though at first these sparks were elicited, so soon as any thing like a diffusion of it was obtained, all was dark. The same invariably occurred in washing ourselves in tubs, or other vessels; the alkali in every instance depriving the insect of life.

L. W. CLARKE.

Birmingham.

MAGPIE MOTH REFUSED BY BIRDS.—Can any reader inform me what peculiarity there is in the chemical composition of the common magpie moth, (*Abraxas grossulariata*), that all my various insectivorous birds invariably reject it? I have a nightingale which will readily take food from the hand, and which, like all other small insectivorous birds, is most voraciously fond of lepidopterous insects, in general; but the magpie moth he constantly refuses, though I have seen him swallow in succession three or four of the large yellow underwings (*Triphæna*) I once even kept my insect-eating birds without food beyond their

usual time, when I threw into their cage a variety of common moths amongst which were three or four of the *A. grossulariata*; but the latter were even then rejected, though the other various species were all devoured greedily. One, however, was swallowed by a whin-chat, but he did not take a second, and I noticed a tree-pipit (*Anthus arboreus*) take one of them in his mouth, which, on tasting, he refused. The caterpillar also, is rejected by all these various birds. May not this be a principal cause of the magpie-moth being one of the most abundant species we have?

Tooting.

EDWARD BLYTH.

NIGHT-SHINING EYES OF THE DARK ARCHES MOTH.—A few weeks ago, on seeing a remarkably fine specimen of the dark arches moth (*Xylophasia polyodon*), I caught it, and placed it in a small box which I happened to have in my pocket. On my return home in the evening when it was almost dark, I gently lifted up the lid, and was not a little amazed to perceive that the moth's eyes had the power of converging the few rays of light, shining in the dark like two little stars with considerable brilliancy. Ten minutes afterwards, however, when I again looked at the moth, I was surprised to find that its eyes were not visible at all, showing that this faculty is dependent on the will of the animal. I have since examined a considerable number of moths, in various *genera*, but only in one instance have I again had the satisfaction of beholding this beautiful phenomenon. This was in a common golden-tail (*Porthesia chrysorrhæa*), but the appearance was not so bright as in the *Xylophasia*. It shows, however, that moths, like many other nocturnal animals, are endowed with this curious power, to enable them to see their way clearly at a time when the vision of diurnal creatures is of little or no avail.—EDWARD BLYTH.

Tooting.

M. PERTY'S FUNDAMENTAL PRINCIPLES OF NATURAL HISTORY.—In a Latin thesis prefixed to some observations on East Indian beetles, by Max. Perty, published at Munich, we find the following general principles, which we have tried to translate, as a specimen of the stuff now current in Germany, belonging to the school of Schelling, Oken Fries, &c.

“ 1. The world was formed by antithesis, and is preserved by antagonism.

" 2. As to the genesis of celestial bodies, the theory of aggregation is of greater moment than Vulcanism and Neptunism.

" 3. A central fire in the orb of the earth must be admitted.

" 4. Whatever are the mechanical powers in organic nature, the same are the organic powers in the animal and vegetable kingdom: whatever are the organic powers in organic nature, the same are the psychical (spiritual?) powers in the human race; throughout nature there is a perpetual analogy, the same powers being only different, not by quality, but by evolution.

" 5. Explain to me the growth (indoles) of the lowliest grass, and I will explain to you the phantasy and agitation of the human mind.

" 6. The psychical condition of animals is certainly and exclusively derived from their organisation.

" 7. Oxygen and photogen are the universal vivifactive powers.

" 8. The exact limits between the beginnings of each organic kingdom are not to be found.

" 9. It is destined in the generation of the most simple plants and animals, from elementary causes, whether any particle of organisable matter may become a plant or an animal.

" 10. The magnitude of animals depends in kind upon the proportional abundance of the nervous mass, and the degree of the respiratory process: thus it is, that insects and the mass of spiders (*arachnidæ*) are so small.

" 11. The more perfect organisation of Infusoria, lately discovered by the celebrated Ehrenberg, does not contradict their spontaneous generation."

We think our readers will agree with us, that this is a tissue of wild and useless fancy, of similar character to the speculative systems of the ancients. No wonder that all the Germans agree in one opinion, that no *philosophy* is taught in the British universities, and that a village schoolmaster in Germany knows more of *philosophy* than our most learned men in England. With such nonsensical *philosophy* as the above, indeed, we have no wish to see our literature contaminated.

EDITOR.

SPIDERS FOR CABINETS.—The preservation of spiders' (*Aranea*, LIN.) appears to me the most difficult part in obtaining perfect British specimens in Entomology. Donovan recommends holding to the fire until they plump up, or else to plump them up with the blow-pipe, and fill them with sand; but the above ways seem very imperfect, and

I should not like to risk a fine or rare specimen, such as the diadem spider, (*A. diadema*) or brown water spider (*A. aquatica*), on the efficacy of either method. If any of your readers would answer this as to the best manner of "setting" them, many scarce specimens would no doubt be saved.

B. B. CORNEY.

London, July, 1833.

ON THE COLOURS EXHIBITED BY THE CHAMELEON.—It frequently occurs that an individual can suggest to others a clue to the solution of a mystery, although he himself is unable to prosecute his own views. In the present case, this is my situation; I state that which I conceive to be very probable, but yet not possessing one of the animals to which it relates, I am unable to pursue the inquiry which, I strongly conceive would, in the end, answer my expectations. The sudden variation of colour exhibited by the chameleon, has, since that period in which it was first observed, been regarded as a wonderful phenomenon, and has employed numerous naturalists and philosophers in attempting to explain it, and, as yet, they have not succeeded. The *light*, which I conceive I am throwing upon the subject, embraces optical principles, while it discards the belief of the variation in colour being voluntary, or under controul of the animal itself. Some years since, I saw the chameleons in the Tower of London, and it was then I first noticed the similarity of shape, existing between the three-sided form of its body, and that of a prism; and the idea immediately presented itself, to my mind, that this was probably the principal cause of its possessing the extraordinary power of reflecting all the prismatic colours like that instrument; for although the fluids of its body may be rather opaque, yet they may be sufficiently adapted to reflect various colours when the light falls upon it. But, whatever may hereafter be discovered to be the cause, I premise that the peculiar shape of its body will be one, if not *the* principal explanatory point of it. If, however, my idea should in the end prove nothing more than fanciful, the singular coincidence of the shape of the body so strongly, although somewhat irregularly, resembling an optical instrument, possessing similar qualities, will, I trust, be considered sufficient to warrant me in having entertained it; and the publishing it under the belief that it may afford to others, who may have opportunities of experimenting upon the animal, a clue to the discovery, will, I hope, secure me from the attacks of those who may differ in opinion.—SOLITARIUS.

Painted by Miss A. Jones.

THE FIELD NATURALIST.

THE GREEN TODY (*Todus viridis*), WITH A COLOURED FIGURE.

BY R. H. L., WITH ADDITIONS BY THE EDITOR.

I HEREWITH forward you a drawing of the *Barrancali*, or Perroquet de Terre. The birds are represented of the natural size. M. Drouin de Bercy's description will be found to be exact and full, brief as it is. He has not, however, noticed the curious conjointed toes of the feet. It is essentially insectivorous; and as to its voice, the only sound I have ever heard it utter was a sort of angry pur, or murmur, when approached, a sound invariably an intimation of its rising on the wing. Its flight is always extremely short, scarcely ever further than from bush to bush. It may be easily knocked down, and I used to procure them by striking them down with a switch, having a few leaves not stript off at the end of it, to break the blow and well cover the bird.

37, Gloucester Street, Bloomsbury, Nov. 2, 1833.

As I do not know where to procure M. Drouin de Bercy's description, I beg to subjoin the following notices from the sources within my reach, beginning with the synonyms.

Green Sparrow or Humming Bird, *Edwards*, Glean. pl. 121. Green Tody, *Lath.* Gen. Hist. iv. 81; *Shaw*, Gen. Zool. viii. 129, pl. 16; *Wood*, Buffon, xviii. 239, pl. 172, (wretched); *Griffiths*, Cuvier, vii. 414. *Todus viridis*, *Gmelin*, Linn. i., 442; *Brisson*, iv. 528, tab. 41, fig. 2; *Borowsky*, Nat. ii. 141, tab. 19; *Pallas*, Spec. vi. 16; *Vieillot*, Amer. i. 87, pl. 56. *Sylvia gula Phoenicea*, *Klein*, 70, 16. *Rubecula viridis elegantissimus*, *Raii*, 187, 40; *Sloan*, Jam. ii. 306, tab. 363, 1; *Brown*, Jam. 476. *Todier de l'Amerique*, *Buffon*, Planches enlum. 585, 1, 2; *Temminck*, Man. 2nd edit. p. lxxv.; *Desmarests*, Tanag. pl. 1; *Lesson*, Man. 1. *Drapiez*, Dict. Class. in voce. Todo verde, *Ranzani*, Elementi, iii. iv. 227. Der grune Plattschnabel, *Schmidt*, Vog. 69, 56.

Baron Cuvier's description is, "Fine green above; yellowish white beneath; throat with a red spot; four inches in length." "It will be always easy," says M. Montbeillard, "to distinguish the bird; for, besides the peculiarity in the bill, the upper side of the body in the male is of a dilute blue, and the under side rose-coloured; and, in the female, the back is of a fine green, and the rest of the plumage similar to that of the male. In both, the bill is reddish, but lighter below and browner above; the legs are grey, and the claws long and hooked. The bird feeds on insects and small worms, and inhabits wet and sequestered spots." Professor Ranzani mentions that the bill changes its colour after death, being "in the living bird, reddish above and brown yellow beneath; in the dead bird, the upper mandible brownish red, the tip clear reddish brown, the under mandible yellowish." It is probable, I think, that a similar change of colour may occur in the legs and feet. This accounts for Latham describing the "upper mandible brown, the lower orange;" but he seems only to have seen a female, which he mistook for a male.

The accounts given of the nest and eggs differ considerably. M. Chervain says, "that, in the pairing season, the male has a feeble though pleasant warble. The female builds her nest on the dry ground, and preferably on the friable mould, and for that reason these birds choose the ravines and water gullies. They often nestle also 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. They lay four or five eggs, which are *grey and spotted with deep yellow*." M. Ranzani follows this account.

M. Vieillot again says it makes its nest of dry grass and moss, feathers, cotton, and other soft materials within, laying three or four *blue* eggs, the size of those of the redstart.

M. Drapiez says, "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 the 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*."

Prince Maximilian, of Neuwied, says the bird is not uncommon in Brazil, where it makes a conical bag-shaped nest, composed of wool,

closed at the top, with a narrow entrance; and builds in the neighbourhood of a species of wasp, for the purpose, it is believed, of rescuing it from the attacks of its enemies. The latter is of course absurd, and the nest described by the prince must surely belong to some other species.

M. Salerne, as well as Vieillot, mentions its singular habit of sitting crouched with its head drawn in betwixt the shoulders, so that the hind head almost touches the back, giving it a very awkward appearance; and then it is so stupid as almost to permit itself to be taken by hand.

With respect to its voice, we have seen that M. Chervain says, "the male has a feeble though pleasant warble;" and M. Drapiez says it has "a small song, rather agreeable, to which the female responds by a small call-note." M. Vieillot says, "they make a frequent melancholy noise." Ranzani says the female scolds (*gridare*) when the nest is approached.

"They are difficult to tame," says M. Montbeillard; "yet we may succeed if they are young, and fed by their parents in a cage till they can feed themselves. They have a strong attachment to their brood, and will not leave them as long as they hear them cry." This, however, is not peculiar to the green tody, but common to all birds.

M. Temminck has made a genus of this single species; and Baron Cuvier, M. Drapiez, and Signor Ranzani follow him. The peculiar formation of the toes alluded to by R. H. L., is well known to all systematic writers, and brings the bird under the division SYNDACTYLI.

EDITOR.

ON THE EXPANSION AND CONTRACTION OF SOLIDS BY HEAT.

BY R. T. C.

THE principles of heat being associated with the pursuits of the naturalist, the following, it is presumed, will not be misplaced by occupying a space in the columns of the Field Naturalist.

The particles of matter composing a solid body are kept at certain distances from each other by two forces, viz. cohesion and repulsion. If heat be applied to a solid, the attraction of cohesion is weakened,

repulsion is increased, and the substance acted upon is larger in bulk. If heat be abstracted from a solid, repulsion is weakened, the cohesive force is augmented, and the solid occupies diminished space. If a solid be heated equally in all its parts, it will maintain its figure; expansion will cause all its parts to increase in the same proportion, which is easily proved by taking a brass plate pierced with a hole, into which a bar exactly fits, the bar and plate being of the same temperature. Let the bar be heated to a considerable temperature, and it will be found that the hole in the brass plate will be too small to admit the bar. Reduce the bar to the temperature of the plate, and it will resume its original dimensions.

Of solids, metals are the most expansive; and of metals, lead. The effect of the expansion of metals has been regulated with respect to the construction of clocks; and the labours of experimental men have brought these instruments "to such perfection," says Sir John Herschel, "that an irregularity in the *rate* of going, to the extent of a single second in twenty-four hours in two consecutive days, is not tolerated in one of good character; so that any interval of time less than twenty-four hours may be certainly ascertained within a few tenths of a second, by their use." The effect of raising the temperature of a pendulum clock would be to cause the pendulum to expand, which would remove the centre of oscillation further from the point of suspension, and cause its rate of vibration to be slower; diminution of temperature would be attended with a contrary effect. To remedy these defects, Graham, in the year 1715, made several experiments, which led to the construction of the mercurial pendulum. The point of suspension in this pendulum is always kept at the same distance from the bob, or centre of oscillation, by means of mercury, which ascends when exposed to increased temperature, and descends when heat is abstracted, thereby regulating the rate of vibration. In 1726, Harrison, originally a carpenter, at Barton in Lincolnshire, invented a pendulum formed of brass and steel rods. The object in this invention is attained by the greater expansion of the brass rods, which force the bob, or mass, upwards, as much as the steel rods are elongated, or forced downwards. In making patterns for cast-iron moulds, the workman allows one-eighth of an inch per foot for the contraction of the metal. If a goblet glass, at about the temperature of 50° , be filled half full of hot water, probably the glass will crack, because its surface in contact with the water will rapidly expand, and be forced away from that part not heated, and beyond the reach of the water; but if

the glass be heated gradually to the temperature of the water, danger need not be apprehended, because the vessel undergoes a uniform and gradual increase of bulk.

There are exceptions to the law of uniform expansion by heat with respect to solids. Lavoisier and Laplace, by experiment, showed that tempered steel, from the temperature of 32° to 150° , decreased in expansibility; but they accounted for this exception to the law, by the change in the temperature of tempered steel during the process of annealing, which changed its nature, and converted it into untempered steel. An apparent exception to this law of expansion by heat, manifests itself with respect to aluminous clay. When this substance is exposed to intense heat, it contracts, by reason of the extrication of moisture; it does not belong to the class of ordinary expansion by heat any more than the case of tempered steel, as stated above. These substances, after the change of temperature which they suffer, cease to consist of the constituent parts which originally composed their mass. Exceptions, also, are observed in animal and vegetable matter; they are accounted for in the same manner as the case of heated clay, viz- by their aqueous parts being dismissed in vapour, causing their volume to contract. Hence it appears that the abstraction of heat from a solid body is equivalent to compression or condensation; the volume of the substance acted upon being lessened without diminishing its particles of matter, proving that solid bodies are porous.

The porosity of gold was proved by an experiment instituted at the *Accademia del Cimento*, in Florence. A hollow ball of gold was filled with water, and the aperture closed. The globe was submitted to pressure until its figure was changed, when the water oozed through the pores of the metal, and covered the surface of the globe, having the appearance of dew. The pores of a solid body are occupied by air, provided that the solid is exposed to the atmosphere, and that its pores are larger than the particles of air. This is the case with limestone, charcoal, dried fruit, and many kinds of wood, and particularly a siliceous substance called *hydrophane*; the proof of which is manifest by plunging each substance under the surface of water, when the air occupying their pores will escape at the surface in bubbles.

The diminution of density produced in solids by the application of heat, and the increase of density by the abstraction of heat, must be evident to all persons who do not look upon objects around them with a passive and indifferent gaze. Expansion and contraction of solids force themselves into notice during our daily vocations, either to frus-

trate our views, or to forward our wishes. A clearer view of these phenomena enables us to trace the operations of general causes, affording to the contemplative man inexhaustible springs of knowledge. Thus, it seems that the solid bodies by which we are surrounded, although to us they appear to possess a leaden dulness, a sluggish and inert appearance, are never at rest. Constant motion influences their exterior dimensions, and their interior and hidden particles are constantly approaching and receding from each other.

Shouldham, Nov. 1833.

EXPERIMENTS ON THE HEAT OF LIVING PLANTS.

BY PROFESSOR GOEPPERT, OF VIENNA.*

AFTER making some remarks upon the development of heat in plants, and indicating the authors who have maintained conflicting opinions thereupon, M. Goeppert states, that he has been led, by recent experiments, to conclude that plants, as living beings, can generate heat. That, however, which is disengaged during the nutrition and respiration of the insulated plant, cannot be brought under observation, as it is continually carried off by the surrounding air.

A. Experiments made on seeds while germinating. No author has yet made the observation, that caloric is emitted by plants when germinating; they, however, generate a considerable quantity. Modern authors had usually ranked germination as belonging to the phenomena of chemistry or fermentation; they know only that wheat generated at that time a greater degree of heat, but without having made any distinct observations on the subject. After having soaked some grains in water until they had absorbed the quantity necessary to germination, the author withdrew them, and placed them in heaps. In proportion as the quantity of corn was greater and more surrounded by bodies that are non-conductors of heat to prevent deperdition, the higher the temperature became. M. Goeppert usually made his observations in wooden vessels, which were deep, and surrounded with tow, to the thickness of two or three inches. The length of time necessary for the development of the shoots and radicles depends more or less on

* Ueber Wärme-Entwicklung in der lebenden Pflanze : pp. 32: 8vo. Gerald, Wien, 1832.

the temperature of the air. Immediately after this phenomenon, mouldiness is visible; the farinaceous grains become acid by fermentation, and then all power of germination is at an end. The seeds which contain azote, such as kidney beans, requiring four or five days to germinate, are not proper for experiments; because, after so long a space of time, a part has already become putrid. The same observation may be made of mucilaginous grains: consequently, the grains that may be employed with most success are those which germinate very quickly. To prevent a premature budding of the mouldiness, care should be taken to choose a time when the temperature is not very high. The heat of grains when germinating rises rapidly, and stops at a moderate height: it usually rises some degrees higher, when decay, or acidity from fermentation, appears. The first representation that the author gives of these experiments indicates the development of heat in wheat, oats, and maize, during thirteen days successively. At a moderate temperature of 11-12°, wheat arose after the third day to 20°; at which it remained during three days. Then appeared symptoms of decay and acidity, which successively caused the thermometer to rise to 28°. The oats exhibited nearly the same results. The maize rose about the time indicating 16°. On the thirteenth day only signs of decomposition appeared. The results obtained from peas and hemp differed but little from those produced by monocotyledonous plants. The grains hitherto submitted to experiments possessing a great deal of fecula, the author sought to discover the phenomena presented by the germination of those plants which do not possess any; for this purpose he made experiments on the following plants: *Trifolium repens*, *Brassica napus*, *Spergula arvensis*, and *Carum Carui*; they produced the same results; and therefore prove that the quantity of fermenting substances has no influence whatever on the quantity of caloric disengaged, and that we cannot explain the development of heat by a simple process. Experiments made on considerable quantities of wheat leave not the least doubt that the sugar developed during germination may be only the result of an organic operation, and that the caloric disengaged owes its existence to the vital power of the vegetable only, and not to a process of combustion, an opinion adopted in preference by chemists to explain the increase of the temperature.

B. Experiments made with bulbs and tubercles.—Those which were made on potatoes, radishes, and other large tubercles, produced no results; it being impossible to make observations on them. The author consequently proceeded by the method employed with seeds.

He took nine ounces of the *bulbulli* which grow on the umbels of the *Allium sativum*, at the moment when the leaflets were near developing. He examined them during ten days, repeating his observations three times a day: the maximum of caloric observed was from 2 to 3°. Nearly the same results were obtained by 2½ pounds of bulbulli of the *Lilium tigrinum*, and by potatoes the size of a hazel nut.

C. Experiments made on plants already developed, and in full vegetation.—That which especially prevents the discovery by these experiments of results, analogous to those furnished by germination, is the considerable exhalation of vegetables, by which certain plants lose in one day nearly half the weight of their leaves. After having taken the precautions necessary for making decisive observations, the author was convinced that the young oat plants were of a higher temperature by two or three degrees than the surrounding air. The maize and the *Cyperus esculentus* showed an increase only of from 1 to 1½°. Similar results were obtained from the following plants:—*Hyoscyamus niger*, *Sedum acre*, *Pinus abies*, *Eupatorium cannabinum*, *Solidago arguta*, and the fruits of the *Mespilus cotoneaster*. The *Spergula arvensis* had exhibited during germination a higher temperature than the other plants; and plants in full vigour gave the same results. In a few hours the thermometer rose from 16° to 26°: this result may partly proceed from the fact that plants contribute to the restoration of each other, and by that means prevent the escape of caloric. Peas, observed at different stages of growth, constantly presented a higher temperature.

At the conclusion of his memoir, M. Goeppert again speaks of caloric being developed by the *Aroïdeæ*. The *Arum dracuncululus* exhibits a considerable increase of caloric; the anthers especially evince its escape: when cut, they still preserve during twenty-four hours a higher temperature than the atmosphere. The highest degree of heat observed in the flowers of this plant is from 27° to a temperature of 13°. The observations made to discover the development of caloric in the flowers of the *Cactus* and the *Malvas* have hitherto produced no results: the author, however, does not despair of obtaining them in the course of time.

[Our younger readers may be told that the evolution of heat both in animals and plants, is, so far as we know, the result of the combination of various gases, the heat being, as it is conceived, forced out from between their particles, when these particles are pressed closer together.—EDITOR.]

ADVANTAGES OF NATURAL HISTORY.

I HAVE often been asked by persons who know that I am pursuing the study of Natural History, but who are unacquainted with that study, of what utility is the pursuit of that and similar sciences? In answer to these inquiries, I think I cannot do better than to transmit to the pages of *The Field Naturalist* an attempt to give some of the most obvious benefits which arise to mankind from the real study of natural science. In so doing I shall divide these benefits into the direct and indirect: the direct are those which the science has immediately in view; the indirect are those which, although not sought for, yet very naturally become the consequences of a pursuit of the study. Before, however, proceeding to consider these two principal branches, it will be necessary for us to inquire what are the objects proposed by the study of natural history.

Natural history is not at present, as it has been, a mere science of words and names. Amongst all the improvements which modern science has gained to herself in this very scientific age,—amongst all the varied aspects which modern literature presents to our wondering gaze, natural history stands pre-eminent. The vivifying influence of a few illustrious men, in a few short years, has raised it from the depths of oblivion to the highest elevation which science can offer to her numerous and aspiring votaries. I do not, I cannot acquiesce in the opinion, although it has been, and still is, supported by some of our most eminent scientific men, that science is declining amongst us, and that Britain is rapidly losing, if it has not already lost, its pre-eminence. As a scientific country, I confess, that this lamentation over the fallen fortunes of our land appears to me utterly unfounded. How can it be said that science is declining amongst us, whilst such ardour in the pursuit of all its diversified branches cannot fail to be perceived amongst almost every class of society; and whilst such a list of splendid names grace the annals of modern British science, which cannot fail to adorn the fair page of history? “Can it be necessary,” exclaims the learned author of that interesting discourse on the objects of science, which is prefixed to the scientific publications of the Society for the Diffusion of Useful Knowledge—“can it be necessary to declaim on the superiority of a people amongst whom intellectual pleasures, however trifling, are preferred to mere animal gratifications?” The time is now gone by, when a defence of any department of natural

science is necessary. The pleasures of science now go hand in hand with the solid benefits derived from it. They tend, unlike other gratifications, not only to make our minds more agreeable, but better; and a rational being is bound, by every motive of interest and duty, to direct his mind towards pursuits which are found to be the sure path of virtue as well as happiness."

To return, however, to natural history: In following up this most interesting study, it is not our object merely to make ourselves acquainted with a long catalogue of technical terms and scientific appellations. Although some knowledge of this is necessary for a student of nature, yet, were this all, nature could not have gained as many attentive observers of her charms as she has done; for were it so, who, to use the words of Dr. Johnson, would take all that care, and endure all those hardships, which are attendant on a due pursuit of the science of natural history? Who would listen to hear the "owl shriek at midnight, and the cricket cry in the noonday heat?" Who would, like the indefatigable Wilson, wander amongst the dark and impenetrable woods of the vast continent of America; or, like Le Vaillant, endure, with imperturbable magnanimity, the scorching influence of an African sun? This, then, is not the study we advocate; this is not natural history. The objects proposed by the study of modern natural science are of a far higher tendency. In order to be competently acquainted with this so different science, we must search out nature in all her varied shapes, and in all the beauteous forms which she adopts to dazzle the eye and entrance the mind of the enchanted beholder. We study nature, not principally to become acquainted with the number of genera contained in a certain class, or with the number of species contained in a single genus—not in order to arrange those classes in systems, either quinary, or any other singular compound; but in order to adduce facts from which certain principles may be laid down in order to become acquainted with the habits and peculiarities of those animals in a state of nature, which we cannot do in a state of domestication or confinement. These, then, are the objects proposed by the study of natural history. I would now proceed to consider the benefits derived from those objects, but I am fearful that I have already proceeded too far; and that, by the intrinsic interest of my subject, I have been led into considerations which might become matter of discussion for talents far higher than any I can boast of. I hope, however, in a future letter, to be able to follow up my subject; meanwhile I must beg leave to subscribe myself,

OBSERVATOR.

NOTES

BY OBSERVATOR.

A most singular instance of instinct—may I call it?—has recently, come under my observation, as happening in this town. A cuckoo (*Cuculus canorus*) was found, just feathered, in the nest of a hedge-sparrow (*Accentor modularis*). It was immediately taken from thence and placed in a cage, containing a hen canary (*Fringilla canaria*). The birds agreed perfectly well; but, what is most singular, when the proper food for the cuckoo (small caterpillars or larvæ of the *Lepidoptera*) was placed in the cage, the canary fed its young charge with that, although she herself still kept to the hemp seed, &c., which she had always been accustomed to. Can this be referred to mere instinct? Is there not in this an exhibition of some higher principle?

An hoopoe (*Upupa Europæus*) was shot a short time since in or near a village adjoining this town. I had not an opportunity of observing it myself, or I should have transmitted to you an account of its plumage, and other peculiarities which it may have had. The humming bird sphinx (*Sphinx stellatarum*) has been very plentiful hereabout this summer. I have seen and captured several very perfect specimens. In going over lately, for the second time, “Knapp’s Journal of a Naturalist,” I met with a passage which I do not remember to have particularly remarked before, descriptive of the song or note of the missel thrush (*Turdus viscivorus*), or holm screech, as it is here provincially termed. The passage I proceed to transcribe: “The approach of a sleety snow-storm, following a deceitful gleam in spring, is always announced to us by the *loud untuneful* voice of the missel thrush, as it takes its stand on some tall tree, like an enchanter calling up the gale. It seems to have *no song, no voice*, but this harsh predictive-note, and that in a great measure ceases with the storms of spring.” Most other ornithological writers, however, whom I have consulted on this subject, give a contrary statement. In fact, none that I recollect at present mention the note of this thrush as being loud (at least unpleasantly so) or untuneful. I have been led to pay particular attention to this, and confess that I must disagree with Knapp, and hold with the authors who describe this bird’s song as not perhaps soft, but at least melodious*.

Plymouth, October, 1833.

* See Habits of Birds, p. 291.

ON THE AGENDA OF N. N.

BY T. C.

IN answer to N. N., I beg leave to offer you one or two remarks, though I am perfectly of opinion that it will be impossible to satisfy him on some of the points suggested in his communication. It is well that all are not of his opinion; that "little *information* is acquired by being told how a cock robin or a cock sparrow builds its nest, whether with leaves, or moss, or feathers, or flue, or by any information of that kind;" in other words, that no knowledge is useful but that which tends to some pecuniary profit; such as rearing game or poultry, or "adding to the riches of our farm-yards, parks, woods, or fields."

For my own part, I think no study can be more instructive, more useful, or more amusing, than the study of NATURE, whether with regard to "new kinds of game," or only relating to a "cock robin," or a "cock sparrow."

Notwithstanding the delicious food thus afforded, it is with regret that I see the quantities of game brought to the London markets; and I should fear that time alone is wanting to exterminate from this country the game we already possess.

The bustard, the largest British bird, is now rarely to be found, and it is a melancholy prospect to the naturalist to see so fine a species gradually exterminated by the encroaching hand of cultivation. If taken young, the bustard will live in confinement, and might, with care, be possibly made to breed. I am informed by an eye-witness, that one, kept by a gentleman in Norfolk, became so tame that it was quite troublesome, and would not only help itself to whatever came in its way, but would run after its visitors, pecking them, and without showing the slightest degree of fear. This bird was fed upon bread and other fragments, and was also fond of cabbage-leaves and other vegetables. The Argus pheasant has, I believe, never been kept in confinement; but the different varieties of the curassow are equally hardy with the turkey, peacock, &c. In South America, we are informed, they have long been reclaimed; and a friend of mine from Honduras, tells me that there they are kept as common poultry, that is to say, the common crested sort (*Crax alector*, LINN.); and as we know they will live in the English climate, there can be no reason for their not becoming as common and useful in this country as the common fowl, turkey, &c. &c. Gold and silver pheasants have been

“hatched and brought up in large numbers,” and might be “turned out in our common woods,” though I should imagine they would not agree very well with the common species; but M. Temminck says they have been kept in Germany, in an open pheasantry, in company with the common sort; the silver pheasant is as hardy as the common one, and it is possible that the experiment might succeed in this country. The principal difficulty in all these experiments is the great expense incurred in making them.

With regard to the game which we now possess, such as red and black grouse, &c., while such numbers are daily destroyed, it is vain to endeavour to *increase* the number of the survivors.

It is impossible to force a bird to breed in a country, the climate and food of which are different from those to which it has been accustomed; but, as the pheasant has been naturalised, it is possible that the black partridge might also. The wood pigeon has been *tamed*, though it will not breed in confinement, and *how* to make it is certainly more than I can say. Perseverance and patience may possibly achieve this end. To cover our ponds with summer ducks, and teal, and *some* geese of “beautiful and new kinds,” I imagine would not be difficult, if it were once attempted; and our parks are already stocked with deer and stags, though not with elks, antelopes of *every* shape and form, kangaroos, &c. But the emeu is very easily domesticated, and has frequently bred in confinement, both at the Zoological Gardens and in the collection of his late Majesty, so that it might, were it worth the expense, be readily made to breed in our parks, &c.

With regard to “how to stock our woods with Virginian nightingales, and our orchards and shrubberies with the common nightingale, in those parts of England where they are now never heard, and also to naturalise Canary birds, Baltimore orioles,” &c. &c., I must confess my utter inability to answer this question; and until England shall possess the climate of Virginia, and be equally wooded and equally temperate in all its parts; till birds shall change their natures, and those inhabiting the tropics shall fly to the poles; till palms shall spring up in the woods of Great Britain; and, in a word, till all nature shall be altered and her laws entirely changed—I must leave this question to be answered by more learned naturalists than myself, and hope that the little I have been able to say in answer to his other queries may not prove entirely void of interest to N. N.

[In our next we will give an instance of the successful naturalization of the Lama of Peru.—EDITOR.]

MR. BIRT'S ARRANGEMENT OF CLOUDS.

DURING a series of meteorological observations, in which I have been engaged for some years past, I found it important to register the appearance of the clouds, and for this purpose directed considerable attention to them. When I first registered them, I adopted the nomenclature of Howard, but soon found it insufficient to convey to my mind, after a lapse of time, a clear and distinct idea of the clouds I had seen at the time of registering. I was, therefore, under the necessity of sketching out a nomenclature for my private use; when, after a course of daily observations for upwards of twelve months, I found so many distinct varieties and modifications, not mentioned by Howard, that I was induced to collect and classify them for the benefit of meteorologists, generally; and with this view I have laid them before the Eclectic Society of London.

The clouds, I conceive, may be divided into three distinct divisions or classes, according to their structure, as all those that I have hitherto observed may be referred to one of them. There are clouds which possess a structure similar to those known by the familiar name of fogs or mists, and these are observed in the upper and lower regions of the atmosphere: for this class I conceive the most appropriate name to be *Nebula*; and I have noticed five distinct varieties and modifications, two in the upper, and three in the lower regions. The terms I have applied to those observed in the upper region, founded on their appearance, are *Nebula expansus*, and *N. striatus*; or an expanded nebulosity, and a streaked nebulosity. The term applied to those observed in the lower region is *N. stratus*, as expressing that it is spread over a portion of the earth's surface.

The next class is more extensive, and includes all those clouds that possess a fibrous structure; the term *Fibrus*, employed generically, will, I conceive, sufficiently point out the structure of the cloud to which it is applied. The varieties which compose this class I have arranged according to their appearance and relative altitude, commencing with the long, thread-like fibres, which, on close inspection, I have found on some occasions to result from a resolution of the nebulosity of *N. striatus*; this variety I have termed *Fibrus filiformis*. These clouds sometimes unite and form broad bands, stretching from one part of the horizon to another: to express this appearance, I have suggested the term *F. striatus*. On some occasions these bands unite, and form

* The paper, of which the present article is an outline, was read before the Eclectic Society of London, on November 26, 1833.

a sheet of cloud extended over the heavens: to point out this spreading or extending of the cloud, I have employed the term *F. stratus*; it embraces three modifications, which I have distinguished by the Greek letters: Another variety of this class consists of short thin lines or fibres: these, I conceive, may be sufficiently pointed out by the term *F. linealis*. The next variety may be described as very beautiful feather-like clouds, sometimes of considerable size; to these I have applied the term *F. plumatus*. In addition to these, we have a curled variety, commonly known by the name of mares' tails; these, I conceive, may be appropriately designated *F. crispatus*. The last variety of this class consists of clouds that appear as bundles of fibres: to point out these I have employed the term *F. fasciformis*; the variety includes three modifications, expressive of the size of the clouds and their influence on the weather.

The third division embraces all those clouds that differ from the preceding classes, in their structure being hairy: the appearance they present to the eye is that of hairs or fibres, having a very irregular or confused arrangement. As this structure can be clearly traced through the whole class, perhaps the generic term *Crinis* may be appropriately employed. The clouds composing it occupy the middle region of the atmosphere, while those of the class *Fibrus* are generally observed in the upper. The appearance of the clouds of *Crinis* differ according to their elevation; and I have noticed five distinct series of them, which I have designated by the terms *primus*, *secundus*, *tertius*, *quartus*, and *quintus*, commencing with those that occupy the lowest station. These series generally include four varieties, which I have termed *tenuis*, *compactus*, *cumulatus*, and *serratus*; the first expresses that the cloud exists in its earliest stage, and is so thin that its structure is readily perceptible; the second points out that the cloud has obtained an accession of vapour, which gives it a compact appearance, and obscures its structure in the middle: the third that the cloud has put on a heaped appearance; and the fourth, that it has become so accumulated as to present a fine notched or serrated edge: this variety is very conspicuous in showery weather. In the upper series the term *sphaericus* is substituted for that of *compactus*, as the variety then assumes a more globular figure. In the series *secundus*, I have noticed an additional variety, which, on account of its rough and shaggy appearance, I have termed *hirtus*. The *tenuis* of the fifth series approximates very closely to the class *Fibrus*, especially the variety *plumatus*; to point out this connexion, I have suggested the term *fibratus* instead of *tenuis*.

On some occasions a variety may become so prevalent as to overspread a great portion or the whole of the atmosphere: to point this out, I conceive the term *stratus* may be applied, as *C. 1. Compactus stratus*. I have noticed nine varieties that in this manner form *strata*. In the following table all the varieties and modifications hitherto noticed are arranged in the manner above mentioned, and for the sake of reference I have prefixed a letter to each variety and modification, the *Nebula* being distinguished by the small Roman characters; the *Crinis* by the small italic letters, the *Fibrus* by the Roman capitals, and the *Stratus* by the italic capitals. In order that this branch of meteorology may be distinguished from the others, I have suggested that the term *Nephology* be used, which is derived from the word *nephos*, a cloud, and *logos*, a discourse.

TABULAR VIEW OF THE NOMENCLATURE OF NEPHOLOGY.

NEBULA.			<i>h C. Sphæricus</i>		
a N. Expansus			<i>l</i> ...	...	β
b .. Striatus			<i>m</i> ...	Cumulatus	
f ... Stratus			<i>n</i> ...	Serratus	
g β			<i>o</i> ...	Tenuis	β
h γ			<i>p</i> ...	Sphæricus	γ
FIBRUS.			<i>q</i> ...	...	δ
A F. Filiformis			<i>r</i> ...	Hirtus	
B β			<i>Tertius.</i>		
C ... Striatus			<i>s C. Tenuis</i>		
D ... Stratus			<i>t</i> ...	...	β
E β			<i>v</i> ...	Sphæricus	
F γ			<i>w</i> ...	...	β
G .. Linealis			<i>Quartus.</i>		
H ... Plumatus			<i>x C. Tenuis</i>		
I ... Crispatus			<i>y</i> ...	Sphæricus	
K ... Fasciformis			<i>Quintus.</i>		
L β			<i>z C. Fibratus</i>		
M γ			<i>a'</i> ...	...	β
CRINIS.			<i>b'</i> ...	Sphæricus	β
<i>Primus.</i>			<i>c'</i> ...	...	STRATUS. γ
<i>a C. Tenuis</i>			<i>A F. Fasciformis</i>	β	
<i>b</i> ... Compactus			<i>B</i> ...	...	γ
<i>c</i> β			<i>C C. 1</i>	Compactus	
<i>d</i> γ			<i>D</i> ...	...	...
<i>e</i> ... Cumulatus			<i>E</i> ...	Cumulatus	
<i>f</i> β			<i>F</i> ...	Serratus	
<i>g</i> ... Serratus			<i>G</i> ...	2 Sphæricus	
<i>h</i> β			<i>H</i> ...	3	...
<i>Secundus.</i>			<i>I</i> ...	4	...
<i>i C. Tenuis</i>					

NOTES FROM YORKSHIRE.

BY J. H. ANDERSON, ESQ.

As you give encouragement to lovers of natural history in the country to address you and make known their observations, and in return ask information of you, I therefore without further introduction commence my irregular epistle.

The memorable storm of the 31st of August last made terrible havoc among the feathered race in this neighbourhood; whole covies of young partridges were found starved to death in the fields, and a great many larks and other small birds, and several rooks and jackdaws, also shared the same fate. A neighbour found above twenty sparrows lying dead under some poplar trees in his yard; so, computing from the number of dead birds found in this neighbourhood, the quantity that perished must have been very great throughout the country. As I was ranging the fields the first week in September, I fell in with twelve or thirteen fieldfares (*Turdus pilaris*), which I am inclined to think had been bred in the neighbourhood; the locality, I think too, favours the supposition. Their daily haunt is a plantation of ash, oak, and elm trees, through which a considerable stream runs; and in the vicinity there is a good deal of marsh or boggy land. I inquired of some labourers who were well acquainted with the place, if they had noticed them before, and they thought they were natives. However, to be more certain, I intend keeping a strict look-out after them another year.

I also fell in with a young heron (*Ardea cinerea*) at the same place, and had it brought to me a day or two afterwards. I saw a family of long-tailed tits (*Parus caudatus*), and was much amused by their manœuvres as they flitted from one willow to another, twittering incessantly.

We have the gold-crested wren (*Regulus cristatus*) in the larch plantations round about here, and in hard weather they may be seen in our gardens and paddocks in plenty.

The kingfisher (*Alcedo Ispeda*) is a summer resident with us, and some years back I saw a nest of six or seven, but am sorry to add they all met an untimely fate from myself and schoolfellows. Being ignorant of their history, we thought they were natives of the watery element; and being anxious that they should have plenty of it, we put them into water so often, that none of them survived many days. I have watched a kingfisher for more than an hour together, sitting on

the branch of a willow overhanging a corner of the fine open sheet of clear water we have in this village, and it apparently took no notice of the passengers on the road within forty or fifty yards of it. I believe the pretty harmless creature was marked, and shot by a mischievous school boy in the end.

The water hen (*Galinula chloropus*) graces our water course all the year round. The bittern (*Ardea stellaris*) has been seen and heard here occasionally, but is rare.

Wild ducks (*Anas Boschas*) are plentiful here throughout the autumn and winter. Wild geese (*Anser ferus*) visit our hills and large open fields by thousands every autumn, and it is very pleasant to observe their orderly martial flight as they come and go every morning and evening. The whizzing sound a large flock of them makes, as they fly over one's head, puts one in mind of the music of the spheres:—

“ Unheard, but yet remembered still,
Through gleams of hope and clouds of ill.”

O! did the town-bred youths but know the sweet pleasure that the study of natural history would afford them, they would forsake the billiard table and other idle games, and hie into the country after business hours to hold converse with Nature and Nature's God.

I am very glad, my dear Sir, that I fell in with some of your works on natural history when I did,—had I not, I might now have been spending my time in the same idle, profitless manner, that a great many other young men do who have not their time fully occupied by business. But to our subject again.

The dottrel (*Charadrius morinellus*) and the plover (*Charadrius pluvialis*) both visit our large open fields every spring and autumn;—the latter bird often in great numbers, and dire is the slaughter committed among them both by experienced and inexperienced gunners.

The curlew (*Numenius arquata*) may be found on our hills in summer time, and some few years back I had two half-grown young ones. In crossing the hills on a still summer evening after sunset, when a boy, I verily thought I had got on haunted ground when I came where there were three or four of these birds. They used to flit about and utter such shrill, plaintive whistles, that I was almost afraid of looking over my shoulder for fear of seeing the genii of the place, or the fairies “tripping on the light fantastic toe,” around the dark green circles formed here and there on the hill sides. Maturer years have, however, happily stripped imagination of all such illusions, and where demons and genii were once reported to dwell, I now behold only the presence of a God.

The hen harrier (*Falco pygargus*) breeds among our furze brakes, and a few years ago, I shot the cock bird on a nest, and found six eggs under him ; I have also had young ones more than once.

That beautiful bird the goldfinch (*Carduelis elegans*) may be seen in companies of from ten to twenty or forty, throughout the winter, on our sheepwalks and large open pastures where thistles abound. In July and August the starlings (*Sturnus vulgaris*) congregate together in large flocks, and may be found generally, in the day time, in our sheep pastures ; they seem more partial to sheep than to any other animal ; two or three may often be seen on a sheep's back.

On the 10th instant I saw a young cuckoo, apparently quite healthy ; but the poor bird, I am sorry to say, has not been at all consulted in regard to its comfort and convenience, as it has all along been confined in a small canary cage, and has hardly room to spread both its wings at once.

I am sorry that ill health prevented me from getting out in the spring to inspect a few nests and eggs of the carrion crow, or lesser raven ; I think it quite possible that I may find Mr. Waterton and yourself both right on that head. It is possible a crow may have more reasons than one for covering her eggs sometimes, before leaving them ; a magpie's nest, built in the same neighbourhood, may cause her to do so when she is going to be absent from it for some time.

I should like to see naturalists a little more courteous and respectful in their criticisms one towards another, and not abusing one another like tinkers, as I have seen specimens in another magazine, and all about " trifles light as air."

The chapters relating to our British smaller birds in some of your magazines are exceedingly interesting, and they will, I have no doubt, be the means of awakening greater attention towards them among country naturalists.

The Zoological Dictionary was announced to be forthcoming in 1833. I have not yet heard of its publication ; pray when may we expect it out * ?

I should like to have some good coloured illustrations of some of our British birds, to bind up with the Field Naturalist and Montagu's Ornithological Dictionary. Can I get any at a reasonable rate for that purpose, and where ? I have never seen any but Lewin's, and they are very indifferently executed †.

I was just about closing my letter, when a young friend of mine

* The publisher, Mr. Tegg, said it would be out at Christmas or in Spring.—ED.

† I am not aware of any separate plates of British birds. Selby's are the best.—ED.

sent me in a merlin (*Falco æsalon*) which he shot while out ranging the fields for game.

It is a very fine specimen, and perfect in every feather: dissection proves it to be a male bird, and apparently a full grown young one.

The description of the merlin given in Montagu's Ornithological Dictionary, at page 320 and 321, is beautifully accurate. Mine answers best to Mr. Foljambe's description.

Its length is ten inches and a half, and weighs four ounces and seven-eighths exactly. The tail is composed of twelve long feathers, and has six transverse bars thereon. The first two wing feathers appear as if cut with a pair of scissors, as mentioned in Montagu.

Some few months back, as another gentleman and myself were standing on the top of an elevated mound (raised for what purpose history does not say), we witnessed a most animating aerial chase between a merlin and a skylark.

I can only very faintly describe the short, but animating scene; it is as fresh in remembrance as if I saw it only yesterday.

The merlin came like an arrow upon the poor lark, which was flitting about on the wing at the time; it fled hither and thither in utter dismay, calling most piteously for mercy or assistance all the while; it exerted every muscle, and tried every shift and evasion, to shake off its deadly foe. It fled to the bushes and brakes for safety; but alas! found not even a single leaf to shelter it from its merciless pursuer. It made an attempt to reach us on the top of the mound, but was soon outstripped, and made to tack about suddenly; it repeated the attempt again and again—and again and again was frustrated. After a few minutes of such severe exertion the lark became gradually exhausted; and in making a last feeble effort to reach us, was overtaken by its swift-winged adversary, and triumphantly borne off to a distant field, there to be dissected and offered as an oblation to appease the cravings of nature.

Should these lines meet the eye of my friend on his return from abroad, the time, and place, and scene will be recalled to his memory, and probably he may feel the current of his blood somewhat accelerated by the recollection thereof.

Should this P.S. meet the Editor's views, he will please to make any amendment he deems necessary, and the author will be gratified.*

Kilham, East Riding, Yorkshire, Nov. 20.

* The Editor will feel obliged for any other P. S. such as this from Mr. Anderson.

BEDELL'S TREE.

BY RURICOLA.

THERE is in this neighbourhood a noble tree, memorable as well on its own account, being an uncommon specimen of its kind, as from local circumstances, which are likely to make it equally an object of interest to many of your readers. I allude to a *Sycamore*, in the garden of the Bishop's residence at Kilmore, about three miles from Cavan, and six from this place.

The tree, the chief dimensions of which I have procured on the spot for "The Field Naturalist," and which is in a flourishing and vigorous condition, is planted at the end of a fine terrace walk, at the back of the episcopal residence, overshadowing on one side the adjoining church-yard. Local tradition reports it to have been planted by the truly primitive and apostolical Bishop Bedell, who was advanced to the see in 1629, and died in February 1641-2, having been driven from his house the preceding year by the Irish rebellion, and compelled to take refuge in a ruinous castle, in one of the neighbouring lakes, properly called the Castle of Loughouter, but commonly known at this time in the country by the appellation of "Bedell's Tower." The *Sycamore*, of which I am speaking, is also a memorial of the Bishop, being known by the name of "Bedell's Tree."

Whether or not the tree was originally of his planting, seems to be questionable; indeed I have heard the supposed age, for it must in that case be near two hundred years old, alleged as improbable in so quick-growing and soft-wooded a tree as the *sycamore*: on the other hand, its bulk, and the extent of its boughs, which shall be particularised presently, must have required no small number of years to complete them; whilst the sheltered situation in which it grows, may be judged favourable to its protection and preservation.

However this be, it is certain that in the church-yard, which is contiguous to the Bishop of Kilmore's garden, and in a spot now overshadowed by a large limb of this majestic tree, were deposited the mortal remains of the venerable prelate, whose name it bears. At the solemnity of his interment, the Irish papists attended with great decency, and discharged a volley of shot over his grave, crying out in Latin, "*Requiescat in pace ultimus Anglorum!*"—"May the last of the English rest in peace!"—for, as recorded by Bishop Burnet in his life, they had often said that as they esteemed him the best of the

The annexed sketch may give some idea of the appearance of the trunk, and of the manner in which the arms diverge from it. The different numbers indicate the circumferences of the parts respectively, as above enumerated. The limb marked B is that which projects over Bedell's tomb.

Trunk and lower limbs of Bedell's Tree.

Killeshandra, Nov. 18, 1833.

ON THE ORGANS OF HEARING IN INSECTS.

BY PROFESSOR G. R. TREVIRANUS, OF BREMEN*.

IN the posthumous writings of M. Lyonnet, there is given the anatomy of the sheep tick, which belongs to M. Latreille's genus, *Microphthiris*. On the forehead of this animal the author discovered, at the place where the antennæ of insects are usually situated, two oblong protuberances, covering a hole under a double horny scale, in which lay a rounded body on a short footstalk. This projected from a white fleshy substance, composed of a number of globules, very transparent, and rather hard, the footstalk being fixed by a ligament on the interior of the hole. Lyonnet did not, however, come to any

* Translated from the German, by Edward Rennie.

definitive conclusion respecting the functions of this organ, though it appeared to have a structure analogous to ears.

I believed I had discovered the organ of hearing in the cockroach, (*Blatta orientalis*), in the form of an opening, covered by a membrane, white, interiorly concave, and situated at the base of the antennæ. Under it there is a projection from the brain (the first nerve knot or ganglion), which appears to perform the office of an auditory nerve. The membrane was not round but semicircular, and immediately bordering on the ring in which the antennæ are fixed. Under it I found a white horny substance, similar to that which covers the inner crustaceous envelope of the head. The projections from the brain appeared to give off nerves to the antennæ on each side; but I could not determine whether it spread out over the membrane, which I am inclined to consider the organ of hearing, as I could not otherwise conceive of its functions.

The antennæ of butterflies terminate in a clubbed tip, in which there are not muscles for producing motion, as in the body of these organs, but a half liquid substance filling the cavity. In the alderman butterfly (*Ammiralis Atalanta*), I found this substance intermixed with membranous matter, resembling in some degree the substance found in the auditory sacs (*hörsäcken*) of the frog, the calcareous portions being less than in the latter. I think it exceedingly probable that these clubs of the antennæ are the seat of the sense of hearing.

I formerly remarked (*Biologie*, vi. 359), that in the dragon fly, in the space on the forehead between the eyes and the antennæ, there is a projection covered with a thin membrane, filled with a whitish fluid, which is probably the organ of hearing.

In other winged insects, besides beetles, the interior of the head is large, and destitute of any apparent organ which could serve for the perception of sounds. In the breeze fly (*Tabanus bovinus*); there is on the upper part of the head, between the two compound eyes, a longish, slender (*schmale*), horny plate; and above this on the forehead, a small scutiform projection over a hole, between the inner side of the eye, the brain, and the under envelope of the head, continued below, and covered with a very thin, blackish, multiplicate, and uniformly dry membrane. When the head is opened under water, many air-bubbles escape from this hole. Besides small nerves appeared to me to be given off from the further side of the brain to be distributed to this membrane, though I could not make myself certain of this. Rosenthal observed a similar membrane in the flesh fly (*Musca carnaria*); but in

this insect there is no external aperture, though air tubes reach it through the scutiform protuberance.

In many yoke-winged flies, (*Hymenoptera*), such as bees, there are similar apertures in the head, which probably perform the function of hearing. But it is not, as Ramdohr believed, in that part of the head in bees with which the palpi are joined, that the organ of hearing is situated, as I formerly remarked (*Biologie*, vi. 356). A small sac indeed lies there, as I subsequently found, but this is simply one of the air cells.

NOTES. BY T. C.

IN your Number for September, you honoured me by inserting some observations respecting the cuckoo; I have much pleasure in saying, that the specimen to which I alluded, is still alive, though in a most shabby state, as to plumage, being without tail, and almost without wings; still, however, it eats as much as ever, and seems much better than could be expected, when we consider that it is moulting, and I have some hopes of its living through the winter.

I take the opportunity of troubling you with a few remarks, made at different times, and in different places.

THE SWALLOW.—That solitary instances of swallows being discovered at times when they have been supposed to have departed, cannot be denied; for we have instances recorded by highly respectable, as well as accurate observers; but that this should be accepted as a proof that the swallow tribe *generally*, does not migrate, is preposterous. Is it not much more rational to suppose, that such individuals have been disabled by illness, or by some accidental injury, from having been hatched late, or from some other unknown cause, and have existed in a state of *stupor* (for I do not believe that any bird has the faculty of enduring torpidity,) till the first warm day has roused them, and they have sallied forth in search of food?

I should imagine that a bird might exist for some time in this way, either in the chimney in which it was hatched, or in some hole, where it might find a scanty supply of insect food; and it is not certain that when these individuals were observed, that was the only time they had ventured from their hiding places, but they might have left them many times without being observed. Now, though this may appear improbable, how else are we to account for the appearance of swallows in the winter? As to the absurd idea of torpidity, were I even to find a

swallow in some hole in the winter, I should rather believe that it had taken shelter there from the cold, and that it would have died, if not released, than I would believe it to be in a state of torpidity, and that, on the return of spring, it would have aroused and joined its companions.

It is very different with quadrupeds; the cold weather would overtake them long before they could reach a warmer climate, even if they were not prevented by seas and other obstacles; but, with BIRDS, what reason is there for supposing them incapable of migration? they can cross land and sea with most astonishing swiftness. No one doubts that the woodcock and other short-winged birds actually migrate, and why should we believe that the swallow, which of all birds is the best provided with the means of flight, should remain with us in a state of *torpidity*, for want of power to seek a warmer climate?

No one can deny, that it is a most wonderful faculty which enables birds to resist the obstacles which they must necessarily meet with in their passage over trackless seas; but the same power which enables them to support themselves on wing, which guides them across immense tracks of land and sea, and which teaches them whither to direct their course on the change of climate, has endowed them with power and instinct to overcome every difficulty which they may encounter, and has enabled them to resist every storm and every obstacle which would intercept their course, or retard their progress.

It is a mistake, that the kingfisher is a shy and unsociable bird; I have often enjoyed its company when fishing, and a friend of mine found two eggs in a hole, which he says belonged formerly to a rat, in the bank of an artificial river, flowing through a garden, in which children were constantly playing; these eggs were nearly spherical, and were deposited at the end of the hole, without any kind of nest, unless a slight hollow may be worthy of the name.

Much confusion appears to have existed respecting the common starling; whether such a bird as the solitary thrush exists in this country or not, I cannot pretend to say; but it is certain, that the common stare does not obtain its black plumage until the end of July or beginning of August, being of a dingy hair-brown colour; this plumage is sometimes very smooth, and gives the bird the appearance of an adult, but it only remains until the first autumn, when the black feathers appear first on the sides, and gradually spread over the whole body.

The plumage, however, is not in perfection until the second moult, when it assumes the beautiful gloss of the adult bird.

THE EDITOR'S MEDICAL BOTANY*.

FROM the title of this work it may be supposed that it is exclusively of interest to the medical profession; but though it is mainly adapted to this purpose, it may also be very useful to all young botanists who are desirous of a knowledge of the two great systems of Linnæus and Jussieu. In the ALPHABET OF BOTANY, indeed, outlines of these two systems are given, as full as the space there would permit; but here, in the MEDICAL BOTANY, numerous practical examples are given from medicinal plants, with figures and accurate dissections, to show the structure of the flowers. We think the readers of our Magazine will be pleased to see a specimen of these illustrations, as the title of the work might prevent many of them, perhaps, who do not belong to the medical profession, from looking into it. We begin with an illustration (in this case not taken from a medicinal plant), to show the principal parts of a flower.

Example of the principal parts in a flower. NEPAL CINQUEFOIL (Potentilla Nepalensis).

- a* Calyx.
- b* Blossom of five petals.
- c* Stamens.
- d* Pistils.

We shall next go over the twenty-four Linnæan classes in their order, as they are illustrated in this little book.

* Alphabet of Medical Botany and Zoology, for the Use of Beginners. Just published.

FIRST CLASS, MONANDRIA.

GINGER (*Zingiber officinale*).

This plant, which belongs to the Jussieuan order, *Scitamineæ*, is a native of the East Indies, and is also cultivated in the West. The root is creeping and perennial, with fleshy finger-like tubers, which is the part used medicinally. These, when the stalks fade, are taken up like potatoes, scraped, washed, and dried in the sun, and constitute white ginger. By scalding the tubes before drying, black ginger is formed. The flowers grow in a club-shaped spike.

a Flower.

b The stamen and pistil.

SECOND CLASS, DIANDRIA.

OLIVE (*Olea Europæa*).

This plant, which belongs to the Jussieuan order, *Oleinae*, is a native of the north of Africa and of the south of Europe, where it is much cultivated. The flowers are in opposite clusters, half the length of the leaves, on short flower stalks; the calyx four-cleft and regular; the corolla white, four-parted, regular, and spreading. The fruit is a smooth oval plum, bitter and nauseous. The ripe fruit is bruised in a mill, to procure the oil, which is the part used.

a Flower, showing the two stamens and pistil.

b Pistil and seed organ.

THIRD CLASS, TRIANDRIA.

Sugar Cane (*Saccharum officinarum*).

This plant, which belongs to the Jussieuan order, *Gramineæ*, is a native of Asia, and also, it is said, of America, where it is cultivated. The calyx, as well as the corolla, is two-valved, the flowers being in terminal panicles of many spikes, very downy. Sugar is the expressed juice evaporated of the fresh canes, and undergoes various preparations.

a Flower, showing the three stamens.

b The seed-organ, surrounded with hair.

FOURTH CLASS, TETRANDRIA.

Contrayerva (*Dorstenia contrayerva*).

This perennial plant, which belongs to the Jussieuan order, *Urticæ*, is a native of tropical America. The flowers are very small, closely crowded, and immersed in a common one-leaved fleshy receptacle, where also the seeds are in sockets. The root, which is the part used, is spindle-shaped, knotty, and branchy.

a Flower opened, showing the four stamens, single forked pistil, and the seed organ.

FIFTH CLASS, PENTANDRIA.

Hemlock (*Conium maculatum*).

This biennial plant, which belongs to the Jussieuan order, *Umbelliferae*, is a native of waste places and hedge banks in Britain, flowering in June and July. The flowers, which are white, grow in umbels of ten or twelve rays; the corolla has five inflected petals, the outer ones larger than the inner; the seeds are nearly globular, with five streaks, notched at the side, and smooth; the stem is smooth, shining, and marked with irregular spots of brownish purple. The dried leaves are used, and also an extract.

a Flower, showing the five stamens and two pistils.

SIXTH CLASS, HEXANDRIA.

Meadow Saffron (*Colchicum autumnale*).

This perennial plant; which belongs to the Jussieuan order, *Colchiceae*, is a native of moist meadows in Britain, flowering in September, and ripening its seed the following June. The flower, which is lilac purple, appears after the spring leaves have withered away. There is no calyx; the corolla is six parted, the tube extending to the bulb; the seed organ has three lobes and three cells. The expressed juice of the flowers, the seeds, and bulbs, which are taken up from June till August, are used.

a The Plant as it is seen towards the close of autumn.

b The same, as it appears in the spring following.

c The flower opened to show the six stamens.

d The three pistils.

SEVENTH CLASS, HEPTANDRIA.

Horse Chestnut (*Æsculus Hippocastanum*).

This tree, which belongs to the Jussieuan order, *Acerideæ*, is a native of Asia, cultivated in Britain, and flowering in April and May. The flowers, which are reddish white, grow in large spikes. The calyx has one inflated leaf; the corolla five spreading downy petals arising from the calyx: the seed organ is three-celled; the seeds are large, smooth, and round. The bark is the part used.

a Flower, showing the seven stamens and single pistil.

b The fruit.

EIGHTH CLASS, OCTANDRIA.

Balsam of Gilead Tree (*Amyris Gileadensis*).

This tree, which belongs to the Jussieuan order, *Terebinthaceæ*, is a native of Abyssinia. The flowers, which are white, grow three on a stalk, and two of these are commonly infertile. The calyx is four-toothed and persistent; the corolla has four concave spreading petals; the seed-organ is egg-oblong; the fruit opens with four valves, containing a small nut. The part used is a balsam, procured by incision.

a Flower.

b The same, showing the eight stamens, and single pistil.

NINTH CLASS, ENNEANDRIA.

Cinnamon Tree (*Laurus Cinnamomum*).

This evergreen tree, which belongs to the Jussieuan order, *Laurineæ*, is found in tropical Asia, particularly Ceylon, flowering in January. The flowers, which are white, grow in axillary panicles. There is no calyx; the corolla has six petals, oval pointed, and spreading; the fruit is an oval berry, with a depressed tip, and one seed. The bark, which is the part used, is taken off from May till October.

a Flower, showing the nine stamens.

b Anther magnified, showing the apertures, with their lids, for the discharge of the pollen.

c The single pistil.

TENTH CLASS, DECANDRIA.

Senna Plant (*Cassia Senna*).

This annual plant, which belongs to the Jussieuan order, *Leguminosæ*, is a native of Africa, flowering in July and August. The flowers, which are yellow, grow in loose spikes; the calyx has five narrow leaves; the corolla has five petals, the two upper smaller than the three under ones; the fruit has two valves and from six to nine cells, with a seed in each. The leaves, which are the part used, are winged, the leaflets being *unequal at the base*.

a Flower showing the ten stamens, and single pistil.

ELEVENTH CLASS, DODECANDRIA.

Agrimony (*Agrimonia Eupatoria*).

This perennial plant, which belongs to the Jussieuan order, *Rosaceæ*, is a native of Britain, flowering in June and July. The flowers, which are yellow, grow in a tall bunch. The calyx is five-toothed; the corolla has five concave notched petals; the seed organ has a fleshy receptacle; the seeds are two, egg-oblong and flat. The whole herb is used.

a Flower, showing the twelve stamens.

b The five pistils.

TWELFTH CLASS, ICOSANDRIA.

Pomegranate Tree (*Punica Granatum*).

This tree, which belongs to the Jussieuan order, *Myrtaceæ*, is a native of the tropics. The flowers, which are of a fine deep red, are sessile, and grow in threes or fours together. The calyx is superior, thick fleshy, red, and five-cleft; the corolla has five wrinkled petals; the fruit has a red succulent pulp, with many seeds. The rind of the fruit is the part used; the bark of the root has similar properties.

a The flower.

b The calyx and stamens.

d Another view of the same, showing the attachment of the stamens to the calyx.

c The fruit.

THIRTEENTH CLASS, POLYANDRIA.

White Poppy (*Papaver somniferum*).

This annual plant, which belongs to the Jussieuan order, *Papaveraceæ*, is a native of Asia, extensively cultivated, flowering, with us, in June and July. The flower is large, and usually white, but varieties of red and purple colour are not uncommon. The calyx has two large smooth leaves; the corolla has four large wavy petals; the seeds, sometimes called *maw seed*, are numerous, small, and greyish white. The seed-heads (not the seeds) are the part used, as well as the concrete juice or *opium*, procured from them by incision.

a The seed-organ, showing the stamens attached to the receptacle.

b The fruit.

FOURTEENTH CLASS, DIDYNAMIA.

Foxglove (*Digitalis purpurea*).

This biennial plant, which belongs to the Jussieuan order, *Scrofulariæ*, is a native of Britain, flowering from June till August. The flowers, which are large and purplish red, grow all on one side in a fine showy spike. The calyx is five-parted, the uppermost division the narrowest; the corolla has one large bell-shaped petal, spotted and hairy within, the upper lip slightly cleft; the seed organ has a double partition with many seeds. The leaves, gathered when the plant is in flower, are the part used.

a Part of a flower, showing the four stamens, two short and two long.

b The pistil.

FIFTEENTH CLASS, TETRADYNAMIA.

Cuckoo Flower, or Ladies' Smock
(*Cardamine pratensis*).

This perennial plant, which belongs to the Jussieuan order, *Cruciferae*, is a native of Britain, flowering in April and May. The flowers, which are pale purple, or rather purplish white, grow in bundles. The calyx is somewhat gaping and yellowish green; the corolla has the petals large and slightly notched; the seed pod opens when ripe with an elastic spring. The flowers are the part used.

a The six stamens, four long and two short.

b The pistil.

SIXTEENTH CLASS, MONADELPHIA.

Tamarind Tree (*Tamarindus Indica*).

This tree, which belongs to the Jussieuan order, *Leguminosae*, is a native of the tropics, flowering in April and May. The flowers, which are yellowish, grow in loose bunches of five or six; the calyx is straw yellow and four-parted; the corolla has three egg-oblong, indented petals, plaited at the margin; the seed pods contain a pulpy substance (the part used) enveloping the seeds.

a The three stamens, united by their filaments into one body.

b The pistil.

SEVENTEENTH CLASS, DIADELPHIA.

Cowhage (*Dolichos pruriens*).

This perennial climbing plant, which belongs to the Jussieuan order, *Leguminosæ*, is a native of the tropics, flowering from September to March. The flowers, which are blood red, grow in drooping spikes. The corolla has two oblong scales at the base of the standard; the fruit is a leathery pod, in the form of the Italic *f*, containing from three to five seeds. The part used are the short brown bristly hairs which cover the pods.

a The flower.

b The ten stamens and pistils which lie folded up in the keel-like petals of the flower. The stamens are divided into two bodies, of which nine form the lower, *c*, and one, the upper, *d*.

e The pistil.

EIGHTEENTH CLASS, POLYADELPHIA.

Lemon Tree (*Citrus medica*).

This evergreen tree, which belongs to the Jussieuan order, *Aurantia*, is a native of Asia, cultivated in the south of Europe. The flowers, which are large and purplish white, grow on the smaller branches. The calyx is saucer-formed, five-cleft, with pointed teeth; the corolla with five petals oblong and concave; the fruit is large, and egg oblong. The juice of the fruit, and the essential oil of its rind, are the parts used.

a Flower, showing the division of the stamens into three bundles.

b Section of the fruit.

NINETEENTH CLASS, SYNGENESIA.

Chamomile (*Anthemis nobilis*).

This perennial plant, which belongs to the Jussieuan order, *Corymbiferae*, is a native of Britain, flowering in August and September. The calyx is hairy, and has broad membranaceous edges; the florets of the disk are yellow—of the circumference, white, and more than five in number; the receptacle is chaffy; the seed is downless. The dried flowers are the parts used.

a Florets of the circumference; *b*, florets of the disk; *c*, the receptacle, showing the insertion of the two kinds of florets; *d*, floret of the circumference, consisting of a single strap-shaped petal; *e*, floret of the disk; *f*, the five stamens, adhering by their anthers, together forming a tube, through which the single pistil, *g*, passes.

TWENTIETH CLASS, GYNANDRIA.

Snake Root, or Birthwort (*Aristolochia Serpentaria*).

This perennial plant, which belongs to the Jussieuan order, *Aristolochiæ*, is a native of North America, flowering in May and June. The flowers, which are brownish purple, grow upon bending foot stalks, from the joints near the root. There is no calyx; the corolla has one petal, with a triangular lip, and bulging out at the base; the seed vessel is inferior, with six cells and many seeds. The root, which consists of bundles of yellow fibres, is the part used.

a The flower; *b*, section of the same, showing the situation of the stamen and pistils; *c*; *d*, the stamens attached to the pistils, *e*.

TWENTY-FIRST CLASS, MONŒCIA.

Colocynth Plant, or Bitter Cucumber (*Cucumis Colocynthus*).

This annual plant, which belongs to the Jussienan order, *Cucurbitaceæ*, is a native of Africa, flowering from May till August. The male flowers have the calyx five-toothed; the corolla five-parted; the stamens three. The female flowers have the calyx and corolla like the male; the pistil is three-cleft. The fruit is the size of a small orange, and of a yellow colour. It is the fruit which is used after it has been peeled and dried.

a The male flower, containing stamens.

b The female flower, containing pistils.

TWENTY-SECOND CLASS, DICEIA.

Hop (*Humulus lupulus*).

This climbing perennial plant, which belongs to the Jussienan order, *Urticææ*, is a native of Britain, extensively cultivated, flowering in July. The flowers are furnished with flower scales. The male flowers which are whitish, and grow in panicles, have a five-leaved calyx and no corolla. The female flowers have a one-leaved, entire, spreading calyx and no corolla. The fruit cones (*strobili*), are egg-oblong and pendulous. It is the cones, after drying in a kiln, which are used.

a, a branch of the male plant; *b*, the male flower, bearing stamens only; *c*, another; *d*, a hop, or catkin of flowers, from the female plant; *e*, a single scale of ditto; with the pistils and germ at its base; *f*, the same, enlarged.

TWENTY-THIRD CLASS, POLYGAMIA.

Fig Tree (*Ficus Carica*).

This tree, which belongs to the Jussieuan order, *Urticeæ*, is a native of Asia, not uncommon in gardens, and flowering in June and July. The male flowers have the calyx three-parted, and three stamens; the female flowers have the calyx five-parted, and one pistil: neither has a corolla. The fruit, which is the part used, in a dried state, is pear-shaped and fleshy.

a, section of the fruit, bearing in its inner side, male, female, and hermaphrodite flowers.

b, male flower.

c, female flower.

TWENTY-FOURTH CLASS,
CRYPTOGAMIA.Bladder Wrack (*Fucus vesiculosus*).

This plant, which belongs to the Jussieuan order, *Algae*, is a native of the British seas, bearing its fruit in spring. The leaf is smooth, glossy, and dark olive, having a mid-rib tapering from the base. The male vesicles are hollow; the female vesicles filled with jelly. The whole plant is used.

a Vesicles, containing the spores.

b Section of the same.

THE FIELD DIARY OF SOLITARIUS.

JANUARY. This month has not hitherto presented me with anything *peculiar* to it, although I have paid as much attention to field pursuits during its continuance as I have in other months. The active reader, however, must not let this remark deter him from searching the fields at this time of the year, for much may be noticed by him that has escaped my observation.

FEBRUARY 7, 1832. At Kilburn I found the larva of the goat-moth (*Cossus ligniperda*) concealed in the earth beneath a stone, which is rather a singular situation to find it in, as it generally inhabits willows and poplars, to which and other trees it is very destructive.

— 8, 1831. In the soft earth of a bank at Kilburn, I found several specimens of *Chrysomela staphylea*, and of *Pæcilus cupreus*.

MARCH 5, 1833. The dung-fly (*Scatophaga stercoraria*) appeared.

— 16, 1831. The red-ants (*Formica rufa*) commenced their labours in Kensington Gardens.

— 17, 1837. Found the scarlet satin-mite (*Trombidium holosericeum*) in Kensington Gardens, where I noticed that the squirrels are now in a state of activity, jumping with their wonted agility from bough to bough.

— 19, 1833. At Paddington, in the afternoon, heard the song of the blackbird (*Merula vulgaris*) for the first time this year. Saw a *Scarabæus vulgaris* on the wing.

— 27, 1831. Heard the skylark (*Alauda arvensis*) for the first time this year, at Harlesdon, on the Harrow Road.

— 22, 1832. At Lee, observed a flock of fieldfares, and a single specimen of the nettle-butterfly (*Vanessa Urticæ*). Snails were copulating.

— 25, 1831. The common bat (*Vespertilio Pipistrellus*, GEOFF.*) flying at Kilburn, at about seven o'clock in the evening. This species is said to fly throughout the year; but although I have observed it in the cold evenings of October, November, and December, yet I have never seen it during the frosty nights of January and February. In

* The Rev. Mr. Jenyns, in the Linnæan Transactions, denies that our common-bat is, as is generally supposed, the *Vespertilio murinus* of Linnaeus, and endeavours to prove (and I think with success) that it is the *V. Pipistrellus* of Geoffroy. I have therefore adopted the latter term.

the selection of its haunt, it does not seem to give preference to either secluded or quiet places; for I have observed it flying over the Elephant and Castle at Newington, and other places equally noisy. But the great bat appears to attach itself to still places, usually in the neighbourhood of water, flying over canals and reservoirs, where its prey probably consists of insects of the genera *Botys*, *Hydrocampa*, *Alucila*, &c.

— 25, 1832. *Timarcha coriacea* abundant upon Blackheath.

— 25, 1833. Found *Acanthosoma virens*, *Coccinella* 7 *punctata*, and *Timarcha coriacea* on Hampstead Heath.

— 30, 1832. The water-measurer (*Hydrometra Stagnorum*) appeared upon the brooks at Lee, Kent.

APRIL 7, 1833. The house-fly (*Musca domestica*) appeared.

— 6, 1833. On the skirts of the wood near Shooter's Hill, I observed the nettle-butterfly (*Vanessa Urticæ*), the brimstone-butterfly (*Gonepteryx rhamni*), the peacock-butterfly (*Vanessa Io*), and the cabbage-white butterfly (*Pontia Brassicæ*).

— 13, 1831. Noticed a large flock of fieldfares at Kilburn.

— 13, 1833. The bed-flea (*Pulex irritans*) appeared.

— 24, 1832. Observed at Blackheath the first pair of swallows I have seen this year.

— 27, 1831. Swallows made their appearance at Kilburn.

— 29, 1831. Found several chrysalides of *Vanessa Urticæ* at Twickenham.

— 30, 1831. At Twickenham, heard the cuckoo for the first time this year.

MAY 1, 1833. On Wandsworth Common found the purple dorr-beetle (*Geotrupes sylvaticus*) and *Silpha levigata*.

— 9, 1831. Found the larva of *Arctia caja*.

— 11, 1832. In a field near the Harrow Road found the larva of *Abraxas grossulariata*.

— 18, 1832. In the course of a walk from Blackheath to Chiselhurst and back, I found several specimens of *Curculionidæ* (including *Otiorynchus scaber* and *Polydrusus uniformis*) *Chrysis ignita*, *Seioptera vibrans*, *Libellula vulgata*, &c.

— 19, 1833. Some specimens of *Cynips Rosæ* were hatched in one of my chip-boxes, from a gall found upon a rose-tree.

— 20, 1831. In Fitzroy Square I noticed in the evening what, in my notion, was a very singular occurrence. There was a very beautiful halo or circle on one side of the moon, but not round it as is usual. It

attracted the attention of several persons, all of whom appeared to regard it as something extraordinary.

— 22, 1833. *Plinus pectinicornis* appeared.

— 30, 1832. In some fields near Westbourn Green, Paddington, I captured three specimens of the orange-tip butterfly (*Pontia cardamines*).

— 30, 1833. In Epping Forest, captured *Abia sericea*, *Cetonia aurata*, *Elatér fulvipes*, a *Chrysopa* and a *Pimplia*, *Hipparchia Mægera*, *Hipparchia Pamphilus*, *Lycæna phlæas*, *Polyommatus Alexis*, *Callimorpha Jacobææ*, several specimens of the long-horned japan moths (*Adela*), and the larva of *Arctia caja*.

JUNE 8, 1831. *Syrphidæ*, *Cynipidæ*, *Culicidæ*, *Libellulidæ*, *Bombi*, *Tortrix viridiana*, and the larvæ of *Cassida equestris*, very abundant in the fields between Kilburn and Hampstead.

— 13, 1832. Found *Chrysomela Polygoni*.

— 21, 1833. In Epping Forest, found several specimens of *Hipparchia Aegeria*. This species of butterfly, from repeated observation and an attentive search, I observed was local to one particular dry ditch, at the Wanstead side of the forest, where I could obtain specimens every day during their continuance, although elsewhere about Wanstead, Ilford, &c., I could not meet with a single one.

— 23, 1833. *Vanessa Urticæ* made its appearance at Laytonstone, which is a much later date than usual.

— 25, 1832. In Kensington Gardens, took several specimens of *Cantharis biguttata*; and two moths, somewhat resembling a species of *Tinea*, being of a black colour, except on the exterior margin of the superior wings, where there is a conspicuous line of white.

— 30, 1833. A female of *Pygera bucephala*, confined in one of my boxes, laid her eggs therein.

JULY 11, 1832. Found the larva of the peacock-butterfly, (*Vanessa Io*) and observed the meadow-butterfly (*Hipparchia Jurtina*) in great abundance at Kilburn, and caught *Carabus catenulatus* on Hampstead Heath.

— 19, 1833. The magpie-moth (*Abraxas grossulariata*) appeared at Laytonstone.

— 24, 1833. Saw the brimstone-butterfly (*Gonepteryx Rhamni*) near Caen Wood, Hampstead.

— 27, 1833. In Epping Forest, captured *Vanessa Io*, *Hipparchia Jurtina*, *Hipparchia linea*, *Hipparchia Pamphilus*, *Polyommatus Alexis*, *Lycæna phlæas*, and *Geometra illunaria*.

JULY 28, 1833. *Cerambyx moschatus* taken at Norwood.

AUGUST 1, 1832. Found in Kensington Gardens the spider's eggs, figured in the Field Naturalist (p. 180), and from which emerged the Ichneumon-flies, called *Microgaster alvearius*.

— 7, 1833. On Wormwood Scrubbs, caught *Hipparchia Pamphilus* and *Lycæna phlæas*.

— 9, 1833. On Hampstead Heath and Golder's Green, captured *Pontia Brassicæ*, *Hipparchia Mægera*, *Hipparchia Pamphilus*, *Polyommatus Alexis*, *Vanessa Io*, *Vanessa Urticæ*, *Cassida equestris*, *Hæmatophora pluvialis*, and *Carabus monilis*.

— 20, 1833. In Hornsey Wood, found *Pæcilus cupreus* *.

— 23, 1833. Blackberries observed to be very plentiful, and remarkably fine, in the hedges about Shooter's Hill.

SEPTEMBER 2, 1832. At the pretty little village of Wilsdon, entomologising with a friend, we found in some ponds, the boat-fly (*Notonecta glauca*), the water-scorpion (*Nepa cinerea*), the water-measurer (*Hydrometra stagnorum*), *Ranatra linearis*, and several larvæ of *Libellulidæ*. We also found *Necrophorus sepultor*, three solitary specimens of *Hipparchia Jurtina* and of *Polyommatus Alexis*, which is now nearly out of season.

— 3, 1833. At Hendon, saw a heron flying over head, and found the larva of *Lasiocampa Rubi*.

— 14, 1833. Found *Timarcha coriacea* on Old Oak Common, Wilsdon.

— 16, 1832. At Hampstead, with a friend, found *Chrysomela nigricornis* very abundant in the gravel pits, and in a pond found *Geotrupes stercorarius* infested with *acari*. We also found two specimens of *Catocala nupta*, one of *Lycæna phlæas*, and the larva of *Arctia caja*.

— 29, 1832. The larvæ of the buff-tip moth (*Pygera bucephala*) very plentiful in Hyde Park, where it committed extensive ravages upon the foliage of the trees.

OCTOBER 2, 1833. Found *Carabus catenulatus*, and a species of *Chrysopa*, in Copenhagen Fields.

— 11, 1833. In the river Wandle, found *Notonecta glauca*, *Hydrometra Stagnorum*, and *Gyrinus natator*.

— 15, 1832. At Hampstead, observed an alderman butterfly

* I know not what the natural food of this is, but I found it some time since eating a piece of boiled potato with great avidity.

hovering round a glass-house, and making many vain attempts to get at the plants within. This species of butterfly is rather scarce in the fields around London.

— 26, 1833. Starlings observed in flocks at Kilburn and Hampstead.

— 27, 1833. At Hampstead, in company with a friend, we found *Plusia gamma*, *Hydrophilus piceus*, and the larvæ of *Libellulidæ*. Saw *Mesembrina equina*.

NOVEMBER 13, 1833. On Wormwood Scrubbs, observed a few daisies still in flower.

— 17, 1833. The day excessively warm. Flies observed to be very abundant in Gray's Inn Lane; observed a bat on the wing at about five o'clock, at Highbury.

DECEMBER 5, 1833. At Wilsdon, found *Crioceris cyanella*, concealed under moss.

— 17, 1832. In some fields at Paddington, searching for insects, few of which were to be seen on account of the boisterous wind. Windy days are the least favourable to entomologising, as all insects (excepting the aquatic, but to many of these even the observation is applicable) have an antipathy to wind; and beetles, notwithstanding their being encased by a hard covering, will, during its continuance, seek some place of shelter to defend themselves from its annoyance. The only insects I met with to-day, were *Gyrinus natator*, *Notonecta glauca*, several larvæ of *Ephemera* and of *Libellulidæ*.

— 25, 1832. Saw a single specimen of *Coccinella bipunctata* in the Commercial Road.

Paddington, Dec. 1833.

ON PROCURING SPECIMENS OF THE SMALLER BRITISH LAND BIRDS FOR A MUSEUM,

WITH OBSERVATIONS ON THE HABITS OF VARIOUS SPECIES.

BY EDWARD BLYTH.

HAVING generally remarked, in the numerous public and private collections of stuffed British birds which I have visited, that in the hurry to be all at once possessed of specimens of every species, little or no attention has been paid to the state of feather in which they were obtained, I conceive that it would be useful to many who are now forming collections, to point out, as far as I am able, the particular

season of the year in which each species is to be obtained in its highest degree of beauty ; and, as the plumage of many birds varies greatly in different individuals, according to age, sex, and season, I shall also endeavour to explain what number of specimens of each sort are necessary to illustrate the species properly, and likewise the precise periods at which the contrasts they afford would be exhibited to the greatest advantage.

In the birds of prey (*Accipitres*, LINNÆUS), and in various aquatic groups, the changes of appearance which the same species presents, at different periods of existence are, in many instances, so considerable, as to have occasioned an unnecessary multiplication of species in the works of the earlier naturalists ; but as the variations to which these birds are subject are for the most part dependent on age more than upon season, and as they have moreover long occupied the attention of the first ornithologists, who in their several works have described them with great minuteness, a repetition of them here would be superfluous. The more particular object of this little essay is to note down a variety of minor changes, which, from different causes, take place in the plumage of the smaller birds, and which materially affect, in many cases, the beauty of their tints ; for which reason, all who are forming museums should be acquainted with them.

It would be foreign to my purpose here to give minute directions upon what I consider to be the best method of mounting and preserving skins ; I am of opinion, indeed, that no kind of written direction is of much use towards teaching the art of *taxidermy*, as it is now fashionably called. It requires a vast deal of patience, and practice, and close attention, to enable a person to stuff birds well, and those generally become the greatest proficient who have taught themselves the art by dint of their own ingenuity and perseverance. A few words, however, on the subject of bird-stuffing, may not perhaps be deemed irrelevant. I want to recommend to the great majority of those who undertake to preserve animals, the study of living nature, at present so very generally neglected. There are hundreds of persons who understand extremely well how to take off and prepare the skin of a bird, and who can afterwards even mount it in the very best possible style, but who have nevertheless no kind of notion whatever of finishing it off in even a tolerable manner. This, of course, arises from their having never studied the living originals. The specimens are got up without attention either to form, attitude, or proportions, and they have, therefore, to persons accustomed to admire the beauty and symmetry of

living nature, the appearance of mummies, rather than of artist-like attempts to imitate the appearance of life; or they may appositely enough be compared to an endeavour to delineate the human figure by one who had never studied its proportions.

To naturalists who might wish to possess a small museum of British birds, but who cannot well spare the time it requires to prepare a number of specimens, a general contract with a person of this kind, who is capable of undertaking the more mechanical parts of the operation of bird-stuffing, will be found to prove very advantageous. In mounting the skin of a bird, the principal faults of stuffers are, generally, the filling of it out with a great deal too much tow, or other stuffing, especially about the neck — the putting too much wire into the neck, which effectually precludes all possibility of restoring it to anything like its natural form — and in drawing up the skin close, when sewing up the incision made for the purpose of extracting the body; a very common practice, which contracts the under parts out of all shape and proportions, but which is totally unnecessary, as even in the living birds the feathers of these parts completely conceal a very wide space of naked skin, or which is covered only with a little down. These, however, are faults which require but to be pointed out to be avoided. With care, attention, and a little practice, and a tolerable share of patience withal, the difficulties of this first part of the operation may be soon surmounted; and a specimen thus far well prepared may, while the skin remains moist and flexible, be placed by a skilful hand into any kind of position. But in this it is that most stuffed birds are spoilt, it being here that an acquaintance with the peculiar attitudes of each species is necessary, and that a correct knowledge of proportions and general form is required: in this part of the operation it is that the various little niceties of outline, the natural curves, the gentle sinkings and convexities, the expression of the countenance, &c., must be given; a want of attention to which in the generality of museum specimens is the cause of their horrid stiffness and deformity.

It is a very common practice among bird-stuffers, when finishing off a specimen, to endeavour to render one side smooth and even at the expense of the other; which latter, when the bird is encased, is supposed not to be at all seen. Specimens that are thus prepared, however, can never have the appearance of life; and to persons who have any knowledge of proportions their faultiness is detected at a glance. A specimen is badly stuffed if it does not on every side bear inspection.

With regard to the numerous peculiarities of attitude and position

among the smaller birds, a proper knowledge, I think, cannot well be acquired without keeping the different species in confinement; and though, perhaps, the idea of this may appear rather formidable at first sight, the difficulties of doing so are by no means so great as might be anticipated. A cage containing twenty birds requires no more attention than a cage containing one; both should be daily cleaned out, and both should every day be replenished with fresh food. To the naturalist, indeed, who is desirous of obtaining a thorough insight into the manners and dispositions of the feathered race, various other advantages accrue from keeping the different species in confinement, besides the mere study of their figures and attitudes. In the economy of most birds there are a number of little curious peculiarities, which often throw considerable light on their natural history, but which can only be learned by studying their habits in the cage. By keeping birds in confinement, also, a thorough acquaintance with their various notes is obtained, which of course greatly facilitates all field observation of their habits. But it is not from wild and timid newly-caught birds that information of this kind is to be derived, nor is it from such that a knowledge of their free unrestrained positions can be acquired; it is only when they have become familiar, and devoid of fear and restraint, that their habits become interesting in confinement. A wild bird, however, becomes speedily familiar, if placed with a number of tame companions; though it is advisable, when newly caught, to keep it a few days by itself.

The natural positions of most of our British birds require a great deal more study than is usually bestowed upon them by stuffers; and it is a matter of primary importance to all who intend forming collections, to become minutely acquainted with the general appearance, and with the peculiar attitudes of each separate species when alive. Indeed, the great diversities in this respect, among the smaller kinds, are often surprising. The natural positions of the most approximate species differ in many instances widely; and it consequently requires a close and intimate acquaintance with the living originals to enable even a proficient in the art of mounting skins to give to stuffed specimens the appearance they presented when alive. Excepting in the case of absolute rarities, examples of which might never, perhaps, be a second time obtained, it would be as well not to attempt any bird whatever until this minute knowledge of its appearance and natural attitudes when living had been thoroughly and correctly acquired. It is not enough even that the positions of an assimilated species had been

minutely studied: the characteristic attitudes of the siskin (*Carduelis spinus*) are not to be learned by studying those of a goldfinch (*C. elegans*); nor can a knowledge of the natural positions of the chiffchaff (*Sylvia loquax*) be obtained by observing those of a wood-wren (*S. sibilatrix*); again, many of the most common attitudes of the babillard (*Ficedula garrula*) would be altogether unnatural in either the white-throat (*F. cinerea*) or in the blackcap (*F. atricapilla*).

It is now quite time, however, that I proceed to the immediate object of this paper, which is to point out the different periods of the year in which specimens of the various British land birds should be obtained for stuffing. To commence with the predacious species (*Accipitres*, LINN.) These vary exceedingly in their plumage; but as their tints are in no case affected by change of season, and as the species are for the most part rare, and difficult to obtain, it would be useless to say much upon them. To illustrate the *Accipitres* well, at least three specimens of every species should, if practicable, be preserved, representing the adult male, the adult female, and the young in its first or nestling plumage. As they do not much injure their feathers, they are generally in a fit state for stuffing, excepting, of course, during the autumnal moult; though even then it is often interesting to represent them when in a state of change. Many species, as the common buzzard, (*Buteo vulgaris*), and the marsh harrier, (*Circus rufus*), exhibit much individual variety, and such cannot be well illustrated without a number of specimens. The common barn owl (*Aluco vulgaris*) also varies very much in colour and in markings. I have lately examined a considerable number of these birds, and have hardly found two of them alike. They differ very much in the number and disposition of the black bars on the wings and tail; in one very beautiful specimen, which was lately shot in this neighbourhood, these bars were altogether wanting. In this species, contrary to what is usual among birds of prey, the two sexes are about equal in size; the male may generally be distinguished by the greater quantity of ash-colour on the upper parts, and by the under parts being of a buff-colour, more or less studded with black spots: in the female, the under parts are often pure white, without a spot, and in some specimens there is hardly any appearance of ash-colour on the back; but both male and female present every intermediate shade, and many specimens occur in which the sex can only be ascertained by dissection.

In some species of birds of prey, the sexual difference of size is so considerable, even among the nestlings before they can fly, that it

would be as well, in illustration, to represent both sexes when about a month old: this is particularly observable in the sparrow-hawk (*Sparverius Europæus*), and in the tawny wood-owl (*Strix stridula*). The attitudes of these birds require a great deal of study to enable one to stuff them well; and I cannot but recommend all who ever attempt to preserve them, to avail themselves of every possible opportunity of becoming acquainted with their positions. When alive, they often for a very long time remain fixed in one attitude; and therefore, if properly mounted, stuffed specimens of birds of prey may be made to have the exact appearance of life.

All the crow-kind should be procured in winter, their feathers being then new and uninjured, and they acquire no additional beauty in the spring. A single specimen of each sort is sufficient, as the sexes are similar*, and the young closely resemble the adults: the young rook (*Corvus frugilegus*), however, differs from the old bird in its forehead being clothed with feathers, on which account some, perhaps, may think it worth preserving. Of the jackdaw species (*Corvus monedula*), the handsomest are the old males, in a few of which the back of the neck is almost white. The jay (*Garrulus glandarius*), and the magpie (*Pica Europæa*), are two of the most showy of our native birds: the former varies little, and does not much injure its feathers; the latter is only occasionally to be met with in full beauty: to obtain a fine specimen, several should be procured, and the most beautiful selected.

The different woodpeckers† should be sought for about the commencement of winter, as early as possible after the completion of their autumnal moult, and in fine weather, when the trees are dry: at this time their plumage is very much brighter than at any other season, the tail being new and unworn, and the under parts often beautifully clean. Three specimens of each are necessary, in illustration of the male, the female, and the young in its first feathers. Of the common green species (*Chrysoptilus Europæus-major*‡), a male should be selected in

* Perhaps the hooded crow (*C. cornix*) may prove an exception. See vol. i. pp. 239 and 279.—I have just examined a female in which several black feathers were intermixed with the grey on the back.—E. B.

† I am informed that a specimen of the great black woodpecker (*Picus martius*) was shot about three years ago, somewhere in the northern vicinity of London; it was stuffed by a person who did not know its value; and not being properly preserved, was, in a few months, completely destroyed by the moths.—E. B.

‡ *Chrysoptilus viridis*, AUCTORUM; but as all the woodpeckers of this division are green, the term *viridis* is not exclusive, as every specific name ought to be.—E. B.

which the back is of a lively green, and the *moustaches* rich crimson, some being much handsomer than others: the back of the female should be a fine clear grey; and the young handsomely mottled, before it has begun to cast its feathers.

The wryneck (*Yunx torquilla*) should be procured early in the spring; the sooner after its arrival the better, as it is apt to become dirty. The elegant markings of this species being in some individuals much more beautifully defined than in others, several specimens should be shot, and the finest of them selected for stuffing. The sexes are equally handsome, and sufficiently dissimilar to require a specimen of each to be preserved. This bird's attitudes should be carefully studied; they are extremely peculiar, and totally unlike those of any other British species. It is a mistaken notion to suppose that the wryneck is unable to climb; it runs up trees with as much facility as a woodpecker, though it is not often seen to do so: in the pairing season, it is a curious sight to observe the male and female toying, and following each other about on a large tree; often running spirally up the bole, and occasionally exhibiting the strangest and most unaccountable attitudes. Those who have winged, or otherwise slightly wounded one of these birds, will not easily forget the singular snake-like manner in which it twirled its neck when it was handled; its crest erect, and the feathers of its long neck depressed as closely as possible. A bird of this species was brought to me last August, that had been winged in the spring, and had supported itself in the interim in the garden of one of my neighbours, its wound having healed up to all appearance, though it was quite unable to fly. For the satisfaction of seeing it climb I placed it on the trunk of a pear-tree, which it immediately ascended with ease and celerity, by repeated springs, in the manner of a woodpecker. It seemed fearless, and exceedingly pugnacious: when placed upon the ground its attitudes were most extraordinary, appearing more like an automaton figure set in motion by machinery than a living bird. The most detailed description would convey no adequate idea of its awkward appearance; sometimes it would stretch itself out at full length, its chin, throat, breast, and belly touching the ground, and suddenly spring backwards a couple of inches; then stretch itself out as before, and again spring backwards. If the hand were held to it, it made no attempt to escape, but raising itself a little on its legs, and cocking its tail to nearly a right angle with the body, it slowly twirled its neck about in the peculiar manner of the species, and with crest erect, and uttering its singular hiss, darted up suddenly, and gave a sharp peck; then twisted

its neck about as before, and again sprang up to peck. But these manœuvres must be witnessed ; no description can convey any notion of their singularity, their stiffness, their absolutely unnatural appearance ; as before observed, it seemed to resemble a piece of clockwork, much more than it did a living bird. The long tongue of the wryneck, as in the woodpecker, is darted forth by means of a peculiar annular muscle, and returns, not by any play of muscle, but simply by the elasticity of its tendons ; no other contrivance would admit of the rapidity with which it moves, so great as to elude the sight, its insect food appearing to be drawn up into its mouth by attraction. The reader will pardon, I hope, the length of this and other similar digressions, for the interest which they possess ; and the more especially as the subject matter of this paper is rather dry and tedious. A few more words on the wryneck, and I have done with it. The species is exceedingly abundant in this part of Surrey ; so much so, that in the spring, when their frequently repeated call betrays their presence, two or three dozen might easily be procured in a few hours. This call, which much resembles the cry of several hawks, and may be expressed by the sound *pee-up* repeated nine or ten times in quick succession, is always answered by, and generally attracts to the spot, every wryneck within hearing ; but not, as far as I have been able to ascertain, with any hostile intentions. Several may thus often be seen assembled on a few contiguous trees, calling to each other by turns for half an hour together, the voices of the females being easily distinguished, by being in a higher key than those of the males. From the beauty of their plumage they are in high request among the London collectors, who take advantage of this habit, by imitating their cry with a kind of mouth-whistle, a method by which many unfortunate birds are lured to their destruction. The wryneck is remarkably tenacious of its nest, or rather of the hole which it has itself excavated in a decaying tree ; for it forms no nest, but lays its eggs on the soft sawdust-like chips at the bottom of the hole. I have known every egg to be taken away the morning after it was laid, and yet the bird to continue laying her whole number in the same hole, and afterwards to resort to the same place to lay her second lot. Even if caught in it several times, she will not forsake it ; but on being loosened, will often fly direct to the spot.

The common cuckoo is generally in fine plumage during its short stay in this country ; even the female, being exempt from the ordinary duties of incubation, is almost always in a fit state for stuffing. Speci-

mens of the male and female should be preserved, and two of the young in their first plumage; the latter varying very considerably, even in the nest: individuals should be preferred illustrating the extremes of variation; a very dark and a very rufous specimen: the former, I believe, are generally, if not always, males. The old female cuckoos, also, are subject to much variation, the neck being more or less mottled, like the young. In the adult birds of this species, the irides are very rich, deep yellow; those of the young are of a remarkably dull, insipid grey. I may here remark, that the best method of obtaining artificial eyes of the exact colours required, is to purchase colourless glass eyes, which may be had at several of the London shops, and to colour them one's self from nature.

The nuthatch (*Sitta Europæa*) should be procured about the month of October, in fine dry weather, when its breast is least likely to be soiled with dirt. This bird may easily be recognised by its cheerful, sprightly note (resembling *chwite*; *chwite*; *chwi-chwi-chwite*; *chwite*), which it sometimes utters for several minutes together, perched on the topmost twig of a tree; or as it creeps about upon the larger branches. This is rather a pugnacious species; if two males happen to meet each other in their perambulations, a contest is almost sure to ensue, which is not unfrequently carried on upon the wing, twittering at each other as they fly. The nuthatch is a very bold, fearless bird; even if shot at, and missed, it often seems to take no notice, but continues its search for insects with the most perfect *nonchalance*; or it merely flies, perhaps to the next branch, uttering its usual cry.

The common mottled creeper (*Certhia familiaris*) is a most beautiful little bird when its plumage is clean and unworn; but, although very common, it is seldom to be obtained in a fit state for preserving. It should be sought for about the end of September, as soon as possible after the completion of its moult; for it very soon gets dirty, especially on the breast, and it injures its tail feathers very much. This is an exceedingly abundant species, though, from the retired nature of its habits, it is but little noticed: if listened for, its faint *tsit, tsit*, is sure to be heard in almost every clump of trees; and if watched for it will very soon be observed, as it flits from one tree to another, alighting generally on the trunk within a few inches of the ground, and creeping quietly along the outline, occasionally peeping round to take a glimpse at the spectator, and as soon as it thinks itself observed disappearing behind: it will often flutter down after it has ascended a few feet, and again alight near the ground, ascending the same tree several times in

different directions. In the spring months, its short song is usually uttered as it flits from tree to tree; commencing always a few seconds before it settles, and continuing for about a minute after it has alighted, then leaving off abruptly, like the common wren. This last bird rarely injures its plumage, and consequently is almost always in good condition for stuffing: both it and the creeper vary very much in size, the males continuing to grow for three or four years. The common wren runs up the trunk of a tree with as much facility as the creeper.

It would be useless here to say much on the plumage of rare species, such as the roller (*Coracias Europæus*), the hoopoe (*Upupa epops*), &c. which in any state of feather are desiderata in almost every collection; but I may take this opportunity to mention, that the summer before last a pair of hoopoes frequented a garden in this neighbourhood, the male of which, in beautiful plumage, was shot, but as a specimen was most irretrievably ruined by a tyro stuffer. The same summer a roller was observed on Penge Common, Kent; and in the preceding winter, a number of waxwings (*Bombycilla Europæa*) were shot in this immediate neighbourhood. Of this last bird three specimens are necessary to illustrate the species properly; and as they generally appear in small flocks, and are by no means shy, a sufficient number may mostly be obtained to select them from: an old male, an old female, and a young bird, before the singular wax-like appendages on its wings are developed.

A pair of kingfishers, male and female, should be procured in spring, for though very handsome specimens may occasionally be met with in winter, yet their plumage is at this time always slightly fringed with an edging, which rather impairs its brilliancy. A young bird should also be preserved in its nestling feathers. The attitudes of a living kingfisher require to be carefully studied; no species is more frequently preserved, and yet it is exceedingly rare to see one even tolerably stuffed. The form of the head and the expression of the countenance are precisely those of the heron; and the soft loose feathers, also, on the back of its head, being generally erected, render its physiognomy most strikingly similar to those of the various *Ardeidæ*. I kept a young kingfisher in confinement last summer for about three months, during which time it subsisted entirely on raw meat, which was given to it soaking in a little water; it never once tasted fish, but would occasionally, though not often, swallow a common earth worm. It always knocked its food several times violently against the perch of its cage, to kill it, before devouring it; and swallowed, without difficulty, most

amazingly large mouthfuls. It was at times extremely brisk and lively, flying about from perch to perch for half an hour together with great activity, and generally accompanying every movement with a very singular motion, which made it appear exactly as though afflicted with the hiccoughs. It rested sometimes on the whole length of the *tarsus*, but most commonly in the usual manner of most birds. Though by no means timid, it never became very familiar, although some pains were taken to make it so. I was never able to divine the cause of its death; it was taken ill during my absence from home, and the next day, when I returned, was too far gone for to entertain any hope of its recovery: when dead, it was in good plump condition; and had a few sprats been given to it at the time it was first taken ill, it would very probably not have died. As it was, I was not sorry to get rid of it, for a more *messy* bird never existed.

The length to which I have unconsciously been extending these desultory observations prevents me at present from finishing the subject; there is a vast deal to be said about the plumage of the smaller birds, which it would be useless to attempt to cram into this paper. I must, therefore, close here for the present, and reserve for a future occasion a number of other similar remarks on the numerous smaller birds which frequent the British islands.

Tooting, Surrey, Dec. 18th, 1833.

CHAPTER OF VARIETIES.

ANECDOTE OF A SLOW WORM.—As every little anecdote, however insignificant in itself, tends in some degree to the advancement of knowledge, I have sent the following, which, should you find it worthy, you may insert in your magazine.

My attention was lately arrested, during a ramble, by a rustling among some dry grass, which was contiguous to the path I was treading. And upon examining into the cause of the disturbance, I discovered a slow worm in the close pursuit of a large moth which it had apparently wounded, and was upon the point of capturing; but, on my appearance, it made a precipitate retreat into its hole. I should like to know something more of this beautiful little reptile; perhaps some of your contributors will furnish us with its history.

Being a constant reader of your magazine as well as of your other interesting publications on the science, I intend to make a point of occasionally sending you Ornithological and Botanical notices*.—PLINY.

Lancaster, Dec. 6th, 1833.

THE WOODCHAT.—On the 17th of May, 1833, I shot a female woodchat, Bewick, (*Lanius rufus*, Lin.); it was in company with a red-backed Shrike (*Lanius Colurius*), and appeared to have paired with it, as after I had shot the woodchat, the flusher kept flying round the place where the bird fell, and appeared evidently distressed. I tried to shoot it, but he was too cunning, keeping at a very good distance from my gun. After trying to get at him for some time, I was obliged to give up the chase. As some naturalists state that the *Lanius rufus* is a distinct species, and others that it is only a variety of the red-backed shrike, I think it right to forward this statement to your valuable magazine. Not seeing any other woodchat about, makes me think that it must have paired with the flusher. On dissecting the bird, I found her full of eggs; her gizzard was filled with beetles' wings. Red-backed shrikes abound about here, on the sides of the mountains, near the Capel Curig lakes. On the 19th instant, I shot four of them; they all proved to be male birds; their gizzards were filled with the same kind of beetles' wings as the woodchat. As you state that you will receive hints from mere beginners, I trust you will consider this as one.

Since writing this, I have killed another woodchat, in company with a red-backed shrike. Although I shot at both at the same time, I only killed the woodchat, which proved to be another female. After I had shot it, the flusher kept flying from rock to rock round the place, giving a shrill whistle. I have also shot another flusher, which was a male again. It seems odd I cannot shoot a female, unless the woodchat is it. Both the woodchats corresponded exactly with the figure in Bewick.

A. T.

Capel Curig, Caernarvonshire, May 22, 1833.

* The fact mentioned by our correspondent is curious: every attention will be paid to the promised notices.—EDITOR.

DRAGON FLIES.—In my remarks on the Dragon Fly, in your Number for December, I named a few of the situations where this splendid insect might be found, but omitted to observe that it may be often seen hovering over stagnant waters in company with some other insects, chiefly two-winged flies. This creature often becomes the prey of insectivorous birds, although it possesses so rapid a flight. Last August I was endeavouring to capture a very beautiful specimen, and had approached a patch of lucerne where he was basking in the sun. His numerous eyes, however, were on the alert, and he rose in the air, moving his wings briskly with a humming noise, when, at that instant, one of the many swallows which were skimming along the meadow pounced on the unfortunate dragon fly, and bore him off in triumph. I have ascertained the generic names of five species of the dragon fly, which have come under my observation, and have subjoined their haunts as I have noted them down.

ORDER HYUROPTERA—GENUS LIBELLULA.

Libellula varia	{ Found resting on a wall-tree in a garden at Brixton, Surrey.
L. depressa	{ Situations enumerated, common in Kent, Surrey, and Middlesex.
L. forcipata Cordulegaster annulatus, (Leach MSS.)	{ Hawthorn hedges and sunny banks, Isle of Wight and Hampshire.
L. Flaveola	{ On a lilac tree in a garden at Camberwell.
L. Virgo (Linnaeus)	{ Banks of the river Stour, Suffolk, and Croydon canal.

I have not been able to identify the *L. cancellata* of Donovan; and have only met with a single specimen of *L. flaveola*. The most common of all these insects is the *L. depressa*. The female, however, differs entirely in colour from the male, being of a brownish hue. The larva of this fly has been made the subject of much observation*, and differs considerably from the perfect insect, both in habits and appearance, passing its life under water, but in an active state previous to its emerging as a winged insect. The insect, both in its aquatic and winged state, is formidable to its smaller brethren. Excuse mistakes, as I am but a tyro entomologist.

SYLVANUS.

Camberwell, December 10th, 1833.

* See Insect Transformations.

C.E. Mulsant del. & W. Mason sc. 1862.

THE ZEBRA SPIDER (*Epeira fasciata*.) AND NEST.

THE FIELD NATURALIST.

THE ZEBRA SPIDER (*Epeira fasciata*, FABRICIUS).

[With a coloured figure of the female and her nest of eggs, drawn from the Editor's specimen.]

BY THE EDITOR.

WHEN I resided in Normandy, in 1829, the rugged cliffs at Cape La Hève formed my favourite spot for field excursions, and I seldom went thither, without meeting with something new or interesting, though I had repeatedly traversed every foot of the ground that was accessible. Geological fossils of the oolitic series, plants, shells, insects, reptiles, and birds alternately attracted my attention, and furnished me with numerous facts, which I might in vain have searched for in books of Natural History. This very shore, indeed, had previously been perambulated by two distinguished native naturalists; but St. Pierre seldom condescended, in the midst of his excursive fancies, to look at the more minute facts; and Deterville, though a sufficiently minute observer, had no idea of generalising; while it is more congenial to my turn of mind to combine these extremes, observing minutely to obtain facts, and bringing these facts to bear on some general inference, or some philosophic induction.

In one of my excursions to Cape La Hève, towards the end of summer, I had clambered high up on the grassy escarpment, in pursuit of a butterfly, and, in order to reach the path along the shore at the base of the cliff, I was compelled to make my way through a thicket of brambles and blackthorn, mid-way down the slope. A field naturalist, in such cases, is rarely out of his way. In an opening among the brambles, I remarked a spider's web, of unusual dimensions and texture, with geometrical meshes, but these far too wide to have been

made by the garden spider (*Epeira diadema*), or any similar species ; while the centre of the web was much more opaque and broader than I had ever remarked in others. The whole web was also but slightly sloped from a horizontal position, another striking peculiarity ; for the garden spider and its congeners place their webs nearly vertical. The rustling, which I had made amongst the bushes, had frightened the spider to its retreat ; but I soon discovered it, and was not a little surprised at its great size and the brightness of its colours, so different from any species previously known to me.

Pleased with my discovery, I took the creature home, and let her go in my study, where she soon constructed a web in the corner of the window ; but was compelled to make it more vertical than the one she had previously made among the brambles.

By careful search near the place, I discovered eight other Zebra spiders, all females, and six nests of eggs, which I took with me, as well as some of the living spiders to England, expecting to be able to rear a few of them as a matter of curiosity, but I was unsuccessful ; for not one of the eggs was hatched, probably from the air of my study being too close, when compared with the sea breezes at La Hève, where they had been destined by their mothers to winter.

I never observed this spider depositing her eggs, but I have many times seen other species do so, and infer that they proceed in a similar manner. Looking at the size of the spider, and at that of the egg which she lays, it appears almost incomprehensible how they could be contained in so small a body ; but, by observing them more closely, it may be discovered that they have not, like the eggs of birds, a hard shell, being on the contrary soft and compressible. Accordingly, before they are laid they lie in the egg bag (*ovarium*) within the spider's body, squeezed together in a flat manner, and only come into a globular form after they are laid, in consequence of the equal pressure of the air on every side, in the same way as we see dew drops, and globules of quicksilver formed from the same cause.

The eggs of spiders, it is worthy of remark, are in most cases, though not always, placed in a roundish ball ; and as there is nothing in nature without some good reason, if we can discover it, we may infer that this form is designed to economise the materials of the silken web which the mother spins round them by way of protection. Whether I am right or not in this conjecture, there can be no question as to the manner in which the ball is shaped, as I have often observed the process. The mother spider, in such cases, uses her own body as

a gauge to measure her work, in the same way as a bird uses its body to gauge the size and form of its nest. The spider first spreads a thin coating of silk as a foundation, taking care to have this circular by turning round its body during the process. It then in the same manner spins a raised border round this, till it take the form of a cup; and at this stage of the work it begins to lay its eggs in the cup, not only filling it with these up to the brim, but piling them up above it into a rounded heap, as high as the cup is deep. Here, then, is a cup full of eggs, the under half covered and protected by the silken sides of the cup, but the upper still bare, and exposed to the air and the cold. It is now the spider's task to cover these, and the process is similar to the preceding; that is, she weaves a thick web of silk all round them, and instead of a cup-shaped nest, like some birds, the whole eggs are enclosed in a ball, much larger than the body of the spider that covered it.

Dr. Heineker found the zebra spider common in Madeira, and M. Leon Dufour, in Spain. The following is

Walckenaer's Description.—Corselet and upper base of the abdomen silvery; back yellow, with black wavy crossing bands, somewhat contiguous; belly black, with two yellow bands placed length wise.

Synonymes.—*Araneus septimus* totus viridis et pratensis, protenso corpore, et acuto albo lineis candidissimis quinque insignita. Aldrovandi de Anim. Insect., Francofurti, 1618, p. 240, D, fig. 11, No. 7. Id. De Insectis, Bononiæ, 1602, p. 607 et 609, fig. 7.—*Ar. Septimus*. Jonstonius de Insectis, Francofurti, 1653, p. 134, tab. 18, fig. 7.—*Ar. Tarentina*. Bonanni Micrographia, 4to, Romæ, 1691, p. 70, fig. 69, 70 et 71.—*Ar. Zebra*. Sulzero abgekurtze Geschichte der Spinner, 4to, 1776, p. 254, fig. 15.—*Ar. Speciosa?* Cosaccis ad Jaikum Bojie Misguir, i. e., *Aranea sacrariorum*. Pallas Voyages, traduit par la Peyronie, Paris, 1789. In 4to. vol. 2, p. 543, No. 40.—*Der Heilige Spinne?* Ibid. Reisen 2. Ausg. Auh., p. 36, No. 97, et Muller's Suppl. und Reg. B. p. 343, t. 51.—*Ar. Speciosa*. Gocze, System Naturg. der Spinnen, p. 267, No. 41.—*Ar. Pulchra*. Razoumowsky, Lettre à M. Reynier sur une Araignée dans le Journal de Physique et d'Histoire Naturelle de Rozier, 1787, t. 2, p. 372.—*Ar. Pulchra*. Razoumowsky, Hist. Nat. du Jorat, p. 244, No. 333, pl. 3, fig. 14.—*Ar. Fasciata*. *Ar. Fasciée*, Olivier, Encyclop. Method. Ins. t. 4, p. 188, No. 1, et p. 198, No. 1. Ibid. pl. 18, partie, pl. 261, fig. 14.—*Ar. Formosa* (la belle). C. de Villiers c. Linnæ Entomolog., Lugduni, 1789, p. 130, No. 125, pl. 11, fig. 10.—*Ar. Fasciata*. Fabricius, Entomol. Systematica, p. 414, No. 28.—*Ar. Phragmitis*. Rossi, Faun. Etrusca, t. 2, p. 128, No. 964, tab. 3, fig. 13, et tab. 9, fig. 15.—*Ar. Speciosa*. J. F. Hermann, *Araneæ Rheni medii*, p. 4, tab. 4, et 5.—*Ar. Fasciata*. Gmelin, Linnée Systema Nat. edit. 13, t. 1, partie 5, p. 29 46, No. 48.—*Ar. Fasciée*. Latreille, Hist. Nat. des Crust. et des Insect. t. 7, p. 269, No. 79.—*Epeire Fasciée*. Walck. Tableau des Arancides, p. 55, No. 4.—*Epeira Fasciata*, Latreille, Genera Crustac. et Insect, t. 1. p. 106, spec. 8.

“Eyes lateral, touching each other, the front one red, the hind one black and larger. Corselet flattened with silvery hairs. Breast yellow

in the middle, black at the sides. Mandibles yellow and sometimes brown on their upper part. Abdomen in a lengthened yellow oval, crossed by black transverse bands, which form so many segments; the first, the third, the fifth, and sixth segments often covered with silvery hair; the fourth black transversal line always more markedly waved than the others. Belly black in the middle, with some yellow points, and two yellow longitudinal lines on the sides. Feet long and robust, ringed with black and with a reddish yellow, thighs of the front pair of legs tinged with black. Feelers (*palpi*) yellow with black prongs (*piquants*).

“Pallas, de Villers, and Rossi have published excellent descriptions of this beautiful species, and much more extended than that which we have just given; but for this reason have been more embarrassing on account of the varieties. Rossi has published the most accurate figure of the species.

“I am somewhat inclined to refer to this species, the spider of LEPECHIN, *Tagebuch*, t. ii. p. 316, tab. xvi. fig. 1, since he took it in the same country as Pallas; but the transverse bands are not waved in Lepechin's figure, and appear differently disposed. His figure much resembles that of the *Aranea Luzon*, of Petiver, *Gazophyll*, tab. 1. no. 3, and indeed these two figures resemble also the *Aranea fasciata* which Poiret has brought from Barbary, and which he has described and figured in M. Rosier's *Journal de Physique*, t. ii. p. 114, pl. i. fig. 3. The description which he gives of its cocoon, differs in every thing from ours, and is conformable to the cocoon of the *Aranea luzon* of Petiver.

“I am led to believe that the species described by these authors ought to be referred to the *Aranea trifasciata* of Yorskal, and which he took at Cairo. I have seen this *Epeira* in the collection of M. de Savigny who brought it from Egypt, and who ought to give a detailed description of them. It differs specifically from ours by the transverse bands being less waved, and by an abdomen less elongated. The letter of Razoumowsky upon the spider of Poiret contains many errors both of the author and printer; but he has well described the eyes, particularly the lateral ones.

“This spider is common in all the south of Europe; it was recently found in the environs of Paris, where it is rare. MM. Hermann have often taken it near Strasburg. Pallas has described it on the borders of the river Jaik or Ural, to the north of the Caspian Sea.

“This spider likes moist places, on the borders of streams as well as

the streams themselves, when their borders are covered. Hermann, in his manuscript work, says, 'he has seen them more than once suck at the drops of water which were on the leaves.' Its cocoon is an abrupt oval, greyish marked, longitudinally with black bands, and shut hermetically at the abrupt end.

"Pallas tells us, that the Cossac of the borders of the Ural have a sort of veneration for the *Aranea speciosa*, because it penetrates often into the houses, and because it suspends its net to the statues of the domestic divinities which are there. It is not certain that this spider of Pallas ought to be referred to our species, and it is perhaps the same as the *Aranea trifasciata* of Yorskal. The descriptions of these two species resemble each other in every thing.

"M. Ray, in his *Zoologie Portative*, page 54, gives to the article upon *Araignée portefeuille* of Geoffroy, the extract of a memoir of M. Dorthes, who appeared not to have had this species in view, as Ray believed, but our *Epeira fasciata*, the cocoon of which he had described very well. The *Journal of Nat. Hist.*, of Bertholon, where the observations of Dorthes are said to occur, not being found in the imperial library, where we had sought for it in vain, we could not present the results."—*Hist. Nat. des Aranéides*, No. iii. fig. 1.

All seem to agree that this species prefers damp marshy places; but the eight specimens, which I obtained at La Hève, were all found in a remarkably dry locality, about one or two hundred feet above tide mark.

Lee, Kent.

RETROSPECTIVE REMARKS.

BY JAMES FENNELL.

I THINK it not improbable that your correspondent, Mr. Ball, of Dublin, will, upon careful examination, find the cuckoo mentioned by him at page 7, of the volume just concluded, to be an American species, either the *Coccyzus Carolinensis*, Bonaparte, or else the *Coccyzus erythrophthalmus*, which by some persons has been confounded with the former, from which it may be easily distinguished by its having, according to Wilson, "a bare wrinkled skin of a deep red colour," surrounding the eye, and also by its being much smaller, and its wings being destitute of the cinnamon colour observable upon that species. From the circumstance of the description given in your pages.

having been taken from a coloured drawing and not from the bird itself, it is so imperfect in its details as to be very little assistant to the ascertaining of its species; yet some of the more permanent characters mentioned therein accord pretty well with those of the Carolina cuckoo, (*Coccyzus Carolinensis*,) two specimens of which are stated in the Philosophical Magazine (vol. iii. page 62,) to have been lately met with in Ireland, and a single individual to have been exhibited at a meeting of the Zoological Society on February the 26th, 1833, shot in Wales during the preceding autumn, on the preserves of Lord Cawdor, by whom it was transmitted to London for scientific examination.

Your correspondent "Solitarius" (in whom I think I can recognise a very intimate acquaintance of mine,) states in his "Miscellanies," published in your November number, that he had a specimen of (*Blaps obtusa*) that lived for three weeks without food. A similar, but more remarkable instance of abstinence from food with respect to another species, (*Blaps mortisaga*,) is mentioned by Mr. Baker, the celebrated microscopic observer, who says that he kept one without a morsel of nourishment for the space of three years. The statement which "Solitarius" has introduced into the above named contribution, respecting the reanimation of bees after they had been "well-boiled," may appear to some persons quite incredible, but is not altogether so improbable, for Mr. Spence whose zeal in entomology is a sufficient guarantee for his veracity, tells us at page 237, vol. ii. of his valuable "Introduction," that he once took from the hot dung of his cucumber-bed a small beetle, (*Lyctus Juglandis*, F,) which he immersed in boiling water until he conceived it to be dead; but upon taking it out and laying it to dry it soon showed symptoms of life and regained sufficient strength to walk. Upon this curious and surprising exhibition of resistance to a degree of heat that would have proved fatal to other animals, Mr. Spence remarks, that the native station of that species "being of so high a temperature, Providence has fitted it for it, by giving it extraordinary powers of sustaining heat."

Mr. Clarke's instance (p. 511) of cats catching fish is not the only one on record, several having been furnished by various writers. The author of the "Menageries" at page 208, vol. i., gives an instance which he witnessed of a cat's seizing an eel out of a pail of water, and quotes an account of a similar nature, from Dr. Darwin, respecting a cat being in the constant habit of catching trouts by darting upon them in the water. Many other accounts, all proving that this is a common and a natural habit of the domestic cat as well as of the jaguar (*Felis*

onca), (which is a famous swimmer,) and said to attract its finny prey by dropping its spittle upon the water, have been published in the Magazine of Natural History.

That the winged pupæ of *Ephemera* cast their skins, and with them their beautiful wings, as stated at page 512, is a well known fact mentioned in introductory works on entomology. I once had the pleasure of witnessing the pupa discarding its infantile dress for one better adapted for that state of life into which it was about to enter; an exhibition putting one in mind of a fair and innocent virgin laying aside her maiden-dress to assume the gay apparel of a bride.

“*RURICOLA*,” having, at p. 449, spoken of his having obtained an enormous mushroom, I am induced to draw the attention of your readers to another record of a very large mushroom which, although not equal to his in point of size, yet exceeds the usual dimensions. In the Morning Herald, of October 16, 1833, it is stated that the family of a Mr. Coulton, of the Pig and Whistle, Macclesfield, “supped off a mushroom, which was brought from Shirley Fold, and was in circumference at the top two feet and six inches, eight inches round the stalk, and weighed two pounds and a half.”

To some of the numerous queries of “*N. N.*” (p. 535) who appears by his preliminary observations to put but little value upon Natural History, unless it be made conducive to the fattening of barn-door fowls, I will endeavour to reply; but I am somewhat suspicious that his questions are put more with the desire of ridiculing our pursuits, than to be informed upon the subjects mentioned in his communication. He seems to think with Cobbett, that the study of Natural History is next to useless, unless its principal object be the increase of our already very ample stock of luxuries in the way of food. Though he does not perceive that much information is derivable from studying the architecture of “a cock-robin’s” nest, yet experience proves that a great deal of useful knowledge may be reaped by those who pursue the investigation of that or any other object, (however insignificant it may appear to an ordinary and unthinking mind,) with a proper and philosophic spirit. He is certainly much mistaken in asserting that the Horticultural and the Zoological Societies have effected but very little good. Let him procure a prospectus of each of these Societies, or consult any well-informed botanist and a zoologist, and then, perhaps, he will be induced to alter the opinion he has so rashly stated. The Zoological Society have, I think, done as much as they well could do, in endeavouring to introduce foreign animals, possessing superior

qualities, and requiring less trouble and expense, into the parks, &c. of John Bull, who is not easily to be induced to divest himself of his vulgar and erroneous prejudices against rearing and eating what he terms "curosities." In the very elegant work entitled "The Gardens of the Zoological Society delineated," published under the superintendence of the secretary and vice-secretary, are many hints upon the management of poultry. Speaking of the golden pheasant (*Phasianus pictus*), they remark, that it requires no small degree of care and attention to procure a breed from this species, and inform us "that much of the difficulty, as well as of the tenderress of constitution manifested by these birds, is attributed by M. Temminck to the close confinement in which they are usually kept, and to the very precautions which are taken to preserve them from the effects of cold." He advises that they should be gradually habituated, like the more common race, to the large pheasantries in which the latter are preserved, and doubts not, that, as they multiplied under such circumstances, they would become more and more hardy, until at last they would be fully capable of supporting the cold of our northern winters. The experiment, he tells us, has already been made in Germany, where they have been kept at perfect liberty in an open pheasantry, in company with the common species, and suffered no greater inconvenience than the latter from the change of seasons. We anticipate an equally favourable result from the repetition, under the auspices of the Zoological Society, of this attempt to naturalise so brilliant an addition to our native game. Such an experiment could not have been made with any success in the gardens in the Regent's Park; but the farm in the neighbourhood of Kingston, of which the Society has lately become possessed, affords the fairest prospect of carrying this and many similar undertakings into complete effect*. The silver pheasant (*Phasianus nycthemerus*) they say, thrives "better in domestication than the common pheasant of our woods, and breeds with tolerable facility; so that it might, in all probability, be readily propagated in the open country. We believe that this has, in some instances, been attempted with success†." Respecting the introduction of curassows, the editors of the work from which these extracts are taken, tell us that they have no doubt that the crested curassow (*Cra. alector*) with proper treatment would speedily become habituated to the climate of our country, and that "numerous examples have shown that they thrive well even in its

* Zool. Soc. Gardens, vol. ii. p. 62.

† Idem, p. 64.

northern parts ;” and they expect that the Zoological Society will be as successful in naturalising the curassows as completely as our ancestors have done the equally exotic, and, in their wild state, much less familiar breeds of the turkey, the Guinea-fowl, and the peacock*. Now, as to the “*modus operandi*” in establishing a rookery. The only information I can procure upon this head is in the Magazine of Natural History, vol. 6, p. 334, where, in a note, the Rev. Mr. Bree of Warwickshire states, that he has learnt that “the readiest way to establish a rookery where one did not previously exist, is, to withdraw the eggs from the nest of a magpie that is about to sit, and has built near the place where it is wished the new colony should be raised, and to substitute in their room the eggs of the rook. The young birds, it is said, will return the following spring, and take up their quarters in the same tree in which they were reared.”

The bird objectionably called the Virginian *nightingale*, it being in fact a species of grosbeak, the *Loxia cardinalis* of Wilson, I should hardly think it possible to naturalise in this country, the warblers of which are indeed so rich in point of melody, that, for my part, I fain would remain a stranger to the harmony of all foreign songsters, lest I should become less delighted with those of my native land. There are many, no doubt, who would like to see our groves inhabited by a host of screeching parrots ; our gardens graced by the presence of the splendid bird of paradise, and each expanded flower fanned by the humming-bird’s resplendent wings ; but feeling well satisfied with the songs of such of the feathered race as inhabit this country, I am happy to be able to declare with Shenstone, that

“ I covet not the price of foreign looms ;
 In search of foreign modes I scorn to rove ;
 Nor for the worthless bird of brighter plume. s
 Would change the meanest songster of my grove.”

The lepidopterous insects mentioned by Mr. Blyth, at page 550, as having “night-shining eyes,” are not the only species that exhibit a similar appearance. The eyes of several, when viewed in the dark, are found to be luminous : this is, as is well known, the case with *Acronycta Psi* and *Cossus ligniperda*, and to these I can add, from frequent observation, the names of *Plusia Gamma* and *Plusia Chrysilis*, the eyes of both of which species, when viewed in the dark, shine with considerable brilliancy.

* Zool. Soc. Gardens, vol. ii. p. 9.

P.S. The London Natural History Society, of which you published a notice at p. 417 of the volume just brought to a close, is doing pretty well; and we are of opinion, that in the course of a short time, when our number becomes augmented, we shall do very well*.

Paddington.

N. N's AGENDA.

THE LLAMA OF PERU.

WE are indebted to the attention of a correspondent in Oban for the following account of the interesting attempt now making in that neighbourhood to domesticate the llama.

I am not surprised that the llamas here should be exciting attention, for they certainly are objects worthy of notice. This animal does not in any shape resemble the sheep of this country; its height is from four to five feet, with long legs and long neck, in some respects not unlike the camel, a small head without horns, the countenance gentle and expressive of wonder. It is not remarkable for any peculiar habits, except that it delights in ascending to the summits of the hills: its appearance indicates an unfitness for climbing; I observe, however, nature has served it with a hooked claw on each hoof, which enables it in some measure to travel heights with as much security as the goat. Their food and treatment differ in no particular from Mr. Stevenson's cows; they graze, eat hay, chopped straw and potatoes, with them daily, and have formed such an attachment to the cows, that when the latter are brought from the hill for the purpose of milking, the llamas will not remain behind, but accompany them to and from the byre three times a day, a distance of half a mile—the wool is extremely fine, each fleece weighing from five to six pounds. Mr. Stevenson imported the first pair (of the Alpacha breed, for there are several varieties) about three years ago—he tells me that there were four or five pairs shipped for him, but all died during the voyage except the one, and the following year he received another pair of what he terms the real llama, but a common observer cannot discern any difference. They inhabit the

* I wish all success to this, as yet young, Society, and hope to see contributions from others of its members, besides our present well-informed and enthusiastic correspondent.—ED.

mountains of the Andes, and, when domesticated, are used in that country as beasts of burden, chiefly in carrying ore from the mines of Peru, and they carry about 100lbs., and if one pound be added more than they can carry with freedom, like the camel, nothing will impel them forward. If there was any chance of rearing them they would doubtless become a benefit to the country, but I fear the hope of their breeding is very uncertain. Those who have any curiosity to see their wool, can inspect it by calling on Mr. Paterson, 138, Trongate, Glasgow; this gentleman received a quantity from Mr. Stevenson to get dressed.

ON THE ADVANTAGES OF THE STUDY OF NATURAL HISTORY.

IN following up my last paper, I shall adopt the plan proposed in the commencement, and consider, first, the direct, secondly, the indirect, benefits which we may derive from the attainment of what I then showed to be the objects proposed by the study of Natural Science. First, then, we shall proceed to the consideration of the direct benefits: these, or at least some of the principal of these, (for here the difficulty consists, not in searching for what we may call benefits, but in making a selection from the vast number which immediately present themselves to us;) are as follows:—First, were there no other inducement than the mere observation of nature, in all her wildest forms and most beautiful appearances; to see, as is so graphically brought before us by the pen of Washington Irving, “the solemn pomp of groves and woodland glades, with the deer trooping in silent herds across them, the hare bounding away to the covert, or the pheasant suddenly bursting upon the wing; the brook winding in its beautiful meanderings, or expanding into a glassy lake, the sequestered pool, reflecting the quivering trees, with the yellow leaves sleeping on its bosom,” this alone, without any farther benefits, would be sufficient to induce many to become enthusiastic votaries of the delightful study of Natural History. What naturalist, worthy of the name, is there, who cannot exclaim with the Mantuan bard,

“Rura mihi, et regni placeant in vallibus amnes,
Flumina amem, sylvasque inglorias——”

especially when we know that whilst we are thus luxuriating in Nature's loveliest haunts, we are occupied in discovering those “causas” of which the poet so much desired the knowledge? But this can

hardly be called a benefit ; perhaps the following may be more deserving of the name. Secondly, the domestication, and consequent introduction to the purposes of civilised life, of the various tribes of wild animals, and the beauteous forms of the feathered creation. I was never more struck with this, than in the perusal of the delightful work lately published by the Zoological Society. The various animals, birds, &c., which are there shown to be capable of domestication, and of producing the most striking benefits to mankind in general, convince us, more than ever, of the benefits to be gained from the pursuit of Natural History. To this study, in some measure at least, are we indebted for the horse, that animal, the want of which we should so much feel ; for all the feathered inmates of our farm-yards, and many others, the enumeration of which would encroach too much on your time and patience. The third direct benefit I would mention, refers to another branch of Natural Science, scarcely less interesting, viz. Botany ; and the advantage to be acquired from this pursuit, which I should wish to bring forward is, the benefits derived from the discovery of plants and herbs, which may be useful in Medical Science. Here, perhaps, we may see most clearly the use of some system of Natural History. The botanist knows that a plant of a certain genus is useful as a medical herb ; arguing from analogy, which is alone allowable in a case of this kind, on the discovery of a new plant which may be referred to the same genus, he imagines that this plant may be used in a case of a similar kind ; a trial is made of it, and frequently the result answers to the expectations of the experimentalist. An admirable illustration of the truth of this position occurs in the history of the chemical substance entitled iodine. Long before the discovery of this substance which is procured from a kind of sea-weed, it was known that burnt sponge was an excellent remedy in cases of that dreadful malady, the Swiss goitre. On the discovery of iodine, (which was then perceived to exist in sponge, and most other marine productions,) Dr. Coindet, a medical practitioner of Geneva, imagined that this might also be used with efficacy in similar cases. He tried the experiment, and it is now well known, that iodine is a safe and sure remedy for goitre. I might mention other instances, but this most likely will be sufficient to establish my argument.

We may now, perhaps, proceed to consider what may be called the indirect benefits to be derived from the study of Natural Science.

If we see that some of the most singular productions with which we are acquainted, are the work of those animals whose habits and modes

of life I am now arguing the propriety of studying, I do contend that it is not only our interest, but our duty, to pursue that study which will make us better acquainted with their properties and peculiarities. Nor is this all; there is no study, which is more capable than the present, of lifting our thoughts to the understanding and comprehension of a Divine and Omnipotent Being. Whether we roam delighted through the fair scenes of nature, and wonder at the dazzling plumage of the feathered creation, admiring the myriads of animated beings, revelling in their native glades, and are led insensibly "From Nature up to Nature's God;" or whether we regard the formation of even a blade of grass, or the varied colours of the "meanest flow'ret of the vale," we can in every part trace the wisdom, power, and skill of Him

"Unde nil majus generatur ipso
Nec viget quidquam simile aut secundum."

Nor whilst we are pursuing the study of animated nature, must we neglect the sister, vegetable creation; we must remember, that the same hand which has formed the one, has formed the other, for, according to the magnificent descriptions of our immortal bard, whilst he is describing the progress of the creation:—

"Forth flourished thick the clustering vine, forth crept
The swelling ground, up stood the corny reed
Embattled in her field, and the humble shrub
And bush with frizzled hair implexed; last
Rose as in a dance the stately trees, and spread
Their branches hung with copious fruit, or gemmed
Their blossoms, with high woods the fields were crowned,
With tufts the valleys, and each fountain side;
With borders 'long the rivers."

Let us view then all these, and far more than these, and then say with some that He exists not!

"Sunt, qui fortunæ jam casibus omnia ponant,
Et nullo credant mundum rectore moveri,
Natura volvente vices, et lucis, et anni
Atque ideo intrepide quæcunque altaria tangant."

It is for us, then, to trace the principles of design of the Almighty Creator, it is for us to search into, and gain that benefit, which all around us is so capable of affording, and we, at least, shall exclaim with the poet,

"These are thy glorious works, Parent of good,
Almighty! thine this universal frame
Thus wondrous fair."

OBSERVATOR.

ON THE MIGRATION OF BIRDS.

BY T. C.

THERE is no subject connected with birds more interesting or more wonderful than their migration: so wonderful is this habit, that it has given rise to much discussion, and diversity of opinion; and notwithstanding the numerous proofs which have been advanced in favour of this beautiful and astonishing habit, many are yet unconvinced, or are so bigoted to their own opinion, as to be invincible.

There is no greater obstacle to the acquisition of knowledge than that prejudice, which is often so deeply rooted in some narrow minds (and that too, without consideration or examination of facts), that it is almost impossible to eradicate it, or to convince them of their error; how clear soever may be the proofs brought forward in opposition to their favourite theory.

Since I troubled you with a few remarks on the migration of swallows, and which appeared in your number for January, I have been informed that, "there is abundant proof of the swallow's remaining in a state of torpidity," and also that "this fact is well known." I have therefore been induced to trespass upon your patience with a few more remarks upon the subject, though I must confess that I think the migration of swallows is now generally acknowledged.

The accurate and intelligent observer, White of Selborne, however, evidently inclined more in favour of torpidity than of migration, as appears in many places throughout his interesting letters. He says, "It is very remarkable that after the *hirundines* have disappeared for some time, a few are occasionally seen again; sometimes in the first week of November and that only for one day. Do they not withdraw, and slumber in some hiding place during the interval? &c. Speaking of the sand martin, he observes "it is easy to suppose that they may, like bats and flies, have been awakened by the influence of the sun amidst their secret *latebræ*, where they have spent the uncomfortable foodless months in a *torpid* state, and the profoundest of slumbers."

Now as I have already observed, it is possible that these individuals may have retired to some hole, and there remained in a state of *slumber*, but this is no proof that this slumber was *torpidity*; and it is possible

* The alleged evidence for this I have given in "Faculties of Birds."—ED.

that the unusual warmth of the weather might have awakened them ; but had it not been for this timely fair weather, they would no doubt have perished.

And it is also very probable, as Mr. White himself observes, that they "spend their time in deep and sheltered holes, near waters, where insects are more likely to be found."

I will not occupy your pages (should you deem this worthy of insertion) with further quotations ; suffice it to say, that both White and Markwick advance numerous facts in favour of torpidity, but they appear to consider, not that the *whole tribe* of swallows remains in a torpid state, but that individual birds only have been found. Now, I do not doubt, that, "after the *hirundines* have disappeared for some weeks, a few are occasionally seen again, and that only for one day," and it is most probable that "they withdraw and slumber in some hiding-place during the interval ;" but *torpidity* is a very different thing, and if we allow that swallows have been found in a state of real *torpidity*, we must allow that the swallow is capable of enduring torpidity, and we may very justly observe that if this power has been given, it must have been for some express purpose, and why does not the whole tribe remain in that state ? but we have abundant proof that this is not the case.

Markwick says "Of their migration, the proofs are such as will scarcely admit of a doubt. Sir Charles Wager and Captain Wright *saw* vast flocks of them at sea, when on their passage from one country to another." And Mr. White himself gives an instance of what he considered actual migration ; in fact that the swallow is a migratory bird is seldom doubted ; and indeed what reason is there for doubting it, when so many heavier and shorter winged birds are known to migrate ; the only doubt upon the subject is, that *some* swallows remain in a torpid state ; and this I deny for reasons stated above ; but this will be much better explained by referring to an excellent note by Sir W. Jardine, in White's Natural History of Selborne.

The swallow is a very peculiar bird ; I have seen it busily employed in building its nest under an ornamental swing bridge, in a garden, and so low that a person could but just pass under sitting upright in a boat. White says "they do not enter, like the house martin, the close and crowded parts of the city ;" this is not the case in the present day, for they are quite as common in the city as the martin, and frequently *build* in the "close and crowded parts."

Before departure this bird assembles in large flocks on house-tops, and frequently on trees, and indeed is often seen to perch upon trees, generally the topmost branches. From its being frequently seen on trees growing near waters, it has been supposed to spend the winter immersed in that element: an enviable berth truly! like the poor swift from July to April, "*to rest* after so rapid a life," as Mr. White observes!

P. S. The cuckoo to which I have twice alluded, is dead, after being kept for five months, and without ever having evinced any desire to slumber, more than is usual amongst all animals.

Had it been properly attended to, and kept warm, it would no doubt have lived through the winter.

ON THE ROOT OF AN ASH TREE.

BY R. T. C.

A FEW days ago I was riding through South Runcton, a village near Lynn, in Norfolk, when my attention was drawn towards an ash tree root of remarkable length, the history of which I subsequently learnt. The tree to which this root belonged had yielded to the axe some two months ago.

It is known that the roots of most trees, if embedded in a soil favourable to their habits, will extend themselves a considerable distance from the trees themselves. Du Hamel states, that he found the tap root of an oak, which measured four feet in length, the stem of the tree being only six inches high. The ash, I conceive, under ordinary circumstances, produces the longest root of any forest-tree growing in Great Britain. Farmers in general, who have the opportunity, fell the ash, if growing in the hedge-rows of corn-fields; because, say they, its roots run a long distance near the surface, thereby injuring the corn growing within the range of their baneful influence. Whether the roots of the ash excrete a deleterious matter, which acts upon the root-lets of the corn-plants within their reach, or whether they draw so much nourishment from the soil, that sufficient food is not left therein for the healthy support of the corn-plants, I have no means of ascertaining; probably, each contributes its share of the ills experienced by the agriculturist, whose corn-field fences are encumbered with ash timber. Large timber trees of all kinds overhanging corn-fields, doubtless, are

injurious to the corn growing within the spread of their branches, even if no excrementitious matter is ejected by their roots, and that their roots penetrate too deep into the earth to draw nourishment from the soil in contact with the rootlets of the corn. Light and exposure to the passing breeze are necessary to the rearing a good crop of corn, as they are to the production of wide-spreading, useful, and ornamental timber. But to the root under notice.

A portion of the root reposes on the undulating surface of a meadow near the road's-side, furnishing daily conversation for those travellers whose attention may be directed towards its extraordinary appearance. The root was divided into three parts by the workman employed to fell the tree, and the greatest circumference, of that part detached from the trunk of the tree, was about three feet; its length about twenty feet; the second and middle part was taken from the soil, and measured ninety-five feet in length; its greatest circumference measured eighteen inches; the third part was severed at the distance of one hundred and fifteen feet from the trunk of the tree, and took a zig-zag direction through the space of eighteen feet, making the entire root one hundred and thirty-three feet in length. When in its natural position, its distance under the surface soil was from one foot to one foot and a half. The tree itself was about forty-five feet in height; it grew on a poor sandy soil, on the brink of a rivulet; its age was from ninety to one hundred years; and it contained about two loads of timber.

Shouldham.

NOTES FROM THE ISLE OF WIGHT.

BY S. W.

ABOUT six weeks ago, a countryman brought me a specimen of the Night-Jar, which he had just taken. He fell in with it suddenly, by a hedge-side in his field. The sun was shining brightly at the time, and he thought that the bird was asleep: it was probably dazzled by the glare, as he caught it in hand without its attempting to escape. It appeared perfectly uninjured when brought to me. I am not sufficiently acquainted with the species to know its age, but a want of full plumage under the wing makes me suppose that it is a young bird. It could not fly perfectly, alighting, after having flown about half across a field,

and suffering itself to be retaken. It refused to take any food ; but was fed by having very small pieces of raw meat forced down its throat. It has been kept alive, and in apparent health, ever since by the same means ; being fed in this way every evening. It seems to be stronger than when it was originally taken, but not at all less shy. It will not feed itself, either by pecking from the hand or from the floor of its cage ; water has been put into its cage in an open saucer, but it does not appear to make any use of it, either in washing itself or drinking. Can you, or any of your correspondents, suggest any way of managing it, which may tend to tame it, or any mode of feeding which may lead it to provide for itself?

In the next parish to this there is a Gull (either the *Larus hybernus* or *L. Rissa*) which was brought up there about twenty-seven years ago. There is a small piece of water which it used to frequent ; but for many years it has nearly forsaken this, and spends its time, either sitting upon the rails of one or two cottages to which it confines its visits, or flying at liberty around the country. Every spring, when the breeding season arrives, it leaves the parish, which is inland, and pairing with one of the wild birds, inhabits the white cliffs on the coast, whence it returns again alone when the breeding season is over, after disappearing, however, for some days to either. It is so tame at other times with those whom it knows, that it will come into their cottages and eat out of their hands, but will not be approached thus closely by strangers.*

A few months since, a peasant brought me alive, a female Kestrel and a Magpie, which he had captured in a singular manner ; whilst working in a field he heard a great scuffling on the other side of the hedge, and upon looking over, saw the Kestrel and Magpie fighting on the ground. He got over the hedge, and approached them ; the Hawk endeavoured to escape, but the Magpie held her so firmly by the leg, which he had grasped in his claw, that she could not escape, and both were taken with the hand. The Magpie was very much wounded about the head, and died in the course of the night. The Hawk did not appear to be hurt ; but she refused all food, and did not live long. She had lost one eye in some former battle, but the socket was quite healed and dried up.

* B— Rectory.

* This is an exceedingly curious, and, so far as I know, a very uncommon fact.—ED.

NOTES ON BIRDS.

BY T. C.

As every fact connected with Natural History is worth recording, simply because it is a *fact*, and as a perfect history is only a collection of such facts, I have not scrupled to hand you a few observations or rather remarks, which, though insignificant in themselves, may be interesting to those, to whom they are new, and may form small parts of one great and perfect whole,—as the more of such facts the history of any animal contains, the more nearly it must approach to perfection.

The Redbreast, though seldom seen in densely populated districts in summer, is very common in winter; this is not so much owing to the inclemency of the season, as to his partiality to the society of man, for it is only when engaged in the duties of incubation or rearing his family, that the Robin returns to more secluded spots, and about the middle of August he approaches our dwellings*. At this season he sings very late in the evening; I have often observed him seated on some projecting corner of the roof, singing for hours together, and that when the moon shone brightly, and the sun had sunk far beneath the horizon. The wren and blue tit also frequently visit the outskirts of London in the winter, and the common wren is exceedingly plentiful in the country surrounding the metropolis. Markwick notices young goldfinches on the 15th of June. White on the 15th of August. I have seldom seen them till the 1st of August, but they are not plentiful till the middle or end of the month.† I have seen a nest on a cherry-tree, with only one or two eggs in it, at the beginning of July.

The black begins to appear on the head of the young goldfinches about the middle of September, and the red at the end of that month. On one which I kept, the black first showed itself on the 1st of October, and was perfect on the 1st of November, the face was covered with a dull orange, much mixed with black; it is some time before the head assumes its perfect colouring. The goldfinch has many of the manners of the tits; it is very active and lively, frequently hangs with its back downwards, and will put its feet on its food, and peck at it like a genuine *parus*: it is amusing to see it with a teasle or thistle, leaning upon it and pulling out the seeds.

* This remark is not quite correct. See ARCHITECTURE OF BIRDS, page 83.

† There are more broods than one. I have seen the young as early as the end of May, and eggs as late as September.—ED.

I have already noticed the brown plumage of the young starling, but in adult buds there is some variety, owing chiefly to age, but sometimes I think it is accidental, some having the plumage more glossy than others; these are the old ones; but some have no white specks on the throat and neck, which are very much glossed with purple. At the British Museum there is a handsome variety, were it not so badly preserved; the birds there are certainly a disgrace to the institution. The bill of the young starling is always dark horn colour, but in the old bird it is sometimes yellow; is this the effect of age or season? I have never seen the yellow bill in winter.

The common sparrow, though an artful bird, is by no means shy; there was a nest on an elder-tree in St. James's Park, very few feet from the ground, near which a sentry was constantly on duty, besides the numerous visitors who were passing and repassing beneath it all day. In Corinthian capitals, and in *bassi-relievi* it frequently builds, though quite as frequently in *trees*, and it is probably only the scarcity of trees in towns, which makes the bird appear so fond of building in houses, &c. At the Zoological Gardens a few years ago, this bird had constructed her nest between the wire roof of the Condor's cage and the thatching of the building, by no means alarmed at the presence of her formidable neighbour, through whose apartment she frequently flew, secure in her insignificance.—Sparrows both *wash* and *dust*.

The greater redpoles (*Fringilla cannabina*) and the grey linnet (*F. linota*) are one and the same bird, but the twite (*F. montana*) is a distinct species, the upper tail coverts of which are red, but this is seldom obtained after moulting in the cage; it has a ludicrous chattering note, quite unworthy the name of a song.

White notices vast flocks of hen-chaffinches at Selborne about Christmas. In the North of England I have seen them about the end of September, probably on their way southward, but near London the males are as common as the hens in winter.

On the 22nd of last September I noticed some black caps, feeding eagerly on the fruit of the elder-tree. Was not this rather late in the year for them *?

Does the cuckoo leave us so early as has been said? I am persuaded

* At Bonn on the Rhine I had a nest of young blackcaps in my garden in September.—Ed.

that the young ones do not, for I have seen one long after that time; (July). Is it not that the bird being no longer *heard* is not noticed?

In Montagu's Ornithological Dictionary, 2nd edition, is the following passage by the editor:—

“In the Edinburgh edition of Wilson's work, the first volume of which I have just seen, Dr. Jamieson says in a note to the sea eagle (*F. ossifragus*). ‘This is the young of the *Falco leucocephalus*, or white headed eagle, not the young of the *F. albicilla*, or cinereous eagle, which is the sea eagle of Britain;’ he does not say upon what grounds he has come to this conclusion, in opposition to the best authorities upon the subject.”

Now Dr. Jamieson means, that *the bird, described by Wilson* under the name of *Falco ossifragus*, is the young of the white-headed eagle, and not that the English sea eagle, formerly described under the name of *F. ossifragus*, is the young of the white-headed eagle.

This is perfectly correct; the similarity of the young of both species has led to their being described as one bird, under the name of *F. ossifragus*, which bird does not now exist, the English being the young of the *F. albicilla*, and the American the young of the *F. leucocephalus*. I have not seen the last edition of Montagu's excellent work, and should this passage be omitted in it, of course it is needless to notice it here.

ON TAME NIGHTINGALES.

BY ORNITHOLOGUS.

It has long been a subject of regret, that, among the various publications of the day, no periodical should have made its appearance, exclusively devoted to natural history, wherein the observations of those, whose attention is directed to the phenomena of nature, might be communicated to that portion of the public, who take an interest in one of the most delightful and innocent studies that can occupy the mind of a reflective being. This blank in our national literature has now been supplied, and I beg leave to congratulate you, no less on the design of your publication, than on the manner in which it is conducted. I am, myself, an ardent admirer of nature's wonders, but my attention has

been chiefly directed to the manners of birds, of which I have now several varieties by me.

The charming Philomel, is, of course, the prime favourite; and, as I have had two nightingales constantly under my eyes for a long time, I trust a few remarks will not be deemed intrusive. One of these birds was taken on the 19th of April, 1832, and has been in good health nearly ever since. He did not, however, commence his song till the end of March, 1833, and even then he never appeared to warble "his native wood notes" in full perfection. The other I brought up from the nest, and as I had it when only a fortnight old, it is so perfectly familiar, that nothing seems to alarm it. It began to record its song when five weeks old, and has continued to improve till now, when its song is almost perfect. During the summer and autumn, this bird was very amusing from its dexterity in catching flies, which, on appearing in front of his cage, immediately fell victims to his quickness of eye, and rapidity of movement; in this manner he must have destroyed nearly two hundred *per diem*. He now sings nearly all day, and what is remarkable, when the room is lighted up for the evening he seems most cheerful, and sings with most animation,

" In his sweetest, saddest flight,
Smoothing the rugged brow of night."

Thus have I enjoyed one of the greatest delights of spring through the dreary season of winter. I was aware that these birds would sing in confinement at night, during the summer, but am somewhat surprised that my bird should do so in winter. It is remarkable that these birds seldom roost with the head under the wing; at least, I have never seen my other bird (taken when old) in that position. This is, perhaps, the reason, why they have been supposed never to sleep, but my young one frequently assumes that posture, starting from it sometimes suddenly, and resuming his song as if he had been actually dreaming, which Buffon asserts they do. If placed in an obscure corner of the room they become very restless, but resume their tranquillity if brought nearer the light.

I am informed, that, in some parts of Germany, nightingales may be seen hanging from the windows, as common as canaries are in England. If this is the case, (and it appears very probable from the number of German canaries, imported, singing the nightingale's note) I should like much to ascertain the food on which they are kept,

as our German friends have most likely some less extravagant food for them than egg and meat, which are alone found to answer the purpose here. The great difficulty is that the food must be moist, as they seldom drink; one of mine lived, I should think, for a month without water, but then the food was very moist. Perhaps some of your correspondents can suggest an efficient substitute, as I have not yet succeeded in discovering one. I find I have so filled my paper that I have no room for an interesting anecdote of the hawfinch, which I had intended to communicate; if, however, the above is deemed worthy of a place in your Magazine, I will not fail to forward it shortly*.

Gravesend, Jan. 8th, 1834.

GEOLOGICAL POSITIONS†

IN DIRECT PROOF OF AN IMPORTANT PART OF SCRIPTURE CHRONOLOGY.

FIRST LINE OF ARGUMENT.

1. The chalk is a marine formation, and consequently was deposited as a sediment, in the bed of the sea‡.

2. As the chalk now forms an extensive member of the secondary strata of our dry lands, there must have been a time when it first became dry land.

* In Germany, they feed their nightingales, from May till September, almost wholly on ants' eggs, which are regularly sold for this purpose, and are also dried for winter food; but in winter the chief food is German paste. Live meal worms are also given them, to the number of twelve a day, during their time of singing. I myself purchased, at Cologne, about ten thousand for a sovereign, and have now, I should think, a million or more. Full information on all these points is given in Dr. Bechstein's work on *Tame Birds*, now in the press. See also *Field Naturalist*, vol. i. page 224.—ED.

† This singular paper has been sent to me, in print, without any name, or printer's imprint.—ED.

‡ The chalk formation is here selected for the establishment of the following positions, from its very marked features, and from the facts on which they are founded having been first remarked on the chalk coasts of France and England. But the argument applies with equal force to all other secondary formations, acted upon by the erosion of the sea.

3. The actions of the waves upon a sea coast is unceasing, and the effects of this action are more or less visible on every shore, according to the consistency of the rocks which compose it.

4. From the very first moment that the chalk became dry land, this unceasing agent must have operated as it still does, upon such portions of it as extended to the level of the sea.

5. From that time to the present, is the exact age of the chalk, as a dry land.

6. The chalk is never superficially level, but is, on the contrary, invariably of a rounded and sloping surface.

7. The surface of the chalk is always grooved out into valleys, divided by ridges of various degrees of steepness, but invariably smooth.

8. These valleys seldom contain water, or running streams; they, consequently, have never been altered in their surface by the erosion of rivers, since they became valleys.

9. Notwithstanding this absence of rivers, the chalk valleys universally open either into larger valleys which lead to the level of the sea, or they individually point to this exact level, thus plainly bespeaking the action of waters.

10. As all chalk valleys, unaffected by the corroding action of the waves, have this character and tendency, we are certain that all other valleys, though now cut short by precipitous sea cliffs, had, originally, the exact same form and tendency.

11. Our present chalk cliffs are constantly encroaching upon the lands, by a progress more or less rapid, according to circumstances.

12. As rotundity is a universal characteristic of the chalk, and as the cliffs will thus all be higher, and further back a thousand years hence, than they now are, it follows that they were more in advance, and consequently lower, a thousand years ago.

13. Having the perpendicular of the cliffs, and the angle formed by the hypotenuse with that perpendicular, we can have no difficulty in correctly ascertaining the length of the base.

14. The length of the base is the exact amount of space destroyed by the action of the waves, since the chalk first became dry land.

15. The length of the base being ascertained, and also the rate of decay per annum, we are led with certainty to the number of years which have elapsed since the erosive action first commenced.

16. As this action is unceasing, and as the chalk is peculiarly

affected by it, it never could have been in full force, even for a single century, without occasioning a cliff.

17. As no such cliffs exist, from top to bottom of the whole chalk formation, except those now in progress on the sea shores, the sea never could have acted upon the chalk for any length of time, except on its present level, as compared with the chalk.

18. We are thus forced to the conclusion that to whatever elevation the chalk may extend, (and it is upwards of 1000 feet in England,) the whole mass was either raised at one time from the bosom of the deep, or the deep was depressed, at the same individual period, so far below its former level.

19. No stratum now reposing on the chalk above the level of the sea could have been deposited in the sea, since the present cliffs were begun.

20. The whole series, therefore, of what are usually termed Tertiary Strata, reposing on the chalk, were formed in the sea previous to the elevation of the chalk, and were elevated along with it, at the very same period.

21. Assuming 900 yards as the mean extent of decay on the chalk coasts of both sides of the British Channel, (as indicated in the thirteenth position,) a waste of eight inches per annum gives four thousand years as the age of the chalk as a dry land.

22. As eight inches is above the general average decay of chalk cliffs at their present height, so it must have been greatly below the real amount during the first two thousand years of the operation, and may be considered as a fair general average of the whole.

23. As the action of the Falls of Niagara in the midst of the great marine formation of North America, brings us exactly to the same period of about four thousand years; as we are, in neither case, able to extend the calculation much beyond that period; and as both coincide so exactly with what Sacred History and the traditions of all nations have handed down to us, we may look upon these latter as being most fully confirmed, as to the great and preternatural event to which they both bear witness.

24. As we know of no law of nature by which the chalk formation, and the tertiary strata reposing upon it, could have been raised, at one time, above their native element, we must conclude that this effect was the result of a preternatural power, and of an Almighty decree.

25. We are thus forced to admit a more powerful Agent into our

systems of Geology than the mere laws of nature, to which all phenomena are generally referred; and the science is thus placed upon a new, a more solid, and more consistent foundation*.

SECOND LINE OF ARGUMENT.

1. A river consists of the fresh waters of a district, seeking their level in the waters of the ocean.

2. Rivers usually flow in valleys to which their own size and force bear no sort of proportion, and which must, therefore, have been formed by an agency distinct from that of the waters now flowing through them.

3. These valleys must have been scooped out by a force, similar to that of which we have distinct proof in the valleys of the chalk districts, which have never been occupied by rivers. We are also certain of this having been an aqueous agent, from the well known fact of their always ending on the exact level of the ocean.

4. All valleys occupied by rivers terminate at length in this general level, in the same manner as the chalk valleys, without rivers, once did, though these latter are now often cut short by sea cliffs.

5. The bed of every river is a plane, more or less inclined, according to circumstances.

6. As we know that the corroding action of the sea is incessant, and consequently that all sea coasts have been gradually encroaching on the lands, from the very first moment that they became sea coasts; as we also know with certainty, that, at the period when this action first began, the valleys must all have terminated, as they still do, in the exact level of the sea; we have a right to conclude that the time cannot be very distant when this corroding action first began.

7. If we assume that the general average decay of a coast is but one foot per annum (and it will not be denied that it is considerably more upon a large proportion of coasts); and if we take so short a period, (geologically speaking) as only one hundred thousand years, we must suppose that more than eighteen miles have been lost, from the original mouths of all rivers.

8. Had this been the case, we must have found a waterfall, or rapid,

* A detail of the facts on which the above positions are founded, has been sent to the editors of the London and Edinburgh Philosophical Magazine and Journal, in which work they will probably soon appear, in the form of two papers.

at the mouth of every river; and, consequently, all inland navigation from the sea must have been impossible, except in perfectly flat countries.

9. As we rarely find such falls, or rapids, at the mouths of rivers, and as we have reason to know, on the contrary, that their originally inclined planes have neither been materially altered in inclination, nor shortened in extent, we must conclude, that the loss of land on all sea coasts has, as yet, been but small, and, consequently, that the unceasing action of the waves has been but of recent origin*.

10. As the superficial slopes of all hilly countries lead the eye, in a regular line, to the level of the sea, in about one mile, (more or less, according to the consistency of the shores,) we cannot avoid the very same conclusion which we have before attained in a more exact manner, in the instance of the chalk; viz. that all our present sea coasts have been acted upon by the sea but a very few thousands of years, and, consequently, that all existing dry lands were elevated above the level of the ocean, at the same recent period.

VULTURES, (*From Le Vaillant's Birds.*)

(VULTUR,—Cuv., Vieill., Temm., Briss., Linn., Lath.; EGYPIUS, Savig.)

PRINCIPAL CHARACTERS.

BILL straight, longish, flattish at the sides, convex on the upper part, thick or slender; *upper mandible* covered with a cere at its base, and curved only towards the point; the *lower* straight, rounded, and inclined at its point; *nostrils* naked, crescent-shaped or rounded, transversal or longitudinal. *Tongue* channelled, bordered with points or without points, indented at its extremity. *Mouth* cleft almost as far as under the eyes. *Shanks* reticulated. *Toes* four in number, warty underneath, three in front, one behind; the outer ones united at their base by a short membrane; the intermediate very long; the hinder articulated at the base of the shank in the same manner as the anterior. *Claws* slightly arched.

* It is stated by a recent and very able writer on this subject, (but who advocates an unbounded theory of Chronology) in treating of the action of the sea upon its coasts, that, on the coast of Yorkshire, four yards a year is the rate of decay. This loss, for only one million of years, amounts to no less than 2272 miles; and even at one yard of annual loss, Yorkshire must once have extended 568 miles further eastward than it now does.

ACCESSORY CHARACTERS.

Wings long; the first quill shorter than the sixth; the fourth longest. The crop forming a projection above the fork bone, and covered with a thick down. *Head and Neck* partly destitute of feathers; prominent eyes.

Vultures have a very sharp face (*facies bien tranchée*) this character is peculiar to them, and distinguishes them from all kinds of hawks. They are dastardly, cruel, and voracious birds, and feed much oftener on offal than on living prey, for putridity and infection will attract rather than drive them away. In hot countries, as Egypt for instance, where they are in vast numbers, they render the inhabitants an essential service, in purging the land of many noxious impurities, the remains of carcases, which, in becoming putrid, would empoison the atmosphere. The structure of their legs does not permit them to make use of their talons for the purpose of carrying off their prey; they convey the food destined for their young in their crop, which is very capacious, and thence disgorge it into their bill on their arrival at the nest. Their sight is exceedingly keen, and their sense of smell is perfect to the highest degree; they discharge a fetid matter from their nostrils after feeding; their crop forms a large prominence above their fork-bone. The mouth is simple.

Vultures are the only birds of prey which live and fly in flocks; they construct their nests among the most inaccessible rocks.—SAVIGNY.

THE ORICOU (*Vultur auricularis*).

L'Oricou, *Le Vaill.*, Ois. d'Afrique. i. p. 36, pl. 9; *Shaw's Zool.* vii. pl. 10; *Vultur auricularis*, *Lath.* Ind. Orn. Sup. p. 1; *Daud.* Orn. ii. p. 19; Sociable Vulture, *Lath.* Syn. Sup. 2d, p. 11; *Id.* Gen. Hist. i. p. 20.

THIS species is larger than even the largest of our vultures, it being ten feet across the wings from tip to tip. It presents one of those striking characters which I think so useful for the purposes of nomenclature; it is a membrane of four lines in thickness, which encircles the front of the ear, and is then continued in a straight line upon the neck. This kind of raised concha is four or five inches long, and must necessarily improve the faculty of hearing in this species. The entire head and one half of the neck are naked, and of a flesh-red colour, assuming a violet-blue tint towards the beak, and a whitish one towards the ears; a few short and sparse hairs are only to be seen on this coloured skin. The gorge is black, and is covered with rigid hairs of the same colour. All the feathers of the upper part of the body, together with the wings and tail, are of a dull brown colour, but tinged with a lighter shade at the borders; those of the back part of the neck are curved backwards and upwards, forming a sort of cravat, in which the bird, by drawing in its neck, conceals all that part of it which is bare of feathers; it is especially during the digestion of its food that

the bird assumes this most disagreeable attitude. The craw, which protrudes very much, is covered with a fine glossy down of a silky texture, but altogether not unlike the wool of quadrupeds. The entire body, from the breast to the tail, is covered with long narrow feathers, extending from the body in proportion to their length; they are sabre-shaped, of a pale-brown colour, bordered with whitish grey. The thighs and one half of the shank are covered with a very fine white down, presenting a slight shade of fawn at the lower part. The same down also clothes all the under part of the body; it is also visible between the feathers of the breast and on the sides of the neck. The tail is tapering, and is always worn at the end. The base of the beak and the skin surrounding it are of a yellowish horn colour; the feet and toes, very large, are defended with large brown scales; the nails broad, and but slightly arched, are, as well as the end of the beak, horn-coloured. The eye is encircled by long black lashes, and the iris is of a chesnut brown.

This vulture, like other species of this genus, is a mountain bird: it forms its habitation in the caverns and other places of shelter met with in rocky localities. These birds there pass the night, and there repose during the day, after feeding. Great numbers of them may be seen at sunrise, perched upon rocks at the entrances of their dwellings; sometimes they may be seen thus occupied, dispersed over the greater part of an entire range of mountains.

These birds are always found to have their tails much worn; this is from their rubbing them against the rocks, in the interstices of which they squat, or upon the tops of which they roost: but eagles, seldom alighting on the earth, or perching upon trees, preserve theirs more entire; besides this, vultures use the tail also against the ground on the plain, for they do not take flight suddenly, but after a short run and forcible contraction of their members. The flight of vultures is not, however, less powerful and lofty; they rise to an immense height, and totally disappear from the eye. It is astonishing that these birds, themselves invisible, should perceive what passes on the earth, and distinguish such animals as serve them for food, plunging down upon their prey, in great numbers, the moment death has delivered it up to them. Should a hunter kill any large game, which he cannot immediately carry off, and leave it for a short time, he will not find it at his return; but he will find a flock of vultures, and that too in a place from which a quarter of an hour before not a single one could be perceived.

This is a fact, which I have on several occasions, in the course of my travels, experienced on the part of vultures, whether of the present species, or of others which will be described hereafter ; for all voracious carnivorous animals mix with each other under such circumstances. The first time I was their dupe was at a time when I was labouring under a scarcity of provisions, and, consequently, the lesson which they gave me made a very sensible impression. I had killed three zebras : satisfied with my sport I returned to my camp, from which I was at a league's distance, and ordered a wagon to be despatched to bring them away. My Hottentots, better informed than myself, told me, that the journey appeared to them quite useless, as the zebras would be devoured before our return. However, we set forth ; but we had not advanced far, before we saw afar off the air filled with vultures. At our arrival, we found them strewed over the plain ; the zebras were devoured ; the only remaining vestiges of them were large bones ; vultures moreover were still arriving, and on all sides there was an astonishing assemblage of these animals in motion, of which I could reckon more than a thousand. It was curious to observe with what rapidity such an immense number of vultures could be so soon collected. I one day hid myself in a bush, after having killed a large gazelle, and left it on the spot. In an instant crows came, and, croaking loudly, jumped upon the animal ; in less than a quarter of an hour, hawks and buzzards arrived ; a moment afterwards, raising up my head, I perceived birds at a prodigious height, and, which, wheeling around, were rapidly descending. I was not long in recognising them to be vultures. From their appearance one might have supposed that they had escaped from a cavern in the sky. The first were not slow in pouncing upon the gazelle ; I did not allow them time to tear it piecemeal ; I hopped out of my hiding place ; they heavily retook to flight and rejoined their companions, who were visibly increasing in number, and who seemed to fall from the clouds to participate in the prey ; but my presence quickly caused them all to disappear in the air.

The following seems to me to be the way in which vultures are called to share in any prey : the first carnivorous birds, which discover a carcase, give an alarm to the others in the vicinity, as much by their screams as by their movements. If the nearest vulture should not observe the prey, from the high region of the air in which he is floating, he discerns, at least, the inferior land birds of prey who are preparing to feast on it ; but it may be the vulture's sight is sharp enough to dis-

cover the body itself. He descends then rapidly, and in circles; his descent is understood by other vultures who observe it, and who have, doubtless, a thorough knowledge, and practised instinct, upon whatever relates to their food. In the neighbourhood of the carrion, there is then formed a concourse of carnivorous birds which drop from the clouds, and are certainly sufficient to attract vultures from every part of the country, in the same way as several men, by running in the streets, would draw a crowd together.

From the congregation of vultures towards a given spot, we may sometimes infer the proximity of the lion, tyger, or hyæna; for, when one of these animals has killed a large quadruped, the vultures, who have observed him, immediately arrive, and bring after them a train of others, which warns the traveller to be upon his guard. These timid and dastardly birds, wanting the courage to dispute a prey, evince on this occasion all the baseness of their character; for not daring to make use of their force, weapons, bulk of body, advantage of flight and even of numbers, which make even cowards valiant, keep at a respectful distance from the ferocious animal, wait until he has finished his repast and retired, and then devour the abandoned fragments.

The Hottentots and colonists of the Cape of Good Hope, well informed by experience of the ability of vultures to discover the bodies of animals, and also their voracity, never leave what they have killed, without concealing it, generally beneath a heap of leaves and branches; sometimes they cover it over with a pocket-handkerchief, or waistcoat; but, in spite of these precautions, it often happens they find nothing more than a mere skeleton at their return; for the crows, who are of a bolder temper, first of all search out the animal, and the vultures, then venturing to approach, in a short time entirely devour it.

The Dutch colonists of those districts which the oricou inhabits, give it the name of *swarte-aas-vogel*—the black carrion vulture. They call it black, to distinguish it from another species of vulture of paler colours, and which I shall describe in the following chapter, under the name of *Chasse-fiente*; a name which it has at the Cape, where it is also called by the inhabitants *stront-jager*. All vultures are generally known at the Cape by such names as *stront-vogel*, *stront-jager* or *aas-vogel*.

I never observed the oricou in the environs of the Cape; it is very common in the inland districts, especially towards the country of the Great Namaquais, where the other species is also found.

It builds in rocky caverns. The female lays two white eggs, and sometimes, but very rarely, three. In October these vultures begin to pair, and in January the young ones are all hatched. As they live in very large flocks, a single mountain will contain as many nests as it has places adapted for them. It is worthy of remark, that vultures never build on trees, at least in Africa; and I am very much deceived if they do in any other part of the world. They appear to live together in great harmony; for I have sometimes seen in the same cavern as many as three nests side by side.

During the period of incubation, each male stations himself as sentinel at the mouth of the cave in which his female is sitting: a circumstance from which it is easy to discover the situation of the nest, which on the other hand is almost always inaccessible. I have, however, by the assistance of my Hottentots, occasionally vanquished all difficulties, and often risked my life to examine the eggs of these birds; their dwellings are disgusting, and infected with an insupportable stench. To approach these obscure retreats is attended with great danger, as the entrance to them is covered with dung, which is always in a fluid state, from water which continually filters through the cracks of the rocks: so that in happening to slip on one of these rocky points, we run the risk of falling down the frightful precipices above which these birds usually establish themselves.

I have tasted the eggs of the oricou as well as those of the chasse-fiente, and found them very good for use.

At its birth, the young oricou is covered with a whitish down. On leaving the nest, its plumage is of a pale brown, and all its feathers are tinged with red on the borders: those of the breast and belly are not yet sabre-shaped, and its head and neck are entirely covered with a fine thick down, and the stripes round its ears are hardly perceptible; which often misleads inexperienced naturalists, and induces them to consider it as an eagle, or vulture of a different species; though it is not difficult to distinguish a vulture from an eagle by the form only of the claws—a character much more decisive than that of a bare head, which in all vultures, while young, is covered over with down. In this way, who can point out in the numerous works on birds all the young vultures which have been regarded as eagles, although there is nothing more easy than to distinguish a young from an old bird? But on this subject, I repeat, that a single glance from an experienced naturalist is unquestionably worth more than the scrupulous testimony of all those

numerous and general characters, which, for the most part, only exist in the imagination of him who established them, and are seldom suitable to two species of the same genus. The Grands Namaquas call the oricou *ghaip*, preceding the word with a loud clap.

M. BIOT ON THE SAP OF PLANTS.

IN all my experiments, the motion of the sap appears to me to proceed from the eminently *hygroscopic* quality of the vegetable tissue. The sap received at the roots evaporates by the leaves, whilst between these points the vegetable tissue acts precisely as a cylinder, composed of animal charcoal, covered with an impenetrable envelope, and with its lower part immersed in liquid. The column is thus supplied with all the liquid that it can contain; the vegetable tissue becomes itself in the state of saturation that suits its mass under the existing temperature. This kind of equilibrium being established, should any cause, a sudden change of temperature for instance, increase the evaporation at the extremity of the branches, these will act by suction; draw more from the roots, and the equilibrium is still preserved. Should, however, the roots come to furnish more, and the leaves evaporate less, then will ensue turgescence in the vegetable tissue; and if a hole be made, the sap or liquid will overflow. This is precisely what is observed in the birch tree in spring, when its sap begins to rise, and before its leaves have come forth, or are able to perform their task of evaporation.

As another trait of resemblance, it may be remarked, that the lateral action of heat on any hygroscopic column, such as we have represented the vegetable tissue to be, would have the effect of rendering it capable of less saturation, and, consequently, would oblige it to throw out a part of the liquid it contains. This is the effect which the sun produces upon the birch, and upon other trees, whose sap runs out at this period. When the leaves come these phenomena cease; the task of evaporation is performed, and the sap bursts neither from the bark, nor through an orifice, if made.

Now suppose we replace the impermeable or air-tight envelope by one, on the contrary, capable of absorption from within, and exhalation from without, the state of things will be changed. The issue of the sap or liquid, by the sides of the envelope, will be more frequent

and facile. The diminution of the exhaling power by a sudden cold will favour it, and the sap will burst forth at once from all the pores of the tree equally, taking into account merely the different degrees of thickness in the bark. Such is an account of the emission of sap by the sides of the nut tree and sycamore, in spring.

The influence of the leaves on the internal motions of the sap in trees being thus explained, let us observe what will be the consequence, if these leaves, or great evaporating organs, be enveloped with a colder atmosphere. The sap conveyed to them being no longer evaporated, will rest and collect on their surface, and check all evaporation, especially at night. The upper parts of the vegetable tissue, or hygroscopic column, being thus overcharged, will let fall their superabundance upon the parts that are lowest, which will produce a descent of the sap. Hence proceed the alternate ascent and descent of sap, such as have been noticed. Moreover, these effects will become continuous, if the evaporating property of the leaves should diminish before the supplying power of the root ceases to throw up the sap; and this is precisely the case in September: the same trees that afforded me but their ascending sap in the spring, in September afforded a continual sweat. The latter was no longer the same as the spring sap, for it contained no saccharine principle.

M. Biot concludes from his experiments, that the alimentation of the foliaceous organs is accomplished principally during the day; whilst the alimentation of roots, and the formation of new layers of them, is effected during the night, when the diminution of evaporating power in the leaves precipitates the sap in a descending course towards the roots.

That in deciduous trees, the annual increase of the trunk and branches taking place in summer, the increase of the roots takes place in winter. The ascending motion is thus suspended by the cold, and the absence of leaves allows the sap to accumulate in the roots, which experience little of the atmospheric variations, and which, in the first warmth of spring, send up their accumulated juices with force through the uppermost parts of the tree.

THE EFFECTS OF MUSIC, ELECTRICITY, MAGNETISM, AND GALVANISM UPON ANIMALS.

BY JAMES FENNELL.

THOUGH music has but little to do with the three sciences with which I have here associated it, yet in connection with them it forms one of the four principal extraneous powers capable of operating in various extraordinary ways upon the senses and actions of animals.

As music consists of sounds emitted from instruments constructed by man, its effects, however enchanting and harmonious they may be, are in reality altogether unnatural; but the various notes that enter into the composition of music are quite natural; being voluntarily produced by animated bodies, and involuntarily produced by inanimate bodies. It is with music, indeed, as it is with all other human productions; for we can merely take to ourselves the merit of having made, in this instance a pleasing combination of natural tones; as in the case of the construction of a clock, or of a steam-engine, we are merely entitled to the praise of having produced useful and mighty effects by an ingenious artificial association of numerous natural principles. Thus the notes of music may be all traced to the source from whence they were derived, which source is nature's orchestra; in which her birds and other uninstructed musicians lend their sweet and soothing voices, which intermingling with the deep tones of the wind playing through the thickset grove or hollow cavern, and with the babbling of the running brook, produce a concert possessing charms for the lover of nature, far superior to those which attract the admirers of even the most talented and skilful performer.

The inferior animals being accustomed to the music that resounds through their sylvan haunts, are not affected by it in any peculiar manner, but like our own uncivilised species remain unmoved by it. But instrumental music exercises extraordinary effects upon them. It subdues the rude dispositions of some; arouses the ferocity of others; renders some sufficiently docile and tractable as to be induced fearlessly to approach; while it awakens the alarms of others, and expels them from their abodes. It may be observed, however, that that strain of music which may affect an animal in any particular way, will not be attended with similar results in all others, and in the cases of domesticated animals the effects are various upon different individuals of the

same species*. Having said thus much upon music in general, I shall now proceed to bring forward instances illustrative of my subject.

Of the repulsive effects of music upon animals there is an amusing story in a volume of the *London Magazine* for 1825, which I here transcribe: "A soldier, who had obtained a passport to go to England from Ireland, being fatigued, sat down in a wood, and commenced eating some victuals which he had brought with him; but suddenly he was surprised by the appearance of two or three wolves, who approached towards him, and to whom he threw, for the sake of ensuring their friendship, bit after bit of his bread and cheese until he had no more to give; and then, as the wolves began to approach nearer, he knew not what to do to appease them otherwise than by playing an air upon his bag pipes; but he had no sooner commenced than to his astonishment they all scampered away. 'The deuce take you all!' cried he; 'had I known that you loved music so well, you should have had it *before* dinner.'" Sparrman furnishes us with an anecdote of a trumpeter, who by a similar expedient saved himself from falling a prey to a prowling hyæna. "One night, at a feast near the Cape, a trumpeter, who had got himself well filled with liquor, was carried out of doors in order to cool and sober him. The scent of him soon attracted a spotted hyæna, which threw him on his back, and carried him away to Table Mountain, thinking him a corpse, and consequently a fair prize. In the mean time, however, our drunken musician awaked sufficiently sensible to know the danger of his situation, and to sound the alarm with his trumpet, which he carried fastened to his side. The beast, as may be easily imagined, was not less frightened in its turn." From a notice in "*Goldsmith's Animated Nature*," it appears that crickets are frightened from houses by the sound of music, as he states, that a woman who detested their chirping had her residence accidentally rid of these objects of her dislike, by the playing of a band of music engaged for the amusement of her friends on the occasion of a wedding. Fish, it seems, are usually frightened by music; a circumstance of which the Chinese avail themselves for the purpose of making their finny prey

* For instances of the indifference and the respect of various domesticated animals for the music of the trump-marine, vide "*Alphabet of Zoology*," page 113. We must not, however, judge of the degrees of musical taste respectively possessed by the animals there mentioned, as they might have been differently affected by other instruments, or by other tunes upon even the same instrument.—J. F.

assemble at one particular spot, where they are captured, consequently, in greater numbers. Captain Basil Hall, in his interesting "Voyages," tells us, that proceeding up a river in China, he and his seamates were somewhat surprised at observing some fishermen in their vessels uttering loud yells and shouts, at the same time striking some of those well-known musical instruments termed "gongs," which were suspended from their masts. The captain at first considered that all this noise was intended to drive away the English Ambassador, who had just arrived; but in this opinion, however, he was soon undeceived by learning that it was merely produced with the view of driving the fish from that part of the river to another, where nets were waiting in readiness to receive them *. Æsop would seem to have been aware of the repulsive effect of music upon fishes, as he makes the fisherman in one of his fables fail in his sport in consequence of his playing on the flute.

We will now consider the *attractive* power of music over the brute creation. This power seems to be, from a variety of recorded instances, remarkably apparent in the case of the stag, of which creature it is stated, that upon the sound of music it becomes divested of its natural timidity, and gradually approaches to the place from whence the sounds proceed. "If a person happen to whistle, or call at a distance," says the authoress of the Natural Historian, "the stag stops short, and gazes upon the stranger with a kind of silent admiration; and if he perceives neither fire-arms nor dogs preparing against him, he goes slowly forward, with apparent unconcern. * * * * He seems delighted with the sound of the shepherd's pipe; which, on that account, is sometimes used to lure him to destruction." A dolphin, according to ancient history, was so charmed with the lute of Arion, as to swim towards him and save him from the watery element into which he was necessitated to throw himself, to escape from his mutinous crew, who permitted him, at his request, to chant some sweet strains to his lute previous to his diving into the sea, from which he was so happily rescued by the intervention of this philharmonic fish, who safely conveyed the great musician upon its back to Cape Tænarus in Sparta, where it was taken leave of by its rider, who went thence to the city of Corinth. Mr. Wadd, in an extremely interesting article on "Medical Music," published in the Quarterly Journal of Science, in April 1829, when alluding to the above historical account, justly observes, that "it would

* Hall's Voyages, vol. 1. p. 24.

have been well for the mutineers if their taste for music had been as great as the dolphin's, for the history not only affords a grand instance of the power of music, but of retributive justice, as the sailors accidentally going to Corinth paid the penalty of their evil intentions with their lives." Persons who have been aware of the possibility of attracting animals by music have, according to different writers, resorted to it with great success, when desirous of removing obnoxious animals from their abodes. In Hone's *Every Day Book*, p. 1372, is given a remarkable (and the reader, perhaps, will say an incredible) account of this kind, with respect to the rat, from Verstegan's *Restitution of Decayed Intelligence*. This account (which may be found versified in some works) is thus stated: "Hulberstadt, in Germany, was extremely infested with rats, which a certain musician called, from his habits, the 'Pyed Piper' agreed for a great sum of money to destroy; whereupon he tuned his pipes, and the rats immediately followed him to the next river, where they were all drowned. But when the piper demanded his pay, he was refused with some scorn and contempt; upon which he began another tune, and was followed by all the children of the town to a neighbouring hill, called Hamelin, which opened and swallowed them up, and then closed again. One boy, being lame, came after the rest; but seeing what had happened, returned and related this strange circumstance. The story was believed, for the parents never after heard of their lost children. This incident is said to have happened on the 22nd of July, in the year 1376, and that since that time the people of Hulberstadt permit not any drum, pipe, or other instrument, to be sounded in that street which leads to the gate through which the children passed. They also establish a decree, that in all writings of contract or bargain, after the date of our Saviour's nativity, the date also of the year of the children's going forth shall be added in perpetual remembrance of this surprising event." By similar means to those pursued by the revengeful piper towards the rats, the natives of certain countries are said to rid themselves of snakes, which by reason of their venom they would not venture to eject from their houses by application to force. "The eastern Indians will rid their houses of the most venomous snakes, by charming them with the sounds of a flute, which calls them out of their holes. Instances of the same kind, however incredible they may appear, are given not only by ancient writers, such as Pliny and Seneca, but by modern authors of undoubted credit, such as Sir William Jones, Bruce, Shaw, Greaves, Forbes, and Chateau-

briand.*" These instances, exhibiting the attractive influence of music over certain creatures, are very curious; but how much more curious is it to find some animals so sensitive to its charms as voluntarily to resort to places where they have learnt by experience that they can gratify their taste by it. In a note prefixed to Innes's edition of Goldsmith's *Natural History*, we are told, that "an ass at Chartres used to go to the chateau of Quarville, to hear the music that was performed there. The owner of the chateau was a lady, who had an excellent voice; and whenever she began to sing, the ass never failed to draw nearer to the window, and listened very attentively. Once when a piece was performed, which no doubt pleased him better than any he had ever heard before, he left his ordinary post, walked without ceremony into the music-room; and, in order to add to the concert what he thought was alone wanting to render it perfect, began to bray with all his might." I remember having read an account, some time since, of a dog that loved military music, so much as to be in the daily habit of going to some barracks, or court-yard, where a performance of this kind took place.—Though

" Music's force can tame the furious beast;
Can make the wolf or foaming boar restrain
His rage; the lion drop his crested name,
Attentive to the song;"

yet one would hardly suppose that it would have sufficient influence over a spider as to appease its fears and render it perfectly tame, a matter which one would suppose extremely difficult to effect upon so small a being. But M. Pelissan, when an imprisoned inmate of the Bastille, is said to have gained the friendship of a spider, to whose habits he paid much attention, by means of music. The observations which M. Pelissan made upon the habits and actions of his dumb, but amusing companion, must have tended, in great measure, to divert his mind from the gloomy contemplations which a prison's walls are too well calculated to engender.

I now come to speak of the effects of electricity upon animals:—If we consider electricity with reference to its universal presence, its extraordinary powers, its useful properties, and its awful consequences, we find it embracing some of the most curious and splendid phenomena among the many that engage the attention of the natural philosopher. In this paper I speak of the effects of electricity, magnetism, and gal-

* *Mag. Nat. History*, vol. i. p. 373.

vanism separately ; though modern discoveries, particularly those of Faraday, Ritchie, Pixii, and others, amount almost to a proof that the subjects of these three sciences are merely modifications of the same principle. I would therefore ask, by the way, would it not be better to consider these as constituting three branches of one science, in like manner as we, in natural history, regard ornithology, conchology, and entomology as three branches or sub-sciences of the extensive science of zoology. To say more at present upon this point would be somewhat foreign to the professed object of this paper, and would defeat the aim I have in view of supplying a few pages of interesting and untechnical matter, chiefly intended for the amusement of those who are not over partial to the perusal of the dry details of science.

To describe the effects of electricity, when administered by the electrician to the bodies of animals, would here occupy more space than I can reasonably expect could be conveniently granted for the purpose ; therefore I shall confine myself to speaking of the powers of lightning, which is merely a strong electric shock, the thunder by which it is accompanied being the noise of its explosion. The dreadful effects of lightning, in depriving mankind and other creatures of their limbs and senses, and of even life itself, are too well known, from the unfortunate frequency of their occurrence*. The illness and debility which seize some persons previous, and sometimes subsequent, to the discharge of the electric cloud, must have been noticed by almost every one. Pains are felt, particularly in the head and stomach, by some persons (myself included) upon the approach, or after the cessation of lightning ; which pains, perhaps, are ascribable to its acidifying property, which appears to convert the food contained within the stomach into acid, as freely and as quickly as it does the beer in a beer barrel. Previous to the appearance of lightning, cattle and most animals, all of whom are, probably, more sensitive than ourselves to the atmospherical changes by which it is no doubt preceded, become restless, and resort to places of protection. Ants, bees, and butterflies, I have, from repeated observations made in the field, been induced to think, diligently avoid exposure to lightning, at least when it is unaccompanied by rain : but how they behave when it is attended with rain I have not as yet remarked. Before the commencement of lightning, and during its pre-

* The best means of guarding against the destructive consequences which so often result from exposure to lightning, will be described in a future communication.—J. F.

valence, ants are seen in great commotion; bees hide themselves in flowers; and butterflies become sluggishly inactive and rest upon the leaves of plants, which leaves, I have reason to believe, are not promiscuously selected. The devastation which lightning commits among the insect tribe, and which is so heartily welcomed by the selfish husbandman, who would deny all such animals as are not convertible into pounds, shillings, and pence, any participation in the fruits of the earth, is a circumstance familiar to all. From the same cause great numbers of fish are said to be destroyed.

Magnetism exhibits its inexplicable effects principally upon metallic bodies; and with the exception of the power attributed to it of curing corns and rheumatism, of stopping vomitings, and of sending persons into so sound a slumber that all endeavours to awake them by hallooing in their ears, or even pinching their flesh, are of no avail, I am only acquainted with one instance (which appears to be well authenticated) of its exercising any effect upon the living body. The instance to which I allude is that of the ill-fated youth Caspar Hauser, who was secretly confined within a dungeon, wherein he lived from his infancy, devoid of speech, a stranger to the light of the heavens and of the beauty and luxuriance of the earth, until at the age of seventeen he was conveyed by the same unknown being, who had hitherto supplied him with bread and water during the time of his unmerited incarceration, to Nuremberg, where he first beheld the face of man, upon being discovered after his abandonment by the wretch who brought him hither while under the influence of sleep. This individual, whose life has recently been taken by an unknown hand at Anspach, where he had long resided under the fostering protection of benevolent individuals, was, it is stated, wonderfully affected by the application of the magnet, as was accidentally discovered by the circumstance of his complaining that a magnetic toy, with which he was presented, occasioned in him disagreeable sensations. Some experiments are said to have been instituted upon him by Professor Daumer, with a view of eliciting the cause and nature of this singular susceptibility to magnetic influence. "When the north pole was presented to him, he complained of pain in his stomach, and that a current of air appeared to flow from him towards the magnet; the south pole had less effect on him. These experiments were varied as much as possible, but he was never deceived*."

Galvanism produces some very remarkable and powerful effects upon

* London Medical and Physical Journal, vol. 70, page 173.

man and other creatures. The saline taste which is conveyed to the tongue, by the mere insertion of that organ between two metallic plates connected to each other in a certain manner, and the sudden and violent convulsions which it produces upon animals when alive or dead, are facts too generally disseminated to require recapitulation at any great length. An extract from a treatise upon galvanism, published in the Library of Useful Knowledge, perhaps will suffice to convey an idea of its effects upon some of the smaller and more sensitive animals. "If a crown piece be laid upon a plate of zinc of larger size, and a living leech be placed upon the silver coin, it will suffer no inconvenience so long as it remains in contact with the silver only; but the moment it has stretched out its head so as to touch the zinc, it suddenly recoils, as if it had experienced a painful shock. An earthworm will also exhibit the same kind of sensitiveness; and the same effect is still more strikingly exemplified by the *nais*, which is an aquatic worm. Humboldt found that the *cernæa*, or water-serpent, and even *vania*, *ascaris*, and other species of intestinal worms, had their movements accelerated by the influence of galvanism, which altogether speedily destroyed their life. Powerful shocks from a voltaic battery are no less immediately fatal to animals than discharges from an ordinary electric battery. Small animals are easily killed by discharges which would only produce a temporary stunning effect on larger animals*."

At a future period I may have occasion to revert to the subjects here introduced, in an article on the distribution of electricity among animated beings.

Paddington.

ON THE SINGING OF THE SWAN.

BY SIR T. BROWNE, M. D., NORWICH†.

FROM great antiquity, and before the melody of syrens, the musical note of swans hath been commended, and that they sing most sweetly before their death. For thus we read in Plato, that from the opinion of Metempsychosis, or transmigration of the souls of men into the bodies of beasts most suitable unto their humane condition, after his death Orpheus the musician became a swan. Thus was it the bird of Apollo

* Treatise on Galvanism, page 79.

† From Pseudodoxia Epidemica.

the god of music by the Greeks; and an hieroglyphic of music among the Egyptians, from whom the Greeks derived the conception—hath been the affirmation of many Latines, and hath not wanted asserters almost from every nation.

All which notwithstanding, we find this relation doubtfully received by Ælian, as an hearsay account by Bellonius, as a false one by Pliny, expressly refuted by Myndius, in Athenæus, and severely rejected by Scaliger; whose words unto Cardan are these, “You are a goose to throw a light upon the true sweet song of the swan, which of the story tellers I appoint, with their parent Greece, a tribunal to Lucian about which you will say something new.” Authors also that countenance it speak not satisfactorily of it. Some affirming they sing not till they die; some that they sing, yet die not. Some speak generally, as though this note were in all; some but particularly, as though it were only in some; some in places remote, and where we can have no trial of it, others in places where every experience can refute it; as Aldrovandus, upon relation, delivered concerning the music of the swans on the river Thames near London.

Now that which countenanceth, and probably confirmeth this opinion, is the strange and unusual conformation of the windpipe, or vocal organ in this animal; a figuration to be found in elks; and not in common swans, observed first by Aldrovandus, and conceived by some contrived for this intention. For in its length it far exceedeth the gullet; and hath in the chest a famous revolution; that is, when it ariseth from the lungs, it ascendeth out directly unto the throat, but descending first into a capsulary reception of the breast bone, by a serpentine and trumpet recurvation it ascendeth again into the neck; and so by length thereof, a great quantity of ayr is received, and by the figure thereof a musical modulation effected. But to speak indifferently, this formation of the weazen is not peculiar unto the swan, but common also unto the platea or shoveld, a bird of no musical throat; and, as Aldrovandus confesseth, may thus be contrived in the swan to contain a larger stock of ayr, whereby being to feed on weeds at the bottom, they might the longer space detain their heads under water. But were this formation peculiar, or had they unto this effect an advantage from this part, yet have a known and open disadvantage from another, that is, a flat bill. For no latirostrous animals, (whereof nevertheless there are no slender numbers,) were ever commended for their note, or accounted among those animals which have been instructed to speak.

When, therefore, we consider the dissension of authors, the falsity of

relations, the indisposition of the organs, and the unmusical note of all we ever beheld or heard of; if generally taken, and comprehending all swans, or of all places, we cannot assent thereto. Surely he that is bit with a tarantula shall never be cured by this music; and with the same hopes we expect to hear the harmony of the spheres.

ON INSTINCT IN BIRDS.

BY C. W. S.

It is my present intention to make known to you a few facts, which have come under my own observation, illustrative of the partial loss, or modification, of instinct in animals, which frequently takes place in them when domesticated. I think that caged birds often lose the habit of swallowing gravel for the purpose of grinding their food in the gizzard. I generally open my own birds which die, and have always found a deficiency of gravel, from which circumstance I am induced to believe that the diseases of caged birds are very often owing to their losing the instinct of swallowing gravel.* I observed one of my redpolls the other day in a fit, tumbling about in violent convulsions; he remained so for about two hours, during which time I, for an experiment, made him swallow some drops of sherry, without its seeming to have any very good effect; I then, with a great deal of trouble, forced three little pebble stones down his throat, and he has had no recurrence of the fit, though he does not look quite well. I think that the above-mentioned case shows evidently that the bird had partially lost its instinct. I once put two hen canaries, with one cock, into a breeding cage; one of the hens immediately paired, but the other was of too quarrelsome a disposition, and was continually fighting with its two fellow prisoners. She, however, built a nest by herself; and as her eggs were addled, I put some chaffinches' and green linnets' eggs under her, which she afterwards hatched. But I will proceed to relate the more remarkable part of the affair. As the single hen hatched more young ones than the other, I took some from under her, and put them under the other hen; this she immediately discovered, and used to go over and feed her young one on the other's nest; and, what was most extraordinary, used to feed the other old hen as well, whenever she found her sitting

* I have entered minutely into the subject of birds swallowing gravel in "FACULTIES OF BIRDS," Chapter v.—ED.

on the young ones, though if she met her any where off the nest, she used invariably to fight. The above fact seems to show a kind of blindness in instinct. I have put green linnets and chaffinches, nearly fledged, into canaries' nests, when their own young ones have been just hatched, and they seem to have generally observed no difference, but fed them and brought them up as their own. I, however, once put some young whitethroats into a canary's nest, but she refused to feed them, though they opened their mouths most importunately; but these were very nearly full-fledged birds, and of course looked very dissimilar to young canaries. I once paired a couple of green linnets, and the hen laid as many as six eggs: the cock, however, had so far lost his original instinct, that one day, after the eggs had been sat upon for several days, he went and turned the nest quite over and broke the eggs. I also had a bullfinch who had two sets of eggs, but the cock broke them in the same manner. I will conclude my remarks by an instance of very early formed instinct: I once broke a chaffinch's egg, in which I found a young one, with its stomach as yet in a fluid state; it, however, opened its mouth and swallowed some food which I gave it even at this early period; I tried to bring it to maturity under a canary, but it was so fluid that it dried to the shell and died.

Stepney.

CHAPTER OF VARIETIES.

EFFECTS OF INUNDATIONS ON THE HAUNTS OF SMALL BIRDS.—In the month of August, 1829, the estate of Balliudalloch, in Banffshire, was among others a very great sufferer by the dreadful floods which at that period devastated almost the whole of the north of Scotland. The house was surrounded with water for upwards of eighteen hours; and the garden, pleasure grounds, and parks, were all either destroyed or very much injured. But what I think most surprising, in connexion with this, was the almost total desertion of the smaller birds which then took place, and was so remarkable as to attract the notice of the most careless observers.

Before this inundation, the chaffinches and house sparrows in particular, had become so numerous as to be a perfect pest, and nothing in the garden was secure from their depredations. The latter of these birds built in great numbers, not only in holes of the garden wall, and under the eaves of the out-houses, but nestled also on the tops of some lofty

silver firs, the summits of which were quite filled with their "straw-built sheds." After the subsiding of the waters, and for the greater part of the season which succeeded this visitation, very few chaffinches, and not a single sparrow, were seen. The former, however, gradually returned, and are now nearly as numerous as ever; but of the latter, not one individual, as far as I can learn, has since been noticed, though I have been very assiduous in looking for them myself, and in inquiring of all others who were likely to have observed them. What seems to me to make this still more surprising, is the fact that there is a great extent of wooded bank not a hundred yards from their usual haunts, which was quite beyond the reach of the water, and on an elevated part of which the silver firs grow, in which, as I have already observed, many of their nests were built.

I cannot think that the destruction of the garden is the cause of it, for this reason, that a new one has been formed, at a little distance, no doubt, from its predecessor, but still on a spot, the neighbourhood of which they used formerly to frequent, and in it I have seen numbers of chaffinches, hedge-chanters, redbreasts, and other small birds, but never could distinguish any sparrows among them. All the other grounds near the house have been restored to their former condition, so that no change *on* them can account for it.

Should you think this worthy of a corner in your Magazine, I will feel much indebted to any of your numerous readers, who can suggest a reason for this curious desertion of so common and familiar a bird*.

T. M. G.

Edinburgh.

BLACK RAT.—It is, I believe, very generally supposed that the black rat of this country has become very rare, and that it is now almost every where superseded by the larger brown species; so that the circumstance of it still being common in one part of this island may not be, perhaps, altogether uninteresting. At Ballindalloch they are at present very numerous, and are the only species of rat known there, principally frequenting the granaries and stables, where they do a great deal of damage. It is, however, not long since they made their appearance; as I recollect, some years ago, that there was not a single rat of any kind to be seen on that property. The black rat is in every respect much less offensive than the brown one; it is also smaller, and has

* An exceedingly curious and interesting fact. Other communications from T. M. G. will be very acceptable.—ED.

more of the shape and general appearance of a mouse, while its glossy black fur and long tail make it, in my opinion at least, a very handsome animal*.

T. M. G.

Edinburgh.

SPARROWS BUILDING IN WINTER.—I was a good deal surprised to-day, to see a sparrow with a large feather in its bill. It was sitting on the ground when I first observed it, where it remained for some time, while it looked about with as much caution and circumspection as they generally do in spring, when they are afraid of their nest being discovered. After a little it flew away with its treasure, but I could not see where it went. I noticed one some time ago carrying off some straws, but unfortunately neglected to note it down. The frost is at present severe, and has been so for a day or two; so that it cannot be supposed that the sparrow intended to employ the feather in the construction of a nest †.

T. M. G.

Edinburgh.

JANUARY REMARKS.—In the Field Diary of “Solitarius,” in your last number, he mentions not having met with any thing in the month of January *peculiar* to it; and he states, under date of April 13th, 1833, that the *Pulex irritans* “appeared,” as if it were for the first time that year. Now I captured a very fine one on the 15th of January instant. I know not if you or your correspondent will think this worthy of notice. I consider that in mild winters, like the present, this insect may be found, not only in one particular month, but any day or night during the season.

I beg to add, that a solitary *Musca domestica* remained in my room up to the 16th instant, since which it has disappeared. It seemed in a very healthy and lively state, and there were others with it till very lately. I should be glad to learn from you if these insects survive the winter or not?

A friend brought me a short time ago a kitten with a double head, complete in every respect, except that the two eyes, which came to-

* Could T. M. G. favour us with a specimen or two of the stuffed skins, sent to Messrs. Orr and Smith, through Messrs. Chambers, Edinburgh?—ED.

† As the sparrow is very fond of warmth, (see Faculties of Birds, chap. i.) might not this be for lining a roosting, not a breeding, nest?—ED.

gether in the centre, appeared to be formed into one, of larger dimensions than the other two. The skull &c. I have preserved in spirits, and the skin has been stuffed by Mr. John Ware, of this town. By the way, John Ware is a taxidermist of some celebrity—he is also a ventriloquist and a musician, and upon the whole a great natural genius, worthy of a recommendation in your valuable work.

The neighbourhood of a large town, like this, is not very favourable for observations in natural history; but I intend to record such things as may come under my notice relating to it, and send them to you, if you think them worthy of your acceptance*.

M.

Southampton.

RAT'S NEST.—In removing a stack of paper, some time since, I was surprised to see a full-grown Norway rat (*Rattus decumanus*, Fleming) issue from the centre; this excited my interest, and the probability of her having just left a nest made me remove the remaining bundles with the greatest care. The desideratum was soon discovered; she had excavated one of the reams so completely, that but for the aperture at which she entered, it would have deceived the most scrutinising eye. No young were there; but by the quantity of dung behind the stack she must have lived there *multos per annos*, and had probably reared in many a “*progeny*.”

RAZOR BILL (*Alca Torda*, Linn.)—A very fine specimen of this singular bird was shot in the parish of Bew Castle, a few miles from Carlisle, a short time ago. It was esteemed rather a curiosity, being seldom met with so far inland. The great winds, which have been so prevalent lately, have probably had some hand in its appearance so far out of its “latitude,” as well as in that of the Northern Diver (*Colymbus glacialis*), a specimen of which bird has now for more than ten weeks been sojourning at the farm, a small lake near Brampton, in this county. The capabilities of this bird for diving have hitherto enabled it to escape all the contrivances of neighbouring sportsmen for its destruction.

F. J.

Carlisle.

HOSTILITY EVINCED BY THE LAPWING TO CROWS.—Most persons residing in the country must have observed the determined hostility

* The Editor will feel obliged by M.'s future correspondence

shown by the lapwing against the crow, whenever the latter has the audacity to enter a field in which the lapwing has chanced for a time to take up its residence. On such occasions, immediately the intruder is discovered, he is pursued with the greatest animosity, until driven away from his enemy's dominions; and it is rare, indeed, that the crow has the courage to face its opponent, who keeps up the attack on all sides, and without intermission. This takes place during the breeding season, either when the eggs are being hatched, or the young ones are not sufficiently grown to be left to themselves; but at no other time, as I have often observed, and as any person may observe for himself, in the autumn of the year, when numbers of lapwings may be seen feeding and flying quite peaceably with flocks of crows. Whether this aversion on the part of the "peewit" proceeds from mere jealousy, or is the effect of that wonderful power of instinct, which in this instance might lead that bird to evince hostility in order to protect its young from the ravenous maw of the crow, I must leave to some one more experienced in the study of natural history than myself to determine. F. J.

Carlisle.

TRANSPARENCY OF THE SEA.—Having been struck by the descriptions of the transparent clearness of the sea in high latitudes, and also near the line, and far from land, in many situations, I feel surprise that so little advantage has been taken of this by naturalists, to attempt to discover plants and animals living at such a depth, as to be unlikely ever to be discovered by any other means than by sight. Times may occur, in a long voyage, when on these deep seas (the surface may be so still and quiet) that telescopes might enable the eye to penetrate many miles down, and bring to our view many of those creatures still living, which are supposed to have been destroyed, and not to have lived since the creation of man. Over these immense plains, lofty mountains, and dense groves, two or three miles from the surface of the sea, far out of the reach of winds, and storms, and currents, may even now exist those huge snails, the *Cornua Ammonis*, the *Nautilus* with its own proper inhabitant, the *Megalosaurus*, *Ichthyosaurus*, *Plesiosaurus*, *Ornithocephali*, *Mammoths*, &c., &c. All these may, most of them certainly could, live at these immense depths, and in the dense air, as we know our own toads, frogs, and newts can do. No argument against this can be framed on the fact, that their recent remains are never found thrown up on any shores; because the great depth at which they live would render it impossible for any storm ever to disturb them; and if

the animals lived at the bottom, their remains could never rise to the top, through such a prodigious weight of water and of air. There, therefore, they may be at this very day—and in my opinion are: as, from analogy, no part of nature that we are acquainted with is void of inhabitants. If you like to insert this it is at your service. P. W.

HAWK SHOOTING—I read with interest in the 1st number of the "Field Naturalist," an interesting account of an ingenious method of shooting eagles in the Alps. Since that time, I have heard that a similar plan for shooting hawks has been adopted by a clever and intelligent gamekeeper at W——. He has two tame hawks, (a kestrel and a sparrow hawk) which he stakes down in some exposed situation, at the distance of about a yard from each other, and places a dead rabbit or pigeon between them. He then stations himself in concealment behind some neighbouring hedge or tree. If there are any hawks in the neighbourhood, they are almost immediately attracted to the spot, either from motives of curiosity or anger, and afford an easy shot. What is worthy of remark is, that all kinds of hawks seem to be equally attracted by this lure. C. B.

January 23, 1834.

ESTABLISHMENT OF A ROOKERY.—Although T. C. has already replied to the sweeping demands of N. N. for accounts of the best mode of improving nature, and although I cannot inform him on *all* his innumerable points of inquiry, yet I *can* tell him how (please the rooks) to *establish* a rookery. In Northamptonshire there is a village where three rookeries have been established by the following plan; namely, removing the eggs of the first magpie that builds in the desired locality, and substituting those of rooks; of course this presupposes the existence of a magpie's nest, but few large clumps of trees are without that, in Northamptonshire at least. If no magpie will build, I cannot help him.

Your correspondent A. T., *Capel Curig*, has, I think, been misled by Bewick's cut into a belief that the female Red-backed Shrike was a Woodchat. This uncommon visiter of our country is there so ill described, and the cut is so carelessly done, that I was in the same manner deceived until I got your edition of Montagu, where I found it properly described as totally distinct from the hen-flusher.

If A. T. ever visits London, he might see preserved specimens of the *Woodchat* at Mr. Ashmead's, bird preserver, in Duke Street, Grosvenor Square, in good plumage, and well set up. T.

SANDPIPER AND STINT.—Presuming an interrogatory communication to be not entirely repugnant to the plan of your Magazine, I have sent the following, it being to me the only plan of solving the difficulty in which I find myself.

I have often remarked, during my ornithological rambles on the coast, the alternately dark and white appearance presented by the flocks of a species of Sandpiper, as they skim the surface of the water.

Till your edition of Montagu came into my hands, I had always regarded it as the Stint (*Fringa Cinclus*) of Bewick. Now in Montagu the stint is said to be a name for the Dunlin, which it seems is not abundant, (whereas this species is extremely so,) and no notice is taken of the characteristic I have mentioned.

Now the question is, am I right in calling it the *Fringa variabilis*? it seems strange that Montagu should have omitted so striking a peculiarity.

PLINY.

Lancaster.

ROOKERIES.—At a village called Hatherby, about four miles from Gloucester, there is a rookery, the nests of which are built in *poplar trees*; is it not an unusual thing?

In the last number, December, N. N. wants to know how he may establish a rookery; I have been told it may be accomplished by placing some old nests in the trees where you wish to establish one.

ALPHA.

Gloucester.

SAGACITY IN A HORSE.—I am unwilling to trespass on the public stock of room in the Field Nat.'s pages, but have just seen an instance of sagacity worthy of notice,—that of a horse in one of those large coal-waggons going down one of the steep avenues to the Thames, turning the fore wheel against the curb-stone, and keeping it there as a *drag* during the whole descent.

T.

SINGULAR HABIT IN A BACHELOR'S CAT.—If the following remarkable fact is likely to amuse any of your readers, you will oblige a great admirer of your "Field Naturalist." I am a bachelor, and really a happy one, though I anticipate many an incredulous smile on the lips of some of your fairer readers for my choice of the epithet; but I am a bachelor, and *consequently* never pass an evening, when alone, without my tea, with which I generally have an egg boiled, or a fine Yarmouth

herring broiled. I have a fine old motherly-looking cat, who is never allowed to come near my "sanctum sanctorum;" but whenever *I ring the bell* for the removal of my tea-table, she starts up before the servant, and waits on the staircase for her morsel. This *only* takes place when my egg, or herring, is ordered; and she eats the egg-shell with quite as much relish as the herring-bones: if I have neither egg nor herring, the sound of the bell has no charms for her, and she does not even stir from her fire-side.

I can readily imagine her finding out the herring, but cannot see how she can detect the egg, which she runs up stairs for with such glee.—From a great admirer of Nature, and of *your* valuable labours.

S.

Shrewsbury.

EFFECTS OF MOUNTAIN HEIGHTS ON PLANTS.—M. Gay, in his recent interesting tour among the Cordilleras, discovered many beautiful and rare species of *Baccharis*, *Loasea*, *Alstrœmeria*, and, "above all," he says, "those charming *Mutisia* which exhibit this singular phenomenon." The tendrils with which these plants are usually furnished, becoming useless in these cold regions, unprovided with shrubs or bushes, change into real leaves, organs of such great utility to alpine plants. I have also remarked that the plants which are herbaceous in the plains, become here entirely ligneous; and that several trees, especially the *Escallonia*, instead of assuming that forked appearance which characterises it, becomes stunted, creeping along the rocks, and thus offering less surface to the cold, with which the wind is charged in passing over these numerous and immense glaciers. But another observation which I have also made among these cold regions, is still more interesting; it is the form of imbricated leaves, which the greater portion of the vegetables assume—those genera even whose habitual form seems to be entirely contrary to this disposition. Thus, the leaves of the *Triptilions*, which are so lax and small in the lower regions, become here extremely hard and tough, closely imbricating the stalk, and even the flowers of these beautiful plants; the *Mutisia*, which is nearly devoid of leaves, when at the side of the mountains, produces at their summit a considerable number. The Violets here have not that elegant form which we observe in those lower down, but are found under a form altogether different; they represent a rosette, which may be compared to that of a *Sedum*, with this difference, that the leaves, instead of being almost vertical, are in these alpine violets entirely hori-

zontal. These leaves, which are extremely hard and tough, are round, scabrous, strongly imbricated, and exhibit at the footstalks flowers, which are sessile, and of a violet colour, somewhat approaching to red. Although very familiar with the genera *Triptilion*, *Escallonia*, *Mutisia*, *Viola*, the particular aspect of these alpine species caused me to mistake them entirely, and I did not discover to what genus they belonged, until I studied them after my return."

MIGRATORY BIRDS IN CORNWALL.—I have taken the liberty of sending to you a list of birds that frequent this neighbourhood in the summer; together with a few others which visit us in the winter. Should you deem them worthy of insertion in the "Field Naturalist," you will oblige your constant reader,

Those marked with an asterisk are rare.

	Arrival.	Departure.
Chiff Chaff (<i>Trochilus rufa</i>) - - -	2nd April	lat. end Sept.
Swallows† (<i>Hirundo, rustica and urbica</i>)	14th do.	begin. Oct.
Curlew, (<i>Scolopax Arquata</i>) - - -	22nd do.	middle Aug.
Reed Bird (<i>Ripæcola arundinacea</i>) - -	26th do.	lat. end Sept.
Cuckoo (<i>Cuculus canorus</i>) - - -	28th do.	begin. Aug.
Whitethroat (<i>Sylvia cinerea</i>) - - -	1st May	begin. Sept.
Turtle Dove (<i>Columba Turtur</i>) - -	5th do.	middle do.
Bearded Tit* (<i>Parus Biarmicus</i>) - -	do. do.	do. do.
Black-cap Warbler* (<i>Sylvia Atricapilla</i>) -	do. do.	do. do.
Spotted Fly Catcher* (<i>Muscicapa Grisola</i>)	middle do.	middle do.
Red-backed Shrike* (<i>Lanius Collurio</i>) -	do. do.	begin. do.

The following birds visit us in the fall of the year and depart in spring:—wild goose, wild duck, wigeon, teal, heron, woodcock, snipe, lapwing, dottrel, terns, redwing, bluebird, and kingfisher; after minute observation I may venture to say none of these birds breed here.

The long-tail tits, together with a host of golden-crested wrens and other tits, I have observed this winter (as is usual with them) congregated together, flying from tree to tree in perfect friendship.

P.S. Should these my first gleanings be acceptable, I shall always feel happy in doing my best endeavours to contribute to your interesting Magazine.

E. P.

Penzance, Cornwall.

† The Swift and Bank Martin are very rare in this neighbourhood.

FLOATING ISLANDS.—In the province of Colchagua, M. Gay found, near Tagnatagua, an extensive lake, “in which,” he says, “I saw, for the first time, that singular phenomenon, a great number of floating islands directed entirely by the winds. Having studied a certain number of these islands with great care, I observed that they were composed entirely of the remains of several vegetables, and especially of the stalks of *Typha*, *Arundo*, *Convolvulus*, &c., interlaced in a thousand different ways, and forming a species of net-work, on which had been driven many other plants; these latter, decaying, deposited a mould, which increased from day to day, and became at length capable of receiving shrubs and even trees of a moderate size. Their form is generally circular, and their thickness four or six feet; the greatest part of which is sunk in the water.

As this lake is nearly desert, and surrounded by very high mountains, birds of every genus and species repair to it in flocks, and add to the truly picturesque aspect of its environs that gay and animated air which is so pleasing to the landscape painter; it was, indeed, both curious and agreeable, to see at one time this prodigious quantity of birds navigating peaceably among these floating islands; some of them, such as the black-necked swan, the numerous varieties of ducks, trails, cocks, &c., seemed to prefer the middle, while the ibis, spoon-bill, flamingo, *hyalus*, and an infinity of other wading birds, with a beak more or less slender, wandered by the banks, quietly seeking objects for food, at the bottom of the water. I visited for several days the greater part of these isles, which enriched me with several very interesting plants, such as *Convolvulus*, *Ranunculus*, *Istricularia*, and other European genera, and, above all, with a series of beautiful nests and eggs, objects which are so neglected by travellers, and yet possessing such real interest in the natural history of birds.”

ON THE ANIMALCULÆ FOUND IN WATER, &c.—There is, perhaps, no more surprising fact in the study of nature, than the existence of such minute beings as these. That each of these creatures which are invisible to the naked eye, unaided by the microscope, possesses a perfect set of organs, as well calculated to perform every function as those of superior animals,—those who have attentively studied can testify. But the most extraordinary fact, and one which (I confess) fairly puzzles me, is the theory of their production. I have made some trifling experiments on this subject but can form no satisfactory conclusion. I made an infusion of hay in spring water, and after letting it remain

two days, I tried it with my microscope, but I could perceive no living creature whatever; I tried it again after four days, but with as little success. I then let the infusion stand till it became putrid, when I found that it absolutely teemed with life. I perceived among others the *Verticella*, or wheel animalcule, that shaped like an eel, and some round ones, edged with spiculæ, which last revolved similar to the wheel animalcule. I should observe, that some of the latter possessed a kind of tail. I never observed any living creature in good spring water, though many impurities. There can be no doubt, I think, that they owe their being to decomposition, which is certainly one of the most wonderful and important phenomena of nature. I should feel grateful if some of your correspondents would be so kind as to give me a few hints upon this subject; viz., by investigating in some future number, the changes which take place among the particles of vegetable matter when submitted to the putrefactive process, so as to produce these singular creatures.

TYRO.

June 1st, 1833.

FANNING OF THE WINGS OF CERTAIN INSECTS.—May not the constant fanning of the wings of certain insects, particularly those of the genus *Vanessa*, and the constant vibration of the wings of *Seioptera vibrans*, &c., be intended to create a current of wind to repel the attacks of acaridæ and other little parasites, most of whom have an obvious antipathy to it? The explanation which some have given, of this fanning being produced by the insects to *cool* themselves, I think is not very likely to be correct, for other insects equally exposed to the summer's heat do not practise this habit. The notion which some have entertained, and stated, of this being performed to assist the circulation of the fluids of the insects, I am just as little inclined to adopt.

Paddington.

JAMES FENNELL.

ANIMALS SWALLOWING HARD SUBSTANCES.—Ostriches, as is well known, will purposely swallow, and without injury, hard substances, such as stones, &c., which are digested whole, as they do not possess the incredible powers of digestion attributed to one Francis Bathalia, who is said to have been capable of swallowing flints, and then, at the expiration of a week, passing them in the shape of sand. The stomach of the ostrich is so simple and so strong, as readily to admit of the safe passage of pointed nails, keen edged stones, and even sharp knives, as

frequent experiments have satisfactorily proved. It seems, indeed, to be absolutely necessary that the stomachs of some birds shall always contain pieces of stones and other hard bodies for the purpose of assisting and facilitating the process of digestion. Messrs. Kirby and Spence, in their Introduction to Entomology, tell us, that one of the camellicorn timber beetles occasionally gnaws a passage through sheets of lead, the particles of which are taken into the stomach. "The larva of a *Cerambyx*," say these famed entomologists, "which Dr. Leach has discovered to be *Cerambyx bajulus*, sometimes does material injury to the wood-work of the roofs of houses in London, piercing in every direction the fir-rafters, and when arrived at the perfect state, making its way out even through sheets of lead one-sixth of an inch thick, when they happen to have been nailed upon the rafter in which it has assumed its final metamorphosis." They afterwards mention their being "indebted to the kindness of Sir Joseph Banks for a specimen of such a sheet of lead which, though only eight inches long and four broad, is thus pierced with twelve oval holes, of some of which the longest diameter is a quarter of an inch! Mr. Charles Miller first discovered lead in the stomach of this insect." Hard substances are sometimes swallowed by animals, without any better motive than that of mischief. D'Azara mentions the circumstance of an American tapir, (*Tapirus Americanus*,) which he kept domesticated, swallowing his silver snuff-box. The ingulfment of D'Azara's snuff-box (are *naturalists* really given to taking snuff?) was not a matter of so serious a moment as that detailed in the following account of an expensive meal made by an elephant, as reported in the Morning Chronicle of September 19, 1833. "On Friday afternoon, at the Zoological Gardens, Regent's Park, a lady was holding a biscuit to the elephant from the top of her reticule, when the animal, mistaking the extent of the lady's generosity, seized the reticule with his trunk, and conveyed it with its contents, consisting of a ten-pound note, some loose money, and a bunch of keys, into his stomach, to the dismay of the lady and amusement of the bystanders." The animal in this case, no doubt, swallowed the keys to open his *trunk*, but what he needed the money for, unless to present his keeper with a pecuniary reward, is difficult to discover. What a pity that the thought did not occur to the lady, of sending for an officer to overhaul the trunk, and insist upon the seizure of the smuggled goods.

SOLITARIUS.

Paddington.

THE
FIELD NATURALIST.

ON PROCURING SPECIMENS OF BRITISH LAND BIRDS
FOR A MUSEUM, WITH INCIDENTAL OBSERVATIONS
ON THE HABITS OF VARIOUS SPECIES.

(Continued from page 54.)

BY E. BLYTH.

I AM sorry that a severe indisposition should have prevented me from continuing this subject last month; but if these desultory gossiping observations are worthy a place in your pages, I feel much pleasure in resuming them now.

In addition to the various remarks I made upon a kingfisher, which I kept for some time in confinement, I may here add, that it was very rarely heard to emit any sound; but that when hungry, or kept longer than usual without a supply of fresh food, it was at times extremely clamorous, uttering continually a sharp and loud chirp, resembling *chwife*. I have heard it said, that, on account of the extreme shortness of its legs, the kingfisher is unable to move forward upon the ground, but this is erroneous; if placed on the ground, it will generally fly off immediately, but I have, nevertheless, on more than one occasion, seen it with short quick steps waddle along in rather a ludicrous manner. I have lately examined a considerable number of jays (*Garrulus glandarius*), and think that to illustrate this species well both male and female should be preserved; in the former, the feathers upon the forehead are whiter, and the black spots consequently better contrasted than in the other sex: the tail also is more barred, and the colours of the whole plumage more lively: the female, however, exhibits a number of small transverse bars upon the crest, which, in the male bird, are scarcely discernible. My own observation of this species leads me to

corroborate a remark which Pennant has made concerning it, that the young follow their parents until the succeeding spring. Mr. Selby appears doubtful on this point; but I have always noticed them, in places where they are not much disturbed, to remain throughout the autumn and winter in small parties of five or six.

The swallow kind are in good feather for stuffing during the whole of their stay in this country, as they do not injure their plumage, and moult in the middle of winter. Four specimens are requisite to illustrate the common swallow (*H. rustica*); the adult male and female, and the young male and female in their first feathers. Of the other species two specimens, an old bird and a young one, are sufficient. The evejar (*Nyctichelidon Europæus*, Rennie) varies a little, some individuals being much brighter than others, and the delicate pencilings on their plumage being better defined. Three examples, male, female, and young, should be preserved. This curious bird is not rare in several places within a short distance of the metropolis; I have noticed it upon Penge Common, in Dulwich Woods, and in several other suitable localities, especially about the Coombe district, where I have compared its powers of ventriloquism with those of the little grasshopper warbler (*Salicaria locustella*, Selby); [which species, however, is much its superior in the exercise of this strange faculty. It is well worthy of remark, that all animals which emit rolling, thrilling, rattling, or croaking sounds, have the power of making their voice appear to proceed from different directions: as examples may be adduced, besides the two birds above mentioned, the corn-crake, the water rail, the frog, the mole-cricket, and various other *Orthoptera*.

The evejar will often sit for hours, during the day, perched lengthwise on the top of some grey lichen-covered paling, or other similar situation where its colours are not conspicuous, looking like, and being often passed by and mistaken for, a large lump of mouldiness. At such times, it will occasionally suffer itself to be approached sufficiently near to be easily struck down with a stick; but if alarmed, it seems not much incommoded by the glare of day, but darts off to hide itself in some close fern covert, often at the distance of a couple of hundred yards, with as much promptness and confidence as any diurnal species, and in a manner very different from what some owls would do in similar circumstances. Of the various conflicting opinions which have been advanced respecting the use of the pectinated claw in this and other species, the most plausible is certainly that suggested by Mr. Hayward in the Magazine of Natural History for

September, 1830, p. 449; and by H. B. of Dublin, at p. 373 of the *Field Naturalist's Magazine*:—that it is formed for the purpose of detaching the sharp hooked claws of beetles, which hitch to the sides of the bird's mouth, and impede its swallowing of them. Certainly no kind of structure could answer such a purpose better, as may be readily seen, by bending the foot of a dead evejar to the mouth, and observing how extremely well it is adapted for removing whatever might adhere to it or to the vibrissæ. I have never been able, however, to find the remains of beetles in this bird's stomach; the few that I have opened having contained nothing but moths, principally, if not entirely, the different yellow under-wings (*Tryphæna*). A very simple method will go far towards determining whether or not this is the true use of it. The bird is often noticed, when flying, to bring its foot to its mouth; I have frequently seen it do so myself; and if, immediately after doing this, it were to be shot, and the just swallowed beetle found in its stomach, there would be no reason for hesitating to admit this to be the use for which it was designed. Perhaps your correspondent S. W. of the Isle of Wight will favour us with the result of some experiments on this subject, if his bird be still living. I may observe here, in reference to that gentleman's observations on the evejar, that the common swallow (*Hirundo rustica*) and martin (*H. urbana*) feed readily, and thrive well in confinement; and that, according to a very interesting note in the quarto edition of White's Selborne, by the Hon. and Rev. Mr. Herbert, the young swift (*Cypselus mura-rius*) soon learns to snap food from the point of a stick, but that (I think we may almost venture to infer *negatively* from the same note,) this species has but little notion of pecking up its food from the ground. If hunger cannot induce S. W.'s evejar to feed of itself, I fear that no other kind of method will prove successful.

To recur to the pectinated claw; I have just observed a somewhat similar structure in all the front claws of a bee-eater (*Merops Euro-peus*; *M. apiaster*, auctorum), now before me; only, that not being serrated, it forms a sharp cutting edge, turned inward, like the comb of the evejar. Can any correspondent suggest the use of this? Its consideration may, perhaps, throw some light on the much controverted question of pectinated claws. Does the bee-eater perch lengthwise, in the manner of the evejar? An apparently still more curious structure in the latter bird are the two spaces of transparent membrane inside of its capacious mouth, one in front of each eye, which would seem to intimate that it possessed the power of directing its eyes straight

forward, and seeing through its widely open mouth. A peculiar muscle, however, would be necessary to enable it to do this, which dissection proves not to exist; the eye is indeed sufficiently large and prominent to render such a power quite unnecessary.

The ash-coloured shrike (*Lanius excubitor*) is occasionally shot in this neighbourhood during the winter; but being exceedingly rare, I am unable to say any thing concerning it. The wood-flusher (*Collurio rufus*), also, I have never yet observed alive; but have seen two specimens of it, said to have been killed in Britain. The common flusher (*C. vulgaris*) is in these parts very abundant, and should be sought for on its first appearance in the spring, as the beautiful lilac gloss upon the breast of the male becomes in a few weeks much obscured. Several of our native birds are adorned with these lovely glosses, of various intermediate shades between pink and purplish lilac, when their plumage is in full perfection; a delicate pink may be observed on the breast of a cock whitethroat during the spring, and a trace of it also on some babilards; in the bearded tit (*Calamophilus biarmicus*, Leach), and bottle tit, these tintings are more permanent. Similar glosses may likewise be observed on the wings of certain butterflies; a full rose colour, for example, on the hinder wings of some male specimens of *Colias edusa*; also the rich and splendid purple which plays on the emperor's wings (*Apatura Iris*). Two chief requisites should be present to form a fine specimen of the male flusher shrike, some being much handsomer than others; the forehead should be white, or very nearly so, and the above-named lilac gloss tolerably conspicuous. A female should also be procured in the spring, and a specimen of the young in its first feathers, which should be sought for about the latter end of July, or beginning of August, not later, as they soon begin to moult. In their nestling feathers these birds are very handsome, the upper parts being beautifully barred with black; I have not Bewick's work now by me, but I think that author represents one in this state of plumage for the female wood-chat, another and very different species. The young flushers are easy to procure, as they follow their parents until they leave the country, and always indicate their presence by their perpetual clamour: which, though it may be heard at a considerable distance, generally appears as if close by, and leads one to imagine that in the nearest bush a brood of nestlings are about to fly; though accustomed to the sound, I have thus been often deceived. I know of no bird whatever, the eggs of which vary so much in shape, markings, colour, and size, as those of this shrike; they are usually somewhat similar in the same nest, but I hardly

ever remember to have seen eggs from different nests which bore much resemblance to each other. One in my possession has the zone of spots on the smaller end, and I have others which it would be impossible to distinguish from those of the robin.

The common grey fly-catcher (*Muscicapa grisola*) visits us in great abundance, but very late in the spring; and, what is singular, (being at variance with the garden warbler, swift, wood-wren, and other late summer visitants) is also very late in its departure. The sexes are much alike; a male should be procured early, and also a young one in its nestling plumage, which is mottled, like that of a young wheatear. I should have mentioned that all young birds should be procured, if possible, about a fortnight or three weeks after they have left the nest: that is, when their feathers are all quite developed, and before they have begun to moult them. The pied fly-catcher (*M. luctuosa*) is here a rare species, though not so much so as it has been described. I have two nests which were taken in this neighbourhood, and which are built more of moss, and contain less bass and other garden rubbish than those of the common species; they each contained three eggs, of a remarkably spherical form, and very pale pea-green colour. Some circumstances connected with one of these nests are worthy of being here recorded, as showing the remarkable attachment of this species to the place it has selected for nidification. A pair of pied fly-catchers took up their abode in a garden near this place; their first nest was robbed by a boy, and another was soon built in the same situation (against the ivied trunk of a large poplar), and four eggs laid; these were destroyed by a snake; and a third nest was actually constructed on the top of the last, which, with three eggs in it, and the broken egg-shells of the last adhering to the bottom, was brought to me as a curiosity, in the supposition that it was a nest of the common grey fly-catcher. I had it replaced as well as could be done, in about a couple of hours after it had been removed, hoping that after all the female would perhaps set; but so much persecution had at length driven the unfortunate pair from the place, and they were not seen afterwards: had the season been earlier, I would have placed the eggs in the nest of some other species, but it was now late in August, and very little incubation going forward. The two sexes of the pied fly-catcher are very dissimilar, and both should, therefore, if possible, be procured for stuffing; the young I have never seen, but from analogy should suspect it to be mottled. I am told that the song of this fly-catcher is pleasing, but have never yet heard it; the common species is one of the least vocal of our native birds, though

even it I have heard at times to chirrup forth a fragment of music; the usual call note of the pied fly-catcher is extremely dolorous, whence its specific name, *luctuosa*.

The different thrushes (*Merula**, Ray) should be procured in winter, as their plumage acquires no additional beauty in the spring, and as they are then, moreover, generally cleaner than at any other season. Of the blackbird (*M. vulgaris*) several specimens are necessary; its first plumage is mottled, like that of a young robin or nightingale; and the male may then be distinguished by being of a darker colour, and by the spots on its breast being generally more distinct. On their first moult, the males become wholly black, with the exception of the quill feathers, which, with those of the tail, are not changed till the succeeding autumn; the females, after their first moult, resemble the adult birds, only that the colour of the bill is not changed. Some female blackbirds have handsome spotted breasts, and I have seen some in which the bill is nearly as yellow as the male's; generally, however, the bill of an adult hen blackbird is only yellow at the base: that of the cock becomes yellow the first spring, and of an orange colour the second, at which time the bird has acquired its full beauty. The fieldfare (*M. pilaris*) varies very much; several specimens should therefore be obtained, and the finest of them selected for preserving; the female is smaller than the male, and its colours and markings less distinct; examples of both sexes should be preserved. A cock missel thrush (*M. viscivora*) should have the ground colour of the breast a fine rich sulphur yellow, and the spots well defined; the female is rather smaller, paler all over, and its spots in general very small; a young bird should also be procured in its mottled nestling feathers. Three specimens of the song thrush (*M. musica*) are necessary, representing the male, female, and young; the breast of the male, in this species, is usually of a deeper colour, and the spots smaller and better defined than in the other sex. The same remark applies also to the redwing (*M. iliaca*), though in both these species individuals frequently occur, the sex of which can only be distinguished by dissection.

A division has been made by some authors between the thrushes with plain, and those with spotted breasts†, but I think without sufficient

* As the central genus of the *Merulidæ*, or birds of the thrush kind, Mr. Selby has (I think with propriety) adopted Ray's name, *Merula*, for this genus, in preference to the subsequent appellation *Turdus*, of Linnæus.—E. B.

† All the species have the breast more or less spotted when young.—E. B.

grounds for so doing : the former (to which Mr. Swainson restricts the term *Merula*) are rather more stoutly built ; and the common blackbird of this country differs a little in habit, being never, I believe, strictly gregarious, and passing its time more in low underwood, protecting itself by stealth and concealment, rather than by open vigilance like the thrushes with spotted breasts : but these characters are at most but of little importance, and are not constant in the exotic species. The *M. migratoria*, of North America, is as gregarious as the fieldfare, which bird it indeed very much resembles, excepting in being much more familiar ; and moreover, some of the American thrushes with spotted breasts are solitary. This division is, indeed, quite unnecessary ; but I think differently of the separation of the rock thrushes, (*Merles saxicoles* of M. Temminck,) and their formation into a genus (*Petrocincla*, Vigors). These form a very natural group *, and I am of opinion that the ring-ousel of this country (*Merula torquata*, Ray) should range in it. Hitherto it has been always placed among the wood-thrushes (*Merles silvanæ*, Tem.); but it seems, in fact, to be an intermediate species, connecting the rock thrushes (*Petrocincla*) with that part of the genus *Merula* to which the blackbird belongs, but leaning rather to *Petrocincla*. It might with propriety, therefore, be denominated *P. meruloides*. This bird is very regular in its migration in these parts, appearing for a few days about the middle of April, and again at the latter end of September. Three specimens of it—male, female, and young—should be preserved. They are handsomest in the spring.

I shall conclude for the present with a few remarks on the common starling (*Sturnus variabilis*, Meyer). At least seven specimens are necessary to illustrate this species properly ; the young are at first of a uniform brown all over, and one in this state should be preserved ; they soon begin to moult ; and a specimen, when moulting, should also I think be stuffed, in illustration of the change. Both sexes, immediately after the first moult, are very handsome, and specimens of them should be procured about November ; the males are then very thickly speckled, and their hues brighter than those of the female ; the spots of the latter are much larger, especially about the head and on the belly ; the bill of each brownish black, or dark horn colour. The male that has moulted twice differs only in not being quite so much spotted on the

* A specimen of the blue-grey rock thrush (*P. cyanea*), said to have been shot in Kent, is now for sale, at Mr. Tucker's, in the Regent's Quadrant, London.—E. B.

breast, and in the bill being partly yellow; it is never yellow at the base, but purplish in the male, and brownish flesh colour in the female. At the third moult the male acquires its mature plumage, the feathers on the throat and breast being much more narrow, and sharper pointed than before, and not being tipped with white. About this time the female also acquires a yellow bill.

Tooting, Feb. 11th, 1834.

FIELD DIARY.

BY WILLIAM THORN, ESQ.

BEING a subscriber to your "Field Naturalist," and "Magazine of Botany," will you allow me to select a few observations, from my diary, on the past remarkable month?—a liberty I should not have presumed on, had you not given encouragement to lovers of natural history to send you their remarks, or "even the slightest hints." Although I am devotedly attached to this branch of science, yet (as will be but too evident), I am by no means an adept in it.

I have your "Insect Architecture," "Transformations," and "Miscellanies," also the "Alphabet of Insects;" but I want a Manual of British Entomology, giving a plain description of the size, colour, localities, &c., of those numerous insects which are constantly presenting themselves to our observation. Do you intend to publish a work of this kind, or can you recommend any already published *?

Will you permit me to suggest for your consideration, whether it would not be for the advantage of many of your readers, as well as myself, if you were monthly, or occasionally, to give plain descriptions, with wood-cuts, of some of our British birds, insects, reptiles, &c., which, though common in the fields and woods, are not generally known by name?

DIARY.

January 2nd, 1834. *Pirus Japonica*, and *laurustinus* in flower.

3rd. Larks (*Alauda arvensis*) congregating. A few fieldfares (*Turdus pilaris*) made their appearance.

4th. Heard a blackbird (*Turdus merula*) singing between seven and eight o'clock this morning. Remarkably mild for the season.

* My "Conspectus of Butterflies and Moths" is the only cheap English work. For other insects there is no similar work.—EDITOR.

7th. Sweet-scented violet, purple and white (*Viola odorata*, var. *purpurea et alba*) in flower. Observed a few yellow crocuses peeping between the leaves.

9th. Observed at nine o'clock this morning the wind was east, a dense fog—from eleven to one o'clock sunny; an upper current of clouds coming from the west, an under current from the south-east; at two o'clock rain commenced and continued till sunset, when the wind had changed to the south-west.

10th. Heard a thrush (*Turdus musicus*) singing.

14th. This day (St. Hilary's) is said, on an average of years, to be the coldest, but to-day the weather has been particularly fine and mild. I heard this morning a blackbird (*Turdus merula*), a sky-lark (*Alauda arvensis*), singing; observed a snow-drop (*Galanthus nivalis*), blue hyacinth (*Hyacinthus orientalis*), and many crocuses in flower.

15th. Heart's ease (*Viola tricolor*), furze (*Ulex Europæus*), in flower; wren (*Sylvia troglodytes*), singing; moles throwing up their heaps of fresh earth.

24th. Common laurel (*Prunus lauro-cerasus*), hazel (*Corylus avellana*), in flower.

25th. Saw some toads' (*Rana bufo*) spawn, many dung flies (*Scatophaga stercoraria*), common house-flies and gnats in numbers. Elm, (*Ulmus campestris*), dandelion (*Leontodon taraxacum*), phillyrea (var. *latifolia*) and countless daisies (*Bellis perennis*), in flower. Heard the ground sea particularly loud through the day*; this phenomenon (which has not been satisfactorily accounted for) generally precedes heavy rain and high wind.

27th. Observed pilewort (*Ranunculus ficaria*), creeping crowfoot (*Ranunculus reptans*), in flower; honeysuckle (*Caprifolium periclymenum*), and elder (*Sambucus niger*), in leaf.

28th. Blue tit (*Parus cæruleus*), chirping; *Corcorus Japonica*, purple and striped crocuses, and double-blossomed furze, in flower.

29th. *Arabis grandiflora* in flower. Observed on the branch of a larch (*Pinus larix*), in a warm and sheltered situation, some leaves just in the state of forwardness they generally are the last week in March, or first week in April.

30th. Saw a large elm felled, which was covered with flowers.

31st. Observed two gulls for the first time this winter. Very few fieldfares and redwings have visited us as yet; but to-day I saw a larger

* Grilston is about eighteen miles distant from the coast.

flock than at any time before this winter. Not a wild duck or widgeon has yet been seen about the streams in our valleys. Saw some frogs' (*Pama temporaria*) spawn; Gathered the first primrose (*Primula vulgaris*), yellow hawkweed (*Hieracium aureum*), scorpion senna, shepherd's purse (*Thlaspi latifolium*), and lychnis, in flower; sweet briar and gooseberry in leaf. An early shaw potato, which was left in the ground last summer, under a south wall in my garden, has produced a stalk one foot ten inches and a half in height.

P. S. (Omitted January 23rd.) I have frequently seen of late, a single heron by the rivers (Mole and Nymph), which I have no doubt comes from Pixton near Dulverton, the seat of the Earl of Carnarvon, (about twelve miles distant,) as there is a heronry in the park. They often visit us during the summer and autumn.

Grilston, near South Maldon, North Devon,
4th February, 1834.

VULTURES (*From Le Vaillant's Birds*).

CAPE VULTURE (*Egyptus fulvus*, Savigny).

(Continued from page 89.)

Le Chasse-Fiente, *Le Vaill.*, Ois. d'Afrique. i. p. 44, pl. 10; Vultur Kolbii, *Lath. Ind. Orn. Sup.* p. 1; *Daud.* i. p. 15; *Temm.* Man. d'Orn. p. 4; *Id.* ed. 2d, p. 6; Kolben's Vulture, *Lath. Gen. Lyn. Sup.* ii. p. 12; *Id.* Gen. Hist. i. p. 19.

INDEPENDENT of the large vulture, described in the preceding article, there is still, throughout every part of Africa which I have visited, another large vulture, totally differing from the former, as much in its colours as in several characteristics which easily distinguish it from the other species.

I have suffered this bird to retain the name of *Chasse-Fiente*, which is the literal translation of the Dutch name *stront-jager*, applied generally by the colonists of the Cape of Good Hope to all vultures, and particularly to the one in question, because it is more commonly known. The *Oricou* is found only on the confines of European plantations, where, as I have previously observed, it is called the black carrion vulture (*swarte-aas-vogel*).

The *Chasse-Fiente* is the bird spoken of by Kolben under the same name, and which he has particularised as an eagle at the Cape. Buffon, it seems, in comparing this pretended eagle, at the Cape, to the genus

of Vultures, has not, moreover, failed to place it among the species of American *urubu*, and to conclude that the *urubu* equally inhabits America and Africa; a conclusion the more hazardous, inasmuch as it has not yet been shown in a single instance that any vulture is common to the new and the old world. But Buffon was not contented to stop here; he must needs precisely indicate the passage between the Brazils and Guinea by which the *urubu* traverses the sea, and repairs into Africa. If this naturalist had given himself the trouble to compare the *urubu* of America with the description of Kolben, he would have been easily convinced that the stout and crooked bill of the *stront-vogel* was not at all applicable to the *urubu*, which has, on the contrary, a bill so long and slender, that the Spanish and Portuguese colonists have given it the name of *gallinaco*, *gallinaca*; and the English, that of turkey-buzzard. The *urubu* has, in fact, a bill more resembling that of the turkey than the vulture. M. Dumarchais, who had remarked with great care the particular form of the bill in this bird of prey, inconsiderately concluded that it was a species of wild turkey, which was accustomed to eat dead bodies and carrion. Look at the *ourigourap* (plate 14 of Le Vaillant); it is also a vulture, and has a bill of nearly the shape of the *urubu's*, but rather longer.

It is a fortunate circumstance that the designer, at least, saw the *urubu*, when he made his figure of that bird; for it is, possibly, represented in Buffon's coloured plates, No. 187, under the name of the Brazil vulture. Is it not, however, astonishing that in Buffon's works all the birds, or at least nearly all of them, have, in the coloured plates, names different from those under which they are described? Is not this strong evidence of the way in which his work was executed? It is clear, however, that Buffon never saw the *urubu*, and never glanced his eye over the plate which represents it, or he would not have committed the error which he has done. But unhappily it requires no great effort to be convinced that all his relations have been written under the same disadvantages; that is, without his having seen or compared the species. It is yet deserving of remark, that the *Chasse-Fiente*, of Africa, is more than three times as powerful as the *urubu*, and but little smaller than the *oricou*. During repose its wings almost reach to the tip of the tail. This character alone would be sufficient to distinguish it from the *oricou*, whose wings go several inches beyond the tail. It has not, besides, the head and neck bare like the latter, but covered with a fine and cottony down, like the *percnoptera*, the vulture figured in No. 425 of Buffon's plates.

Before I compared the *Chasse-Fiente* with these two birds, I was of opinion that it belonged to the species of *percnoptera*: but from the confrontation of these three birds I saw that I was mistaken, and that the *Chasse-Fiente* was a new species to be added to the other two, which bear more resemblance to it than any other description of vulture.

The *Chasse-Fiente* should not be confounded with the *percnoptera*, since the character of the latter, in having its wings shorter and tail longer than the eagle's, is in no respect appropriate to the former, whose wings, on the contrary, are longer and tail shorter; besides, its head is of a clear blue, and its neck is not covered with a white but yellowish down. In a word, the *Chasse-Fiente* has not that brown heart-shaped spot on the breast which is peculiar in the *percnoptera*, and its colour is altogether different. The *Chasse-Fiente* cannot, moreover, be considered as a variety of the vulture, depicted in Buffon's plates, No. 425. A single glance at the two figures will convince those who shall take the trouble to compare them together.

The general colour of the *Chasse-Fiente* borders on Isabella yellow, and afterwards approaches what is called pale coffee brown. Some of the small wing coverts are marked with a deeper tint, and the large quills are blackish. At the nape of the neck is a sort of ruffle composed of long and slender feathers, curved by the friction of the head, which they totally conceal when the bird shrugs up its shoulders. The feathers, which cover the legs, descend a little over the fore part of the shank; the large scales, which cover the legs and toes, are brownish. The claws are blackish horn colour, as well as the bill. The iris of the eye is of a dark brown. The male and female differ but little from each other, and I never observed but a very trifling difference in their size; the male, indeed, is not quite so strong; but there must necessarily be that marked disproportion between them, which is observable between the sexes in almost all other species of birds of prey.

The *Chasse-Fiente* retires amongst the highest mountain rocks. Immense numbers of these birds inhabit the whole of that rugged chain of mountains which spreads over the point of Africa, from Cape Town to False Bay; whence they visit all the dwellings in the environs, and find abundance to supply their hunger: for as the country in the vicinity of the town is exceedingly dry, animals can find but scanty fare, and very frequently perish through want of food. Such is the cause that the carcasses of several oxen, which have been abandoned by their owners, are invariably to be observed in the roads. It is a providential occurrence on behalf of the indolent inhabitants of these climates,

that vultures deliver them from putrid infections. I have seen these birds fly down to the entrances of slaughter-houses, in order to feed upon the head and intestines of animals which had been killed there, and which the prevalence of a bad custom allows to be thrown before the door.

The *Chasse-Fiente*, also, frequents the sea-shores in great plenty, where the inhabitants deposit their rubbish, or house-dust. It is, also, attracted to these parts by the offal which is thrown overboard from vessels riding in the roads, as well as by the shell-fish, crabs, and dead fish, which the ocean ejects from its bosom. It is very probably owing to this abundance of food, that the species of *Chasse-Fiente*, which is much more numerous than that of the *oricou*, has so extensively multiplied in the colony of the Cape.

I know from experiments which I have tried, that this bird can exist a long time without receiving any food. One day, when a violent south-east wind had caused several of them to fall down into the streets of Cape Town, I took two alive; and, as these birds are in general excessively fat, in order to reduce them to a state of meagreness, I was desirous of famishing them to death. For this purpose, I ordered them to be put into a large hen-coop without food. At the end of some time, I killed one of them, which was still too fat. After that I suffered the other to fast several days; but seeing it grow enfeebled, and believing it to be lean enough, I killed it. I was much astonished, nevertheless, to find that it had even too much fat when I prepared it.

My remarks on the manners of the *oricou* are equally appropriate to the *Chasse-Fiente*, which has the same habits. This species, as I have already mentioned, has infinitely more increased than the other, although the females produce an equal number of eggs: those of the *Chasse-Fiente* are bluish white. These birds being of a more conspicuous colour than the *oricou*, are more readily perceived when perched upon the rocks at the entrance of their retreats, and known by their white spots. It is an agreeable sight to behold a troop of these birds quite covering an entire chain of mountains; the report of a *carbine*, loaded with ball, will be sufficient to set them all heavily on the wing, and cause them to wheel round in the air. In deserts, where vultures do not always meet with carrion in plenty, they feed on whatever they can obtain. I have killed some, which had nothing in their crops but pieces of the bark of trees, or clay,—often even bones, upon which there was no flesh whatever; and sometimes, also, the crop was filled with the excrements of animals. The savages assured me that

when vultures are oppressed by want, they reciprocally devour each other's young ones, and even their own: but I had never an opportunity of ascertaining the truth of this fact, and will not, therefore, be responsible for its correctness. The land turtles and land shells, at the Cape, which these birds swallow entire, are to them a very delicate prey: they also fling themselves upon those clouds of grasshoppers, which I have described in my travels.

A BACHELOR'S GLEANINGS.

YOUR bachelor correspondent (S.) has been wandering lately, and hopes a few gleanings may not be unacceptable.

I have been on the borders of the New Forest, Hampshire, and had an opportunity of witnessing the following extraordinary fact. The fallow deer there are remarkably fond of the common holly, but will only feed upon it when *cut* and thrown before them by their keepers, and then they strip off the bark and eat the leaves greedily; if not *cut*, they will never think of touching it.

Staying a few days at a friend's house, I was not more surprised than delighted with the following instance of the tame and domestic habits of the robin. Though my friend is father of a large family, the *pet* (for so the welcome little bird has been christened) invariably comes to the window at breakfast-time, taps violently with his beak at the window, hops in without the least alarm, feeds, and really saunters about for nearly an hour, then flies to the window, where he knocks violently again for liberty. Although the children are playing about, he hardly thinks it necessary to get out of reach of their romps. His visit is again repeated before night; he knocks for admission, and as the window opens walks in as a matter of course.

Last year I had a bed of tulips of rare and beautiful sorts, which I thought I would protect from chance of frost, by covering them with *tan*. They all flowered *perfectly black*.

This may not be uninteresting to some of your readers who study garden chemistry.

Shrewsbury, 4th February, 1834.

[Did S. remark whether the holly leaves cut by the keepers were with or without prickles? The lower branches of holly have their leaves always prickly, while the top leaves are smooth; a circumstance which led Dr. Darwin to fancy the hollies in Needwood Forest *knowingly* put out these prickles to defend themselves from the deer!!! The fact about the black tulips is exceedingly interesting. Ed.]

SKETCHES FROM GRAVESEND.

BY ORNITHOLOGUS.

MANY thanks for your kind insertion of my former communication, as well as for your answer to my question relative to the nightingale's food used in Germany; I have no doubt that meal-worms are much used, but can hardly understand how they procure them in such amazing numbers. It is probably from the animation of warble which such stimulating diet excites that the German canaries acquire that astonishing vigour of song which they possess. One which I purchased last year actually commenced singing at the bottom of the chaise in which I was riding, and this too in the streets of London! I am, however, inclined to think that the bringing them into this high condition (if I may so express myself) has a tendency to shorten their lives, as their strength becomes prematurely exhausted by such extreme exertion. I will now relate the story of the grosbeak to which I referred in my last.

In the summer of 1832, I was informed that a pair of these birds had taken up their abode in a garden or plantation near Cobham. Aware of the doubts which existed as to their nidification in this country, I went over to convince myself of the fact by a personal inspection. Unfortunately I was a few days too late. There had been a nest placed on the projecting branch of an apple tree; but the owner of the garden had secured both the old ones, by placing the young ones under a sieve, and thus entrapping them when they came under it to feed them. They lived for some days; but did not appear to eat any of the food that was given them, with the exception of snails, which they attacked and devoured with great gusto, even before our eyes. The whole, however, soon died, and no others appeared in the neighbourhood. The owner promised to let me know if any appeared in the ensuing year, an event which did not seem probable, as this family had perished. In the month of May, 1833, I went over; and much to my satisfaction found that a pair had built their nest in the garden, and, what is most remarkable, on the same branch of the same apple tree! How can we account for this extraordinary predilection? Is it not possible that in countries where these birds abound they congregate after the manner of rooks, and return at the proper season to their favourite haunts, which might be called a Loxiary? I merely suggest this idea, not having the means of proving

its correctness; but there are two circumstances which give it the appearance of probability. The first is, that there is one member of this family, the *Loxia Socia*, or Sociable Grosbeak, found at the Cape of Good Hope, which breeds in the manner I have suggested. The other circumstance is, that whenever the Crossbill (*Loxia curvirostra*) appears in this country, it is generally in flocks. In my own neighbourhood, a few years since, a small flight of these birds came over and took possession of some high fir-trees in a garden close to a gentleman's house. Here they remained during the summer, when their progeny having arrived at maturity, they took their departure. Their habits were very interesting, and their familiarity seemed to imply that they had come from some region where man had not wrested his powers to their molestation. On the other hand, I am well aware that the bulfinch, and many others of this genus, are only found in pairs; so that doubts may exist on both sides. The nest was composed of small roots, lichens, and small sticks, much resembling that of the bulfinch, especially in the slightness of its contexture. On reference to my diary, I find that it was brought to me on the 27th of May, with two young ones about half grown, and the male parent, which had been caught in the same manner as in the preceding summer. I let them loose in a large volary, and anxiously watched to see whether he fed the young ones. Unfortunately I was taken suddenly ill, so that I could not bestow that personal attention to them I should otherwise have done; but I had the pleasure of seeing the old bird eating hemp-seed, and of hearing that he had repeatedly fed his offspring. Notwithstanding this, however, they did not appear to thrive, and after a short time died, the father surviving his young ones about a fortnight.

I think it very probable that this species might be taught to pipe tunes like the bulfinch, and wonder the experiment has not been tried. There is one circumstance I have omitted, relative to the nidification of this genus, which is, that there is a small species of green parrot which is gregarious; and as I consider them nearly allied to the *Loxia* family, (the parrot crossbill, or *loxia pityo-psittacus*, being the connecting link,) this fact seems to favour the idea. I am a great admirer of this genus, and think them very interesting. The bulfinch especially I have paid great attention to. It is curious that of a nest of six young ones I brought up last year, four of them are hens; curious, because the cocks generally preponderate in about the same proportion. I have for two years had one of them paired with a canary,

but although they appeared completely attached, the bulfinch feeding the canary on the nest, &c., the eggs never hatched. I also tried the same experiment with the siskin, and with the same ill success, notwithstanding the opinion which exists that they will pair readily. A few days since I had brought to me a very remarkable linnet: this bird was of a dirty cream colour throughout the body, and the wings only differed in having those red streaks with which the common linnet is marked. The bird-catcher had been some time attempting to secure it; and when he did succeed, it came but singly from a flock of a hundred, down to his nets. It is curious that very near the spot where this bird was caught, a young lark was taken with white wings, and which having now arrived at maturity, presents a very curious appearance. Is this merely an accidental coincidence, or the effect of some peculiarity in this particular spot? I should think the former. I must now bring my rambling remarks to a conclusion, apologising for their prolixity. The man of the world may smile at what he deems the frivolity of such pursuits, and deem that attention thrown away which is directed to the observation of such diminutive objects; but for my part I am well content to say with friend Horace—

“ Libet jacere modo sub antiqua ilice,
Modo in tenaci gramine:
Labuntur altis interum ripis aquæ;
Queruntur in sylvis aves;
Fontesque lymphis obstrepunt manantibus
Somnos quod invitet leves.”

As links in the mighty chain, no “*created* things” are to be despised; they form parts of the stupendous whole, which is the work of Omnis-science—the production of that Being, (to use the words of the poet,)

“ Who sees with equal eye, as God of all,
A hero perish, or a sparrow fall;
Atoms or systems into ruin hurl'd,
And now a bubble burst, and now a world.”

SOME NEW DESCRIPTIONS AND FIGURES OF THE NESTS AND EGGS OF SPIDERS.

BY SOLITARIUS.

I AM sorry that the circumstance of not being able to procure any work treating upon our British spiders, prevents me from furnishing

the reader with the names of the species to which the accompanying figures relate.

Fig. 1. Represents a spider's nest, formed by an old oak leaf being doubled and supported upon a rush, which penetrates the top of it. The sides of the leaf are apart from one another, but are prevented from spreading, by means of a thick web of silk extending from the margin of the one to that of the other. The two extremities of the upper part of the leaf are always open, so as to allow of the little inhabitant escaping upon the approach of danger. The first specimen I ever noticed I met with in a field near Wormwood Scrubbs, but I now find them in nearly every field in which oak trees grow; and in none of them do I notice any difference, except in the size of the leaf and the height at which it is supported from the ground.

Fig. 2. Is that of an irregularly shaped deposition of eggs, found about a week since, attached to a piece of grass, on Hampstead Heath. The eggs are enveloped in snowy white silk, which also folds round the ends of two sprigs of grass, which, bending, act as its suspenders.

Fig. 2.

Fig. 3.

Fig. 3. Relates to another cluster of spiders' eggs, similar in its situation to the preceding, but different in shape and colour, being globular and brown. For what purpose this suspension is intended is not very apparent, unless it be for the purpose of placing the eggs beyond the reach of predacious larvæ, and such apterous (for it would not avail with the diptera, &c.) insects as might devour them.

MICE IMITATING THE GRASSHOPPER'S CHIRP.

IN a field opposite Porto Bello Farm, near Wormwood Scrubbs, one evening in last May, my attention was attracted by a noise at the bottom of a hedge, resembling the chirping of a grasshopper, but accompanied by a rustling among the dry reeds and fallen sticks that lay beneath, caused by some little animal running and jumping under and over them alternately. This circumstance I have often observed in the country; and from the hasty glimpse which I have now and then obtained of the animal, I came to the conclusion that it was some shy little bird, and which for the want of a name I christened the hedge-creeper, but since I read "White's Selbourne," I renounced that name, feeling satisfied that it must be the grass-hopper warbler. But in the present instance, I embraced the opportunity of assuring myself as to its species; with which view I cautiously advanced towards the hedge, and patiently awaited, hoping to obtain another sight of it; but my approach had frightened it, and all was still for some time. I was bending over the bank, when suddenly I heard the same noise as before, and saw the little author of it run out from under the dead stalks, and giving a fluttering sort of jump, which defied one to form any idea of its shape; it concealed itself again in the dried rubbish under which it ran, uttering its grasshopper-like chirp all the while. I now had my "eyes about me," and remaining as perfectly still and motionless as

though I had been but an overhanging tree, I watched and listened attentively. Not many seconds had elapsed before there came another, a second, a third; but, to sum up, I do not think I shall exceed the limits of truth, if I say that there at length came the thirtieth of these creatures, and all from the same direction, and uttering the same cry as they jumped in their fluttering style one after another over my foot (which rested upon the bank), and then betook themselves to the same path as the leader did. Some of them, however, halted in their career at the sight of my foot, and then it was that I got a correct view of them, and was somewhat surprised to find that the objects of my attention were nothing more or less than mice of a thick bulky form, with blackish backs and light-coloured bellies, and abruptly terminated tails; but one individual, which I had nearly succeeded in catching, was of a beautiful sleek fawn colour above, and white beneath, and was in every respect an elegant little creature. In a short time they returned from the opposite direction; and coming out with more caution from their *run*, as it is termed, they first took a reconnoitring peep, but observing me perfectly motionless they at length collected round my foot to satisfy their curiosity, and were so desirous of removing it (for as it rested upon their *run* it intercepted their regular course) that two or three of them had actually commenced nibbling the leather of my boot. As fate would have it, however, I sneezed, and thus frightened this interesting group, which in a moment was dispersed in different directions; yet I still kept my quiet position, not doubting but that in a few minutes, when their fears had subsided, they would again return. It was not long before they did as I expected, but they came in a less regular order, some arriving from one quarter and some from another; and again they reconnoitred, but as I moved not, they appeared unapprehensive of danger. They had re-assembled round my boot, when I, who now felt anxious to capture a specimen, dashed my hand among them, endeavouring, but without success, to grasp one. It was with no better effect that I hit about with a stick in every direction in which I heard them running, for the purpose of disabling or killing one as a specimen, that its name might be ascertained. I waited some time afterwards, until it grew dusk; yet as I neither heard nor saw anything of them subsequently to my attack upon them, I retired from the spot, but well pleased with this singular occurrence.

SOLITARIUS.

July, 1833.

THE BRITISH MUSEUM.

BY E. G. BALLARD, ESQ.

THE CAMELOPARD, (*Giraffe*, Linn.)

THIS curious animal, of which the present are two of the largest specimens ever exhibited, when standing erect, and holding up its head, measures seventeen feet from the crown of the head to the ground, and eighteen feet from the point of the nose to the end of the tail. It is only nine feet high at the rump; the neck is seven feet long, and the distance from the withers to the rump is six feet.

Such is the general description of this interesting animal, but the Menageries, vol. 1. p. 339, will furnish us with several particulars of its structure and habits, which, though but borrowed from various sources, afford those data on which is founded the true character of the animal, and thus become valuable in a zoological point of view.

Of its structure and habits we have the following description: Le Vaillant, who saw the animal in its natural state, says, "The Giraffe ruminates, as every animal does that possesses at the same time horns and cloven feet; it grazes also in the same way, but not often, because the country which it inhabits has little pasturage. Its ordinary food is the leaf of a sort of mimosa, called by the natives *kanaap*, and by the colonists *kameeldoorn* (*Acacia xariffiana*?). This tree being only found in the country of the Namaquas, may probably afford a reason why the Giraffe is there fixed, and why he is not seen in those regions of Southern Africa where the tree does not grow.

"Doubtless the most beautiful part of his body is the head. The mouth is small, the eyes are brilliant and full. Between the eyes, and above the nose, is a swelling, very prominent and well defined. This prominence is not a fleshy excrescence, but an enlargement of the bony substance, and it seems to be similar to the two little lumps or protuberances with which the top of the head is armed, and which being about the size of a hen's egg, spring on each side at the commencement of the mane. His tongue is rough, and terminates in a point; the two jaws have on each side molar teeth; but the lower jaw has, beyond these, eight incisive teeth, while the upper jaw has none.

"The hoofs, which are cleft, and have no nails, resemble those of the ox. We may remark, at first sight, that those of the fore feet are larger than those of the hind. The leg is very slender, but the knees have a prominence, because the animal kneels when it lies down.

There is also a larger callosity on the breast, which would lead one to conclude that he generally rests on that part.

"If I had not myself killed the Giraffe, I should have believed, as have many naturalists, that the fore legs are much longer than the hind. This is an error; for the legs have, in general, the proportion of those of other quadrupeds. I say in general, because in this genus there are varieties, as there are in animals of the same species. Thus, for example, mares are lower before than stallions of an equal height. What has led to this error, as to the difference between the legs of the Giraffe, is the height of the withers, which, according to the animal's age, may exceed the height of the rump by sixteen or twenty inches, and which disproportion, when we see it at a distance, must have led to the belief that its legs were longer than behind. His defence, as that of the horse and other hoofed animals, consists in kicks; and his hinder limbs are so light, and his blows so rapid, that the eye cannot follow them. He never employs his horns to resist any attack."

To this quotation, which is sufficient for my present purpose, I may add one circumstance, mentioned under the head of Antelopes, in the same *Menageries*, p. 355; namely, "The Giraffe forms the second tribe, which is distinguished by having horns, or prominences on the frontal bone, covered with a soft skin, which is a continuation of the skin of the head. The horns exist in both sexes, and are permanent."

From these brief particulars, a few remarks arise relative to the peculiar structure of the head of this animal. We find that it is furnished with very full and prominent eyes. These, from the peculiar narrowness of the *os frontis*, do not admit of the deep-seated eye socket observed in the ox or horse.

Fig. 1, 2, in which a blow from above would be thrown off in the direction *a a* or *b b*, and thus escape the eye; but in this animal the

protection of that organ appears to be provided for in the prominence *a* fig. 3, in which case a blow would be thrown off in the direction *c c* which I consider as the use of the conspicuous prominence on the frontal bone.

The prominences at the back of the neck, *a a*, fig. 4; I consider as placed there to give a firm and broad basis for the insertion of the strong and powerful ligaments necessary to support the long neck of the animal, which find a similar provision at their base in the height and expansion of the *scapulæ*, which form the withers of the animal. The above prominences may also serve as bases to the insertion of the muscles which support the head, as well as by their position form a protection to the tender horns with which the animal is furnished.

THE HIPPOPOTAMUS.

THIS huge and unwieldy animal, of which the present is a very fine specimen, has been estimated at various dimensions by authors. Some have been killed measuring seventeen feet in length, seven in height, and fifteen in circumference; according to the testimony of experienced travellers. But the individual before us does not by any means come up to the above standard of colossal proportions. Its colour is said to vary considerably, according to its situation; when just emerged from the water it appears of a palish brown or mouse colour, with a blueish or slate-coloured cast on the upper parts; and the belly is flesh-coloured, the skin appearing through the hair; but when quite dry, the colour is, as in the present instance, of an obscure brown, approaching to black; without any of the blueish cast. Its head is of great size and weight, and armed with formidable tusks. From its stupendous size, imposing appearance, and horrid aspect, it is calculated to inspire feelings of dread; but notwithstanding its exterior, it is of mild and inoffensive habits, and subsists wholly on vegetable food. Its singular faculty of sinking at pleasure when in the water, and continuing its course at the bottom, appears to indicate its possessing the open *foramen ovale*, common to some amphibious animals; while its thick skin resembles that of the whale, and is probably furnished with a mucilaginous secretion to prevent the effects of maceration.

I have been often powerfully struck, when viewing the uncouth form of this animal, in juxtaposition as it is with the light and elegant giraffe, at the wonderful adaptation of means to ends in their organisation. In the former all is suited to its habitation in the deep. Its ponderous legs short, and widely separated, and thus fitted either for

swimming or traversing the bed of the river, while its great length of body and consequent specific gravity enables it to sink with facility. What a contrast does this present to the long and agile limbs, lengthened neck, and light body of the swift and timid tenant of the mountain and the plain! Were they to change situations, how could the necessary adaptations be made in physical structure, according to the fanciful theory of some modern naturalists?

E. G. BALLARD.

Islington, 11th Dec., 1833.

UPON THE NATURE OF THE PAR, AS OBSERVED IN SCOTLAND.

THIS small fish abundantly frequents our Scottish rivers, and (as is well known) is never found except in streams accessible to the sea-trout and salmon. We are aware that Pennant and other writers have disputed this fact, and attempt to prove upon their own observation, certainly not the most accurate, that few are to be caught in some waters which salmon are unable to ascend. Pennant mentions a stream in Inverness-shire in support of his assertion, the upper part of which is separated from the rest by an insurmountable water-fall, and yet contains par in considerable numbers. We have inquired into the truth of this statement, and find that it must have originated in some mistake of the learned tourist, who confuses with this fish a very small species of trout, inhabiting rapid and stony streams, and which, in external appearance somewhat resembles the par, without possessing any of its fixed and characteristic developments. Like that, it is white and silvery, active for its size, and in many cases marked on the side with those blueish impressions as of depending finger-points, which are erroneously supposed to be the leading distinction of the other; we say erroneously, because anglers must have observed, how even common and good sized trout are often set off with this peculiarity in different degrees. Nor do we wonder much at Mr. Pennant's statement, since we have known observing and scientific craftsmen fall into a similar error, and hold out to be the par what a little examination has proved to be the common river-trout. What then, it may be asked, are the points which distinguish this fish? And first, let it be noted how the par, with very few if any exceptions, hath only one row of scarlet spots or stars extended on either side, from the gills to the tail, whereas

the common trout hath always two or more of such rows, more varied in colour, and less equalised in their dimensions. Again, the pectoral fin of the par is broader, and contains a greater quantity of spines than that of the common trout. Thirdly, the gills are more silvery and clear of marks, being at no time impressed with more than one or two; while in the trout they have a yellowish appearance, and are studded over with a large number of dark spots. The tail of the one also is forked, that of the other mostly straight. In fact, there is in the whole aspect of the par, when narrowly examined, a singular difference from that of the trout. It is, besides, a nimbler and less cunning fish, and never seems to increase beyond a certain size, although well known to attain that maximum in the course of two or three months from its first appearance during the angling season. And this is a fact to which we beg attention, as it will shortly go some way to support our theory concerning the par, that it is the young of the salmon in a certain state.

In order to prove this, it will be granted to us, as we shall boldly assume, that Pennant's assertion is erroneous, and that this fish is only found in waters visited by the salmon; that, in point of fact, it has some sort of connection, whether direct or indirect, with the sea.

This postulate has been allowed by almost every writer on the subject, and yet has done little towards settling the question at issue. Three theories, barring the one of its being a distinct species of trout, are abroad concerning the par. The first and most general opinion is, that the par belongs both to the trout and salmon species, and is a sort of mule betwixt them. The second theory maintained by some reckons it to be the male of the sea-trout, whitling, or finnock; and the third, which is by far the soundest, is held, certainly we confess upon suspicious premises, by the Ettrick Shepherd, and assumes that the par is nothing else than the fry of the salmon.

We shall consider these three opinions individually, and give our reasons for supporting the last. First then, as to the par being a mule betwixt the salmon (under which term we include the grilse and whitling,) and river trout.

How happens it, that two such comparatively large fishes produce so attenuated a breed, when we know that the cross betwixt beasts, such as that of the horse and ass, is proportioned to the size of the animals, and that the four-footed mule is so much less than the one, and larger than the other? Neither does the crossing of different birds, such as the goldfinch with the bulfinch, diminish their offspring in any degree;—yet the par produced by one fish a yard in length, with another most

probably exceeding a foot, never attains half the weight of its smaller parent, and measures at most six or seven inches. Again it is singular, that in rivers where par lie, they muster as ten to one, compared with the common trout, a most extraordinary proportion of mules ! which, if we consider the well-known precautions of salmon, while spawning, could not possibly be produced. These fish in ascending our streams pair off as spawner and milter ; the female to deposit her roe, and the male not merely to impregnate, but guard the spawn against the attacks of trout and smaller fish, who naturally, instead of doing the same office, molest and devour it ; and in the case of trout roe, the reverse happens ; it is a favourite food of the salmon, and not likely to be impregnated by him, who is well known to watch so devoutly the operations of his own spawner. Hence, a very meagre portion indeed of the ova can possibly (and that by chance, when the water is heavy) be so crossed as to produce mules, if such a production were the consequence. How then is the fact of the par being found in such large numbers reconcilable, supposing them to be mules, with the other fact of the comparatively accidental crossing, which takes place between the salmon and trout ? We submit the question to the maintainers of this theory for a solution. Again, what is the ground upon which the opinion is founded, that par are a sort of mules ? Simply this, that they are incapable of breeding—that they have no spawners among them, and are seemingly all milters. We allow the statement to be true, although, as we shall presently show, it is somewhat questionable whether or not they be all spawners ; at any rate they are all of one sex. But is this the case with mules ? On the contrary, as is well known, the male and the female mule are just as fully developed in every part, as the stallion and mare are among horses. You have both the one sex and the other perfectly distinct, and their only inherent defect is a mutual incapability to extend the species. The formation of the par is, however, precisely the same in every individual. You have not that essential difference in mouth, by which the sex of fresh-water fishes is so easily ascertained. The internal structure of each is the same, examine whatever number you may ; so that, if mules, they want the property common to them with other animals ; a separation into sexes. And here we shall be asked, to which sex do we suppose the par to belong ? The natural reply is, that they are milters ; and thus we hold, in spite of the argument of a Clyde fisher from Hamilton we met with during a ramble, some summers ago, who cut up in our presence several of these fish, and pointed out in each of

them a small yellowish matter, collected near the back-bone, which he maintained was an incipient roe, although no more resembling it than the moon does a man's face. He likewise assured us of a fact, which during the experience of thirty years he had carefully noted, but whether worthy of credit or not we ourselves are unable to discern, namely, that the par in Clyde every fifth year are both fewer and much larger than they are in the other four. If this is the case, it proves nothing, but still it is singular; and no doubt every angler must have observed in most rivers, that one season often presents him with different sized fish from those of another, and that they are few or numerous, according to their size.

But leaving the mulists as sufficiently handled, we proceed to the opinion held by some, and by the author of an article in the Edinburgh Encyclopædia, that par are the males of the sea-trout, whitling, or finnock. This theory is at once overturned by the well-known fact, that these fish have the tail straight, or nearly so, while the par and salmon have theirs fully and beautifully forked. But supposing, as we grant it possible, that the growth of the fish changed in some measure the appearance of that appendage, still we are by no means at a loss for another argument, to be taken from open and conclusive facts, which readily exposes the error of this opinion. In the Rochil, a respectable stream, which joins the Earn, opposite to Comrie, in Perthshire, there are few par, except in the lowermost parts, where they are pretty abundant during the summer months. Two or three miles up, above a point where salmon generally halt, owing both to the uncertainty of the floods, and likewise to the interruption of a small but ill-assorted waterfall, in overcoming which a large fish runs the risk of falling either among bare rocks or shallows, par are seldom or never caught; and yet the sea-trout and whitlings run up without danger, and spawn in immense numbers many miles on, through the whole extent of Glenartney; nay, it is well known throughout Perthshire, that the Rochil is the best stream in the whole county for these fish, and that a dozen or more, averaging three pounds weight each, may be taken by a single rod among the highest pools in a proper season. If, then, par are the males of the sea-trout and whitling, or mules between them and the common trout, of which there are vast quantities in this stream, why are they not to be found among the innumerable spawn-beds along its course? A few surely might remain above as well as under the point alluded to; and yet we ourselves have never been able to capture one individual, although we have angled

there over and over again. But a fact somewhat similar may be noted, nearer Edinburgh, on the stream which runs into the Forth below Cramond, and also on the Esk close to Musselburgh, both of which are visited by a small species of sea-trout. From the former stream we have taken them in considerable numbers; and although angling with a small fly, we never caught or saw a single par. Also at Musselburgh the same thing has happened to us*.

We have thus disproved two theories respecting the par: first, that it is a mule betwixt the salmon and river-trout; and second, that it is the male of the sea-trout, whitling, or finnock. We are now narrowed to the following points—either that it forms a distinct and separate species of fish, or is the real fry of the salmon in a certain condition. In disproving one of these points we prove the other. Now as to its being a separate species of fish, we need only refer to the facts alluded to above, in order to refute this notion; viz., its known relation to the sea, its identity of sex, and want of generating power. But besides these we may further remark, that the par is known to grow rapidly, and that the same individuals do not remain in our rivers above a single season; because, as will be observed, the supply of every succeeding year is a supply of young and fresh-formed fish, without any intermixture of a former breed. What then has become of the vast quantities left in our rivers during the bygone season? Were they dead, a mortality so striking might easily be discovered by their remains; the fact is, they all proceed naturally to the sea, there to undergo those processes which submit them back to us in the shape of grilse and salmon. Nay, there is no other refuge for our opponents in this discussion to take to unless they revert, as we once heard an angler do, to the cross system, and maintain the par to be a breed betwixt the minnow and trout, both of which fish exist in waters inaccessible to the salmon; moreover, the folly of the cross system is here exposed, because we imagine it more likely for the minnow and trout to produce a mule, than a half sea-fish with one absolutely fresh-water. We have

* Salmon, however, are said sometimes to ascend these waters; we have heard of one being caught with the rod above Kirkliston. This, however, on further inquiry, turned out to be a species of bull-trout, bred in the long still pools below that village, and which are not unfrequently taken with the leister near the head of Almond during the spawning season. Salmon have certainly been caught close to the sea in the neighbouring bays, but we doubt very much their breeding in either stream. The fry of these fish have not been discovered of late years in any shape, whether as common sinouts or par.

proved then, upon undeniable premises, that the par can be nothing else than the fry of the salmon; and we will now discover a few points of similarity in these fish, and relate a singular circumstance, which about a year ago turned our attention to this subject. And first, as to the similarity between them. Both have the tail forked—the gills marked in the same manner—the ventral fins strong and blackish; while in trout they have a less fixed and generally yellowish colour—the dorsal one more extended than in the latter fish—they have both an activity proportioned to their sizes, and an equal affection for rapid streams. 7 7

The external shape, although not fully developed in the par, is yet similar: it wants the proportions of a grown fish, no more than the foal those of the horse. Its head, indeed, is somewhat rounder—requiring elongation—the back too straight, and displaying a want of strength: but still the principal points are alike, discovering an intimate and mutual kinship. And here an objection will be taken to the colour of the par, and its want of those silvery scales which belong to the salmon; but let it be remembered that as yet it is in a manner an unclean fish, not having proceeded to the sea; how then can it be expected to retain this brilliant covering, when salmon themselves in ascending rivers throw it off, and become, in some cases, undistinguishable from a large, common, ill-fed trout? We believe, however, that the young fry, when first produced, exhibit a coat of scales which lies on them till spring, when many descend in shoals to the salt water, and the others remaining cast it off; nor does it grow again until the end of autumn, when they are prepared to journey sea-ward with the floods which happen about that season. Nor is such an hypothesis altogether imaginary; for we come to the relation of a circumstance, the happening of which grounded our belief on this theory, and no assailable one it is, if our eyes, which are good, did not deceive us. Last spring, after the time when smelts generally descend, we chanced to capture a few of them in St. Mary's Loch, the streams about which are a favourite breeding-place for salmon. These were of a large kind, and had been prevented from joining the spring shoals by their inability to discover the outlet to the lake; they were soft and loose in the scale, but, seemingly, an enticing bait for pike, which frequent a smaller sheet of water immediately above St. Mary's.

In the afternoon, happening to use one of these smelts on our pike-tackle, we remarked how its scales came off in great numbers, discovering beneath a perfect par, not to be mistaken in any one respect. This accidental discovery we further confirmed by repeated experiments; and

we are now convinced, beyond a doubt, of the fact, that par are the young of salmon in a certain state.

Nor have we availed ourselves in the minutest degree of the observations of the Ettrick Shepherd, in the *Agricultural Journal*; for we esteem his method of proof as somewhat fallacious, and at war with the established doctrine of chances; yet we have conversed with those who asserted the accuracy of Mr. Hogg's statement; and we know it to be the constant practice of the Bard of Altrive to mark the tail-fin of his par with a peculiar incision, not difficult to recognise. We confess, however, that it is wonderful: first, that Mr. Hogg should be able to catch the ten-thousandth portion of the par frequenting Yarrow;—secondly, that out of a few hundreds which he might catch and mutilate, such a number should reach the sea—undergo the many chances of disaster on the way thither—the more hideous perils of that element—that they should ascend the stream of their birth in preference to many others; and, that when of good size, and liable to be taken on ever so many occasions by human means, they should, escaping net and hook, otter and leister, arrive uninjured before Mr. Hogg's nose, and allow him to transfix them through and through in order to discover their personal identity. All these circumstances combined, it seems as if fortune were peculiarly gracious to the poet in overcoming what is next to a physical impossibility—in invalidating the origin of evidential law, and throwing the calculating system of philosophers back among the rubbish of ignorance and error.

We have avoided upholding Mr. Hogg's method of supporting this theory, for no other reason than that we find ourselves unable to answer the many objections which it calls forth; but we think, notwithstanding, that the theory is a good one, that it is worthy of general credit, and that such a manner of support might prove no small advantage to our salmon fisheries in Scotland. We call not for the interference of an act of legislature in order to prevent the destruction of par; such a measure would fall too severely upon the brethren of the streams; it would rob the honestest of our countrymen of a kindly and quiet privilege; it would root out a better sort of men, and a nobler pastime, than are to be found amid the hum of cities and the haunts of viciousness; and that in order to gratify the palates of epicures, and adorn the tables of luxury. But we would submit it to every able angler as a principle he ought to adopt, to commit again to the waters those tiny fish which come ignorantly to his hook; and at best are but a meagre morsel, and give small proof of his skill in the gentle craft.

There are unprincipled poachers enough, who make it a glory to harass our waters with net and lath ; who annually diminish, by some millions, the healthiest fry of our salmon ; who depopulate many a river by means of their nocturnal enginery. But we wish not to see, classed with these, the humane and virtuous, the true and patriotic angler ; who should be above employing his energies on such indiscriminate slaughter ; caring not to check the growth of some future salmon, by the unprofitable and childish act of destroying the infant fish.

RAMBLING NOTES.

BY J. H. ANDERSON, ESQ.

As you deemed my last rambling notes worthy of insertion in your January Number, I am induced to offer a few more, for any future number, when you have not more interesting matter to give us from other correspondents. A few days after the date of my last epistle, I was so fortunate as to fall in with and capture a bilcock or water rail (*Rallus aquaticus*). I never had the pleasure of handling and examining one before, nor was I aware that we had got this interesting species so near us. You may be sure I was very much delighted with my prize ; aye, not even a sailor could be more so, when his gallant foe has struck in bloody fight, nor the soldier when the leaguered town is won. Montagu gives an excellent description of this bird at page 33. The only variation was in weight ; his weighing four and a half, and mine exactly five and a quarter ounces.

Mine is a male bird, and was very fat when taken.

In Vol. I. at page 272, of the *Field Naturalist*, Ruricola says he found the nest of a yellowhammer (*Emberiza citrinella*) built in a hedge about eighteen inches from the ground. I can add my testimony to his and Colonel Montagu's, that they do sometimes, though rarely, build in such situations. I think I shall be under the mark when I say, I have seen not less than half a dozen in my time, and more than that in furze bushes. I recollect an instance of finding one in a hedge about three feet from the ground perfectly well, from the attending circumstances thereof. The old bird was on the nest at the time we found it ; and so, taking it as a mark, my comrade let fly an arrow from his bow, which pierced through nest and bird together. The horrid crime thus perpetrated has riveted the place and circum-

stance in my memory. The poor bird's dying shrieks even now ring in my ears, while I touch on the subject. My observations accord with Colonel Montagu's, with respect to the time of building its nest ; it is late, when compared with the several other kinds of birds. The one seen by Ruricola might be an exception to the general rule. An early or late spring may influence them in some measure, and does, there is no doubt of it. Some few individuals, perhaps, may cling to the old doctrine ; yet I attribute such matters to the influence of the moon, but adopt the former theory. Last summer I found out this bird to be an excellent friend to the gardener, by destroying caterpillars.

On looking into Montagu's Dictionary for the Yellow Wagtail, it says, "a name for the winter wagtail." This must surely be an error of the press.—*Quere*. Should it not be "a name for the spring wagtail?"

The spring wagtail (*Budytes flava*) goes under the name of the yellow wagtail with us hereabout ; and out of the three, is the only one entitled to the name in my opinion.

I have seen the nest of the pied wagtail (*Motacilla lotor*) in two instances, in what perhaps may be considered by many rather out of the way places. They were both on the high wold hills in this neighbourhood, and neither of them within a mile or two of any stream ; but there were artificial ponds for cattle to drink at, within four or five hundred yards of both. One was built on the top of a shepherd's sod hut, in a large sheepwalk, where whins abounded. The hut was covered over with whins and loose straw as a protection from rain. I was on a piratical cruise after birds' nests and young rabbits, &c., when I found this nest.

The other was built in a more curious situation still ; and as I had heard and read of an artificial method of hatching eggs, I was almost inclined to think the wagtails were trying the experiment. It was built five or six feet from the ground in the side of a pyramidal sod heap, which had been thus piled up for the purpose of being burnt to ashes as manure for turnips. Owing to unfavourable weather, part of the outside wall of sods had not been consumed by the fire ; and in this part the birds had built their nest, which had eggs in it when I found it.

It happened unfortunately for them that the ashes were wanted before they had time to complete their experiment ; and as I have not since seen the experiment repeated by any kind of birds, I am not able to inform you and your readers what the result would have been.

No boy was ever more fond of birds and birds' nesting than I was ; had I been a close observer of nature, I might have had a budget full of

interesting facts respecting birds and animals ; but I am sorry to say I was not.

I have frequently rambled for miles over the hills and dales, and through woods and brakes, in search of birds' nests and young hares and rabbits. I have often with another companion or two visited that beautifully romantic place, Falconer's Hall, seven or eight miles distant from our homes, on expeditions of this kind. I probably may give you an account of some of our visits to that place by and by. It stands on the high wold hills, and commands a fine view of the country around ; a finer place for hawks and hounds cannot be conceived.

Falconer's Hall was built for the celebrated Colonel Thornton of sporting notoriety. In his day it was the resort of beauty and of wit ; the scene of revelry and mirth. The ploughman was then often cheered by the sound of " the echoing horn," and the hills enlivened by the gallant train of horsemen in the field. But hear the immortal Peter's song :—

" Come, sportsmen, away,—the morning how fair !
To the wolds, to the wolds, let us quickly repair ;
Bold Thunder and Lightning * are mad for the game,
And Death and the Devil are both in a flame.

" See, Backers, a kite !—a mere speck in the sky—
Zounds ! out with the owl—lo, he catches his eye—
Down he comes with a sweep—be unhooded each hawk ;
Very soon will they both to the gentleman talk.

" They're at him—he's off—now they're o'er him again :
Ah ! that was a stroke—see ! he drops to the plain—
They rake him, they tear him—he flutters, he cries,
He struggles, he turns up his talons, and dies.

" See a magpie ! Let fly—how he flutters and shambles !
How he chatters, poor rogue ! now he darts to the brambles ;
Out again—overtaken—his spirits now flag—
Flip ! he gives up the ghost—good night, Mister Mag.

" Lo, a heron ! Let loose—how he pokes his long neck,
And darts, with what vengeance, but vainly, his beak !
Egad he shifts well—now he feels a death-wound,
And with Thunder and Lightning rolls tumbling to ground.

* Thunder, Lightning, Death, and Devil,—names of four hawks.

An uncle of mine, who was a true sportsman in his day, says he once met above three hundred gentlemen and farmers at breakfast at Falconer's Hall, after which they had a stag chase.

"Thus we falconers sport—then homeward we stray,
 To fight o'er the bottle the wars of the day;
 And in honour at night of the chase and its charms,
 Sink sweetly to rest, with a dove in our arms."

Kelham, Yorkshire, 27th of January, 1834.

ON THE PRODUCTION OF INFUSORIA.

BY E. G. BALLARD, ESQ.

THE inquiry which your correspondent, "Tyro," has made, relative to the "changes which take place among the particles of vegetable matter when submitted to the putrefactive process, so as to produce these singular creatures," involves many particulars relative both to chemistry and vegetable physiology in its first point, namely, the "putrefactive process;" and, secondly, another intricate investigation on the actual generative production of these animalcules from the oviform state. Such I consider to be the real state of the question propounded by your correspondent.

In subjects of this nature, the extreme minuteness of the objects of research, which are only visible under the most powerful microscope, renders it impossible to determine their habits or changes, even in the *adult* state, much less to detect the imperceptible *ova* from which they are probably hatched; for *equivocal generation*, I presume, is excluded from your correspondent's inquiry. Under these circumstances, probable *conjecture*, on sound and rational principles, is all we can have to aid our investigations.

Having thus placed the question in its true light, I shall proceed to examine,—

1. The putrefactive process in vegetable matter.

Without entering minutely into the chemical analysis of vegetable matter, which, throughout the whole vegetable kingdom, according to Nicholson's Chemical Dictionary, amounts to no less than twenty-nine various ingredients, we may briefly observe that the following are *universal* constituents of all vegetable substances; namely, 1, Sugar; 2, Gum; 3, Starch; 4, Gluten; 5, Albumen; 6, Gelatine; 7, Wood; 8, Fibrin. Of these he gives the following definitions:—

1. Sugar—crystallises; soluble in water and alcohol; taste sweet; soluble in nitric acid, and yields oxalic acid.

2. Gum—does not crystallise; taste insipid; soluble in water, and

forms mucilage; insoluble in alcohol; precipitated by silicated potash; soluble in nitric acid, and forms mucous and oxalic acids.

3. Starch—a white powder, insoluble in cold water; taste insipid; soluble in hot water; opaque and glutinous; precipitated by an infusion of nutgalls; precipitate redissolved by a heat of 120° ; insoluble in alcohol; soluble in dilute nitric acid, and precipitated by alcohol; with nitric acid yields oxalic acid and a waxy matter.

4. Gluten—forms a ductile, elastic mass, with water; partially soluble in water; precipitated by infusion of nutgalls, and oxegericycæ muriatic acid; insoluble in alcohol; by fermentation becomes viscid and adhesive, and then assumes the properties of cheese; soluble in nitric acid, and yields oxalic acid.

5. Albumen—soluble in cold water; coagulated by heat, and becomes insoluble; insoluble in alcohol; precipitated by infusion of nutgalls; soluble in nitric acid; soon putrifies.

6. Gelatine—insipid; soluble in water; does not coagulate when heated; precipitated by infusion of galls.

7. Wood—composed of fibres; tasteless; insoluble in water and alcohol; soluble in weak alkaline laxivium; precipitated by acids; leaves much charcoal when distilled in a red heat; soluble in nitric acid, and yields oxalic acid.

8. Fibrin—tasteless; insoluble in water and alcohol; soluble in diluted alkalies, and in nitric acid; soon putrifies.

1. By this analytical survey, in which I have been minute on account of the future inductions, we may observe that all but the starch, fibrin, and wood, are soluble in water, and the gluten partially so.

2. We also find that the gluten, which remains undissolved, forms a ductile elastic mass with the water; and, besides, becomes viscid and adhesive by fermentation, and then assumes the properties of cheese.

3. We discover that the albumen and the fibrin soon putrify.

4. Thus we have, as the component parts of vegetable matter, *four* soluble substances, *three* insoluble, *one* partially soluble; and of these, two soon putrify. Besides these, we have, according to a more accurate chemical analysis, the elastic products or gases, carbon, hydrogen, and oxygen; nitrogen is a constituent principle of several, and the fixed and volatile alkalies are also found.

Having now decided the component parts of the matter or subject in question, we come to the process by which it is decomposed, and the agent employed. The process is *maceration*, and the agent *water*.

Maceration is that process by which a body is steeped in a cold liquor.

It does not differ from digestion, excepting that the term is never used when the temperature of the mass is raised beyond that of the surrounding air.

On the nature and phenomenon of the putrefactive process in vegetable matter, we have the following excellent account in Rees's *Cyclopædia*:—

“ The conditions necessary for the putrefaction of vegetables are similar to those required in the putrefaction of animal substances. It is necessary that the organisation be impregnated with water; the contact of air is necessary, as also a certain degree of heat; and for the due effect of this kind of decomposition, the vegetables should be heaped together, and their juices be abundant. In these circumstances, the phenomena of decomposition are as follow:—the colour of the vegetable is changed, the green leaves become yellow, the texture becomes lax, the parts less coherent, the colour of the vegetable itself changes to black or brown, the mass rises and perceptibly swells up, the heat becomes more intense, and is perceived on approaching the heap; and the fumes that arise have already a smell, which sometimes is not disagreeable; at the same time bubbles arise and break at the surface of the liquid, when the vegetables are reduced to a *magma*, or mass of feculent matter. This gas is a mixture of nitrogen, hydrogen, and carbonic acid. At this epocha, likewise, an ammoniacal gas is emitted, which is formed in these circumstances; and in proportion as these appearances diminish, the strong and offensive odour is succeeded by another which is fainter and milder, and the mass becomes dry. The internal part still exhibits the vegetable structure when the stem is solid, and the fibrous matter has been the predominating principle; and it then constitutes manure or soil. Hence it arises that the herbaceous plants of a loose texture, and abounding in juices, are not capable of forming manure by their decomposition, but are reduced to a brown mass of little consistence, in which neither fibre nor texture is observed; and this is what for the most part forms vegetable mould.”

This is, decidedly, one of the clearest descriptions that can possibly be given of the theory and phenomena of vegetable putrefaction. The *circumstances*, however, are not the same as those recorded by “ Tyro;” and, consequently, the *effects*, or *results*, or *products* will be different.

Let us then examine each.

First, in the *usual circumstances* there are the following conditions:

- 1, impregnation (not *maceration*) with water; 2, the contact of air;
- 3, the accumulation of the vegetable matter in a heap.

The results are:—1, a change of colour; 2, a change of consistence; 3, a rising or swelling up of the mass; 4, a great degree of heat; 5, the disengagement of fœtid fumes; 6, the evolvment of a combination of gases; 7, the change of the vegetable substance into a magma or feculent mass; 8, the drying of the remains into the form of manure, or vegetable mould.

Second, the *required circumstances* are:—1, maceration in *stagnant* and *unchanged* water; 2, the imperfect access of air by the interposition of the surrounding water; 3, the loose contact of the stalks or leaves of the vegetables, owing to their partial diffusion in a fluid medium.

In all cases of philosophical, and more especially in chemical investigation, we are to consider *causes* and *effects*: the latter, by the immutable laws of nature, being the result of the former. If the *causes* (or *circumstances*) be precisely the same, the *effects* will exactly coincide; but if the *effects* are different, we must seek for the *reason* in some *alteration* or *modification* of the *cause*.

Now, in the present case, the *causes* or *circumstances* have been shown to be *altered*, or *modified*, and we must therefore expect to find a variation of *effects*, or a difference in the *results*.

Accordingly we find the following *effects* proceeding from their respective *causes*:

CAUSE 1.—Maceration in *stagnant* and *unchanged* water.

EFFECT.—The effect here is two-fold. 1st, The constant maceration of a vegetable when severed from its *root*, which is the natural medium by which moisture is received by the plant, cannot conduce to its nourishment, but will sensibly aid its decay, because no circulation can possibly take place; fresh water would, indeed, produce a temporary revival, but its death and decomposition would ultimately ensue. But here is, 2nd, A water *stagnant* and *unchanged*; and, consequently, not only maceration aids decay, but it is accelerated by the momentarily increasing quantity of decomposed vegetable matter which arises from the process of putrefactive fermentation which is going on. Hence arise the *results* of gluten, gelatine, and magma; all of which are to be found in the water, and are the *solid* parts of the vegetable matter decomposed.

CAUSE 2.—The imperfect access of air, by the interposition of the surrounding water.

EFFECT.—This produces *results* different from the *usual circumstances*. 1, The evaporation of moisture from the mass is prevented, and the water becomes charged in a considerable degree with those

gases which would otherwise evolve. Hence the offensive smell of the mixture. 2, The heat not being so powerful as when the vegetable matter is only *impregnated* with water, the gluten and gelatine still remain unchanged, and are held in *suspension* in the water. 3, The magma, which would be dried and become vegetable mould, remains as a feculent matter, also held in *suspension* in the water. 4, The ammonia, probably, which would have exhaled in the state of gas, is held in *solution* by the water, and gives it new properties.

CAUSE 3.—The loose context of the stalks or leaves of the vegetables, owing to their partial diffusion in a fluid medium.

EFFECT.—This will effectually prevent the extrication of the heat which is produced by the close context of the vegetable matter when in a heap, and the decomposition will consequently be slower and more imperfect.

Having gone through the principal elements of the subject,—viz. 1, The component parts of vegetables: 2, the nature of putrefactive fermentation: 3, the *usual circumstances* and the *required circumstances* under which this process proceeds: 4, the *causes* and *effects* of the *required circumstances*:—we now come to demonstrate the actual state of the water, which we must now consider as an *infusion*, and how that state produces the animalcules, which are the subject of “Tyro’s” inquiry.

We have then an *infusion* consisting of water, holding in *suspension* a compound of gluten, gelatine, albumen and magma, as also numerous insoluble ingredients. It holds in *solution* a portion of the nitrogen, hydrogen, and carbonic acid, and probably ammonia.

In this, when in a state of putrefactive fermentation, a number of minute animalcules (called *infusoria*) are detected by the aid of the microscope. To suppose that these animalcules are *produced* by the putrid infusion, without the agency of eggs from parent animalcules, would be to admit *equivocal generation*, a theory too absurd and monstrous for any philosopher, much less a christian, to admit for a moment; but the puzzling question then presents itself—whence did the eggs come?

To answer this question in a fully satisfactory manner to the minds of *all* enquirers, may be a matter of considerable difficulty; but I think our previous analytical investigation will lead to the following inductive reasoning:—

As these animalcules are found in *liquids only*, and the species referred to in putrefactive infusion generally, and as all stagnant waters

which hold putrid vegetable matter in suspension afford some of them, I think we may conclude that *water* is their native *element*, and putrid vegetable matter first their *nidus*, where they are *hatched*; and, perhaps, their first *pabulum* or food on their exclusion from the egg. I do not say their *constant* food, since the oxy-hydrogen microscope clearly shows that they are cannibals, and devour each other.

If, then, we consider the eggs to have been laid in the water. (though too small even for the most powerful glasses to detect) and only to require a proper *nidus*, *pabulum*, and *temperature*, to bring them to life, we have in the infusion in question all the conditions required—viz., gluten, gelatine, and magma, as *nidus* and *pabulum*, and the heat generated by the process of putrefactive fermentation; added to which we have the temperature of the atmosphere in the summer season, when they are most abundant.

With these few remarks I shall close this tedious dissertation, which, I trust, will throw some light on the object of “Tyro’s” inquiries, and induce some of your more learned correspondents to pursue this highly interesting subject.

Islington.

CHAPTER OF VARIETIES.

ACCOUNT OF A CANARY.—In the Christmas of 1831 I procured a fine canary bird (*Fring. canaria*, Linn.) For a considerable time I expected him to break out in the bold strains of his species, but still he was mute. At first I attributed it to his removal; to his being in a strange place. The spring advanced and summer came, and all the foreign warblers graced our plains and cheered our groves; the only note he would occasionally give was a simple *tweet tweet*, for silence was with him the order of the day. When autumn approached I procured a very active and lively goldfinch (*Fringilla cardualis*, Linn.), with excellent action and song, with the hope of eliciting something from this taciturn being; this had no effect. Moulting time came; that was an excuse for him, and continued long. I did not know what to think of him; sometimes I thought it must be a hen; at other times I thought it must be diseased or weak—then a weak bird he was considered. In the following March I procured *another* of good character, which was soon proved; for the second day he broke out in full song, as if he had been long accustomed to the house; unintimidated he

"tuned his pipe and sung his lay," and poured forth his full notes in sweet profusion ; but he had no influence on the other. Wanting his cage, I turned him in a large one in a room upstairs, where I gave him the companionship of a young unmoulted goldfinch, which moulted and sung. But the other was obdurate ; it seemed as if cheerfulness or music never touched his breast, and he appeared as if he was determined it never should issue from it. At length his cheerful little companion died ; and as the winter was now approaching—it being Christmas time—I thought the room would be too cold for him. I purchased a small cage for him, and brought him to my parlour in companionship with his former friends. For two days he sat on his perch, "burly and big," with his usual silence. On the following day, on my return home, I was informed that he had sung ; I thought there must have been some mistake. But on the next morning I had a convincing proof by a lengthened strain ; since that time he seems to be priding himself in emulating the others, always responding, and very frequently preceding and calling to time.

It really is astonishing to see the emulation and activity displayed by this uncertain and hitherto idle bird. He appears as if he was desirous of repaying for his long-suspended song by its now peculiar fulness and continuity ; and as if proud of his acquirements, even before daylight, when the fire is lighted, he will begin with a short prelude of invitation to the other. There is a peculiarity in the character of this bird, who should thus break out with such emulation, energy, quickness of action, and melody of song, after a quiescence of two years.

Old Dawley Park, Jan. 27.

PHILOAVES.

WANT OF A SYSTEM OF ORNITHOLOGY.—In reading your *Field Naturalist's Magazine*—which, I may stop to say, pleases me—I find a disregard of the system of Linnæus in your ornithological remarks, without the adaptation of any other system in its place ; each writer on that history seems to give his own terms, or adopts those of another, but I cannot discover that any *general system* is pursued. If the system of Linnæus is exploded—which I make no doubt subsequent discoveries in the science have tended to nullify—will you be pleased to inform me if any other system on ornithology *is established*, and what are its principal features, divisions, and characters * ?

I would suggest—would not the system of ornithology make a

* There are several systems, such as Temminck's, Vieillot's, the Quinary, as I have sketched in "*Architecture of Birds*."—EDIT.

feature in the above Magazine, making it a leading article therein; beginning, as you would in the Linnæan system, at the order *Accipitres*, giving the genus *Vultur*, with all the known species of that genus, in succession. From thence to the genus *Falco*, with its different species until complete; thus completing an order, &c., until you get to *Picæte*; and so on, until the whole of the orders, &c., are disposed of. Cuvier's "Animal Kingdom," published by Henderson, is not sufficiently clear; it is too brief and ill-arranged: witness the additional notes and the shortness of the text.

Old Park, Dawley, Jan. 27, 1834.

PHILOAVES.

METHOD OF FORMING A ROOKERY.—If N. N. wishes to establish a rookery, and has suitable trees for them, he has only to get a nest or two of young ones from some neighbouring haunt, and place it in them. The old ones will find and come to feed them, and these will the following year return there to breed. A colony may thus be obtained whenever he wishes one, provided there is any other establishment within three or four miles of him. His host of ironical questions I will not pretend to answer, especially as many of them have already been so ably replied to.

C. PARSONS*.

MIGRATION OF THE TREE SPARROW (*Passer arboreus*).—This bird is a constant winter visitant here. I have shot them repeatedly in severe weather in January, intermixed with the common sparrows in the farm-yards, and also with green-finches, chaffinches, and other small birds in the fields; about a fortnight ago I caught one at night in a folding net in a corn-stack, when in quest of common sparrows. I never saw one here in the summer months.

I have been induced to offer these remarks in consequence of an observation in your Magazine, vol. i. page 468, that the tree sparrow might prove a bird of passage, and the fact of some alighting on a vessel off the Suffolk coast; but many of them certainly prefer the winter air of Southchurch to a sea voyage.

Many of the small birds perform partial flittings from one part to another, that do not come under the denomination of migratory birds; and it is only by observations and correspondence from all parts of the country that these minor changes of situation can be ascertained.

Southchurch, Feb. 8, 1834.

CHRIS. PARSONS.

* Other communications from our intelligent correspondent will be acceptable.
—EDITOR.

ON THE DUNLIN (*Tringa variabilis*).—The birds “Pliny of Lancaster” has seen, on the sea shore, presenting an alternate dark or silvery white appearance as they have their backs or breasts towards him, is the dunlin (*Tringa variabilis*) in winter plumage; the purr or stint (*Tringa cinclus*) of Bewick, or ox bird, as it is here called, of which his dunlin (*Tringa alpina*) is a figure and description in its summer plumage.

With regard to their scarcity. In summer they disperse to breed, to what part I am not able to say (none of them stay in this neighbourhood), and at that time it is most probable that not more than a pair will be seen together; but about the middle of July the old ones arrive here, and the first of the young the beginning of August; and all that month and September continue to come, and during the winter, may be seen in immense flocks traversing the surface of the water; or sometimes rising higher, they appear like a dark cloud, and rapidly turning and presenting their breasts to the spectator, they all at once appear of a snowy white. These evolutions are chiefly performed during the time of high water; and when the tide leaves, they may be seen busily running over the sands in quest of food.

In February, a few red feathers may be seen on the backs of some individuals; in March they become beautifully variegated, and the black on the breast begins to appear; many of them take their departure this month; some, however, stay till April, and a few even to the beginning of May: these acquire their full summer plumage before they leave; and it is then that I have obtained them in greatest perfection for preserving, although some good coloured ones may be got when they first return in July.

The young when they first come, are very differently marked from the adult bird in any state of plumage, and it is exceedingly interesting to watch the progress of their changes of colour during the months of August, September, October, and November, when they get their perfect winter dress, and are no longer to be distinguished from their parents.

C. PARSONS.

THE REDBREAST.—I am sorry to have committed any error in the few observations (*professedly* “facts”) which appeared in your number for February; but speaking of the robin, I should have said that he enters the *suburbs of London*, about the middle of August; for it is rarely that he is seen in the metropolis during the breeding season, though in winter his familiarity is daily observed. It was the circum-

stance of my writing in London which led to this mistake, which I hope you will excuse, being from a tyro. I am aware that in country villages the robins are plentiful throughout the year, though when the young have flown, like all other birds, they are most abundant; and yet the next breeding season they do not appear more so than the last, and we never notice, in any district, one species to become gradually more numerous. As, for instance, the swallow: the departing flocks are beyond comparison larger than those which return in spring, and one would suppose that there would be a perceptible increase, but this is checked by numerous accidents, to which migratory birds are subject, such as diminution by storms in crossing the ocean, and by the attacks of birds of prey and other enemies in travelling overland: so admirably is every thing in nature arranged, and so true is the balance of Nature's scales.

With regard to "animals swallowing hard substances," I had often heard of the ostrich swallowing stones, &c.; but was surprised to observe the cassowary at the Surrey Zoological Gardens swallowing several stones of considerable magnitude, *after having already passed through the bird*, apparently without being injured; how often this process was repeated, I had not patience nor inclination to discover; nor do I know whether it be a new fact respecting this bird or not.

T. C.

SPONTANEOUS GENERATION.—"Tyro" notices animalcules found in water, and says "there can be no doubt, I think, that they owe their being to decomposition." I wish I could give him "a few hints upon this subject;" but unfortunately can only suggest one or two queries, being more fond of contemplating Nature's more beautiful, though perhaps less astonishing, works.

1. Do not these animalcules, or at any rate the spawn, eggs, (or from whatever else they may be produced), exist at all times in water? and is it not their extreme diminutiveness which prevents their being seen, even with a microscope?

2. Is it not their increasing in size which renders the water putrid?

3. Is not decomposition the effect of these very animalcules?

I should be glad to be enlightened respecting these points, or informed of the best work upon the subject*.

T. C.

RATS AND GUINEA PIGS.—Some people, I believe, have an idea that *rats* are afraid of guinea pigs; when I kept rabbits I had great diffi-

* I have taken up this question at some length in "Insect Transformation." I have also given the more recent discoveries in the "ALPHABET OF NATURAL THEOLOGY," now in the press. Ed.

culty in preserving them from rats ; for though the doors of the hutches were lined with tin, the rats would squeeze through an almost incredibly small space, and I have frequently seen one feeding out of the same trough with an old rabbit, though the young they would destroy without ceremony. I had also a collection of the spotted cavy ; and though placing but little faith in the notion that they would prevent the depredations of rats, I was willing to make the experiment, and allowing some to run about in the "rabbitry," I placed the rest in a hutch by themselves ; but what was my horror upon opening the door, one morning, to find the whole collection of "pigs" weltering in their gore ; a prey to their kinsmen, the rats*. I have had much painful experience that so far from rats being afraid of guinea pigs, they evince a particular partiality to them.

The spotted cavy is remarkably cleanly in its person, spending much time in smoothing its coat ; it produces generally two, or three, sometimes four at a litter, which run about as soon as born, and grow remarkably fast. How this little animal came by the name of *guinea pig* I cannot conceive, as I believe it was originally brought from Brazil. There is no food of which rabbits and guinea pigs are so fond as the leaves, stalks, and juicy pod of the maize, or Indian corn, and they will touch no other food while a particle of this remains.

AURORA BOREALIS.—A splendid aurora was seen at this place on the 28th of December last, at about six o'clock in the afternoon, appearing, I am told, more to the eastward than is usual with this phenomenon ; it was followed within twenty-eight hours by the tremendous south-westerly gales which prevailed on the last day of the year. As I did not myself witness it, I am sorry to be unable to furnish a particular description of its appearance.

E. BLYTH.

Tooting, Feb. 4th, 1834.

THE SNIPE (*Scolopax gallinago*, Linnæus).—A short time since a snipe was brought to me, slightly wounded in the pinion. It refused at first all nourishment, and would probably have been starved, had I not forced a few worms down its throat, and held its beak until it swallowed them ; it soon began to swallow worms if merely placed

* It is possible that this accident might be caused by *stoats*, though I never saw any in the place ; the bodies were not mangled, but a hole made in the head, through which their enemies had extracted the nourishment.

between its mandibles, and would retain one occasionally for a considerable time in its bill, seizing it in a very adroit manner, and contriving to hold it straight along its bill's whole length. In the course of a few days it fed itself, consuming a most amazing quantity of earth-worms, the major portion of which it ate by night; but this being rather troublesome food to procure, I endeavoured to get it to feed on bread and milk, by putting into it some cleanly washed worms; but was unsuccessful, though Montagu succeeded thus with the woodcock. It soon picked out the worms, and I have reason to believe, from the appearance of a pan of water to which it had access, washed every one of them before swallowing it, as a curlew did, mentioned by Montagu. I kept it for some days on short commons, putting only about a dozen worms into its mess, in hopes that it would soon be forced to take to the bread and milk, but all to no purpose; it became so much reduced in three days that I was compelled to desist, and to furnish it again with its natural aliment, worms, which, in a very short space of time, restored it to its previous good condition. I allowed it the range of a small garden, and when first suffered to remain loose, it would frequently, as may be supposed, endeavour to fly away; at such times it would run about spreading its tail in a very singular manner, the caudal feathers being expanded as widely as possible, and the whitish last feather on each side showing very conspicuously; but not spread horizontally, in the manner of the American redstart of Wilson (*Setophaga ruticilla*, Swain), or the Swedish blue breast (*Pandicilla suecica*, Mihi), but turned up perpendicularly, that is to say, on one side of the bird the upper surface only could be seen, on the other side only the under part, appearing, indeed, on a superficial view, like the tail of a common barn-door hen; it never thus placed its tail excepting when it intended to spring up into the air, but would then run swiftly along, first turning one side of it uppermost, then the other, thus shifting it every two or three yards, until it made a sudden spring, with the intention of flying away. It ran with great celerity; and, what is singular, would often when loose in the garden run into a cage for protection, in which it had at first been confined. I know of no writer who has mentioned the snipe's singular mode of spreading the tail; but Mr. Selby observes, in his most admirable description of the woodcock, that that species "just before rising, upon being disturbed, or when running, jerks its tail upwards, partly expanding it, and fully showing the white that distinguishes the under surface of the tips of the tail feathers." It is by means of this extreme mobility of the tail that these birds are

enabled to perform those sudden turns and evolutions in the air which render their flight so remarkable. I observed that in the living bird the eye did not appear to be placed so far back in the head as it does in dead specimens, and as it has generally been represented in drawings. The markings of the plumage also, in the living bird, are beautifully regular, forming a well-defined pale brown or cream-coloured line along the crown of the head, and three similar lines down the back, which are never the least discomposed. This disposition of the snipe's plumage should be carefully attended to in stuffed specimens.

E. BLYTH.

Feb. 5th, 1834.

ON THE NOTIONS OF P. W.—In your Chapter of Varieties for last month, a letter (signed P. W.) is introduced, which, as it contains notions that I can hardly conceive any one can seriously entertain, I would rather suppose is meant as a joke on the numerous theories that start up daily, or to see if persons can be found credulous enough to believe any absurdity, so that it possesses originality and a seeming plausibility. As coming from a correspondent in the Magazine, some few may, without examination, and without perceiving the writer's intention, think the ideas good, and attach more weight to them than they deserve; for their sakes I will treat the letter as one which gives P. W.'s opinion truly, and I hope in a few lines to show the utter fallacy of such notions. Granting that the sea is two or three miles deep, that an observer might have every favourable opportunity, that the sea should be clearer than crystal, and telescopes more perfect even than any yet invented, still do I assert that P. W.'s ideas cannot be supported, for these few, but, as they appear to me, important reasons: that the *Megalosaurus*, *Ichthyosaurus*, &c., were *formed for breathing air*, and that though they might continue under water for some time, yet sooner or later they must come up to respire; that the *Pterodactyli*, or *Ornithocephali*, *flew in the air* like bats; and that the *Mammoth* was in every respect *a land animal*. The latter part of P. W.'s letter, is, I think, rather obscure. Does the writer suppose that there is a stratum of air under the mass of water three miles deep? If so, I would ask him how it is retained there? how prevented from ascending through the heavier liquid above? or, granting that it could be retained, how would it be renewed? for so many large animals would surely soon destroy its purity. If, as P. W. imagines, these living beings are to be found at the bottom of the sea, and my idea of his stratum of air be correct, they

must either swim about in the water, *descending to the air* to breathe, and never touch the earth, or they must move on the ground in this dense stratum of air, and, excepting the Pterodactyli, which have wings, not be able to get to the water; both of which notions appear to me incomprehensible, and, according to their conformations, are next to impossible.

By inserting this you will much oblige a constant reader of your excellent Magazine.

I beg leave also to state to P. W. that the Cornu Ammonis is not a snail, but a Cephalopod.

WILLIAM FOWLER.

February 12th, 1834.

WINTERING OF THE HOUSE FLY.—In the last number of your Field Naturalist, I observe that your correspondent M. of Southampton mentions it as a remarkable circumstance that he had a common house fly in his room so late as the 16th of January. I was myself surprised at their long stay with us; but such has been the extraordinary mildness of the season, that I have seen them every day, up to the present moment, with the exception of a few days that I was from home, during which interval, I am told, they did not forsake theirs. Sometimes one fly only has appeared for days in succession, at other times several would appear together. Many times, both in January and February, I have taken one, sometimes two, out of the milk. They seem to have little strength, for they will admit of very near approach before they take flight; and upon one occasion, seeing one fly from a dish of broccoli on to the table, I very gently placed a small piece of that vegetable near him, upon which he immediately began to feed, without any apparent alarm. At this moment, February 18th, there are two in the room. The wintering of these insects appears much more mysterious than that of the swallows, about which so much has been written. I should be happy to see a satisfactory account of their migrations*.

E. K.

St. Paul's Church Yard, 18th February.

THE CAT AND THE RABBIT, &c.—Your having favoured a former communication of mine, on the habits of tame birds, with a place in the "Field Naturalist," induces me to hope for the like indulgence now. I have always been fond of studying the habits both of birds

* The Natural History of the House Fly is still obscure.—EDITOR.

and animals ; and, if I have benefited by it in no other way, I have at last found much innocent amusement in it ; and this, with submission to your correspondent N. N., is an object not altogether unworthy of attention, even if Cock Robins and Tomtits should happen to contribute to it. But on this head I know that your opinion coincides with my own, as you prove by the manner in which the "Field Naturalist" is conducted. Some years ago, I kept a tame rabbit, a very fine and large specimen of the common domestic variety, and who for boldness, sagacity, and playfulness, equalled any monkey : he had the range of a small garden and the lower part of the house ; nor indeed was he confined to the lower part, for he could go up and down stairs as easily and as well as the biped inhabitants ; he was very fond of playing before the kitchen fire with a large cat ; sometimes, however, they did not agree, and the cat would erect her back and hiss at him, when he would leave the kitchen at full speed ; presently his head would be seen peeping in at the door ; and, if the cat's back happened to be turned towards him, he would hop softly up to her and disturb her meditations with a sound box on the ear from one of his fore-paws ; he would repeat this several times successively ; he was frequently caught, when he thought himself unobserved, dragging bunches of turnips, carrots, and greens, from the kitchen to a dark closet, in which he slept. In going into the garden, this little animal had three rooms to pass through : he would beat at the first door with his fore paw, until admitted ; then cross the room, and repeat the same operation at the next door, looking wistfully back for assistance to any one in the room ; and so on into the garden, from which he returned in the same way. He was quite devoid of fear, and would fight any one with his fore paws, sitting upright in the most ludicrous manner. He was at last stolen, to my great regret. At different times, I have kept several squirrels ; one in particular was perfectly tame, and devotedly attached to the person who usually fed it. It was not confined to the cage, but was frequently indulged with liberty, when it would run up and down the body of its protector, enter his pockets in search of nuts, which it generally found, and, sitting on his shoulder to crack them, suffered itself to be carried all over the house. It was so tame that we often allowed it to run in the garden ; in a moment it would be at the top of a mulberry tree, about twenty feet in height, and hop about from branch to branch ; but at the call of its protector would immediately descend and get on his shoulder, or into his pocket to be carried to the cage : it was a common thing to see this squirrel at play

with the cat; it would get on her back, and sit there as long as it thought proper without any fear whatever: I observed that at times it was more than commonly playful, and would amuse itself for hours together with any thing that came in its way.

Squirrels are particularly dexterous in the arrangement of their bed or nest. I would strongly advise all who keep them in cages never to put hay into their little dormitory; a bit of wool or flannel would be much better, as it would not so conveniently harbour vermin, and would obviate the danger of the squirrel being strangled by the hay becoming twisted round his neck;—a fate which overtook one in my possession.

MATTHÆUS SYLVATICUS.*

London, Feb. 12, 1834.

THE REV. A. WELLS ON INSTINCT†.—This is an excellent provincial production, upon a very difficult subject, well written, and shrewdly reasoned, and only deficient in being too brief; but this was, of course, unavoidable. The following specimen will show our readers the style in which Mr. Wells has cleared up some of the points, often rendered obscure and mystical even among good writers.

“Instinct, then, is *not* mere *mechanism*, or *organisation*. A bee does not form and store the cells of a honey-comb, a bird does not build a nest, as a power loom produces a fabric of calico, or a watch indicates the hour of the day, by a mere arrangement of mechanical powers, or suitable organs. The organs of the creatures are the instruments by which instinct works, not that guiding power itself. Nor is instinct mere *sensation*. The various irrational creatures do not accomplish their wonderful labours and actions because certain sensations prompt their activities, and find in them their gratification. That sensation, as well as organisation, is subordinate and auxiliary to instinct, is, indeed, highly probable. It may rouse to effort; it may determine as to the materials selected for use; it may, by finding its gratification in instinctive labours, secure perseverance and success in them. But sensation is not a guide; it is *an impulse*: it may move, but cannot direct; or, if at all, only in those subordinate instances, such as the

* Our correspondent will perceive that his verses on a Garden have been transferred to the Magazine of Botany and Gardening.—EDITOR.

† On Animal Instinct: a Lecture delivered before the Members of the Mechanics' Institute, Colchester, by the Rev. A. Wells; and published by their request. 8vo. Colchester, 1834.

choice of food, in which the evidence of sense at once determines between the injurious and the wholesome. Neither is instinct *sagacity*. Brutal sagacity is in many instances very great; but it is most easily distinguishable from instinct, and in many respects stands perfectly contrasted with it. Sagacity, by exercise and tuition, may be improved—instinct cannot. Sagacity displays itself where the guidance of instinct fails. Sagacity is most perfect and remarkable in creatures whose instincts are few and simple; as the dog, the horse, the elephant, and the monkey. Sagacity is various in different individuals of the same species; instinct is uniform in every separate tribe. Sagacity in a brute resembles reason in a man; it is a contriving faculty: it observes circumstances, and makes use of them; it perceives difficulties, and provides against them; it can receive instruction, remember facts, and profit by experience. But of instinct the exact reverse is true: it works where contrivance and instruction, experience and observation, are all alike impossible, and can be of no advantage. What, then, is *instinct*? A guiding faculty, given for a specific purpose; within which design it directs with unerring correctness, but beyond which it has no light or power; equally effectual for any operation, however simple, or however complex; surpassing reason as much in the steadiness of its operation and the certainty of its results, as it falls short in extent of application and capability of improvement. A light to these humble creatures emanating from the *Father of lights*, as much suited to their necessities and happiness, as reason and revelation are to ours. But of the particular nature of this guiding faculty, and of the mode in which it operates, we can, perhaps, know no more than the individual who possesses only the sense of hearing can comprehend of sight, which he never enjoyed: he can be informed of its results and discoveries, as we can observe the wonders of instinct; but in either case, we must possess the faculty to enable us to do more than perceive its effects, and give it a name."

ON THE COLOURS OF NATURAL BODIES, BY SIR DAVID BREWSTER, V. P. R. S. ED.*—The only theory of the colours of natural bodies that has met with reception in modern times, is that of Sir Isaac Newton, who considers them as identical with those of thin plates, and as varying with the size of the ultimate particles of the body.

Although this theory, ingenious as it is, be liable to many great

* Read before the Royal Society of Edinburgh.

objections, and be not capable of explaining the phenomena, even if its postulates be admitted; yet the author of the present paper does not assail it with any arguments of this kind. He has, on the contrary, attacked it in its stronghold, and has endeavoured to bring it to the test of direct experiment.

Sir Isaac Newton considers the green colour of plants (the most general colour which nature presents to us) as a *green* of the *third* order of periodical colours, and has also given us the exact composition of this particular colour.

In order to determine the composition of the green colour of plants, the author dissolved their colouring matter in alcohol; and having analysed it by a fine prism, he found it to have, in every case, the same composition. The portions of the spectrum, however, which entered into its compound tint were totally different from its theoretical composition, as assigned by Sir Isaac Newton; and had no relation whatever to the colour of their plates. The green colouring matter exercised an arbitrary specific action upon different parts of the spectrum, and its green colour was owing to its having absorbed a certain number of rays, which, when subtracted from the white light, left the colour under consideration.

In order to render this result more general, the author examined an immense number of coloured solutions, obtained from plants and artificial salts, and a great variety of coloured solids, either formed by art, or obtained in nature; and in all these cases he found no indication whatever of periodical colours. The colours were invariably produced by the absorption of certain definite rays taken arbitrarily and unequally from different parts of the spectrum; and, excepting in the case of certain imperfectly transparent and opalescent fluids, there never was the slightest trace of a reflected tint similar to that which might have been expected, had the Newtonian theory been true.

ON THE GRADUAL ELEVATION OF LAND IN HIGH NORTHERN LATITUDES, BY J. F. W. JOHNSTON, ESQ., F. R. S. ED.*—In this paper, the author showed by a number of phenomena observable within the coasts of Sweden, chiefly around Stockholm, and on the shores of the lake Macler and its arms, that the conclusion of the Swedish surveyors in 1821, that a change of the relative level of the land and water

* Read before the Royal Society of Edinburgh.

along the coasts of the Baltic had in many localities taken place, could not reasonably be disputed. He then considered if it were possible that the level of the Baltic could have fallen, being, by its connection with the North Sea, a branch of the great ocean; and concluded, from the permanency of the respective level of the land and water on the coasts of Pomerania, among the Danish islands, and at some points on the shores of Finland, that the level of the Baltic Sea had undergone no change of level for the last six hundred years. The change observable on the coasts of Sweden, therefore, must be due to an elevation of the land, now gradually, though insensibly, in progress. This rising is estimated to proceed at present at the rate of about one foot in twenty-five years.

The absence of any record of violent volcanic action in the Scandinavian Peninsula renders it improbable that the rise is due to such a cause. The author referred it, therefore, to the gradual cooling of the crust of the earth, which, by causing a contraction and compression in parts where the cooling was a maximum, tended to elevate other portions of the earth's surface at points or in lines of minimum resistance.

The centre of the action in Scandinavia he considered to be in the mountain chains which traverse Norway, and Sweden, and Finland respectively; and which are mutually connected beyond the head of the Bothnian Gulf; and attributing the original elevation of these chains, with Elie de Beaumont, to the secular refrigeration of the earth, he found in the rise still observable in Scandinavia a relic only of that once powerful action by which these mountain ranges were originally projected. He suggested the probability also, that on other coasts where high mountain ridges ran parallel with the sea, accurate measurements of the mean level of the water, in reference to the scarped rocks on the coast, if repeated at certain distant intervals, might make known other gradual elevations still in progress, similar to those observable on the shores of the Baltic.

The Editor's **HAND BOOK OF ALLOTMENT AGRICULTURE** is now in the Press, and will contain a new rationale of the effects of fallowing, hitherto so much misunderstood among agricultural writers.

THE FIELD NATURALIST.

THE WOOD CHAT (*From Le Vaillant's Birds*).

La Pie-griesche rousse, *Le Vaill.*, Ois. d'Afrique. ii. p. 46, pl. 63, fig. 1 and 2, *Buf.*, i. p. 301, pl. enl. 9 male, 31 female; *Bechst.* Deutsch., ii. p. 387, l. 15; *Lanius rutilus*, *Lath.*, Ind. Orn. i. p. 70; *Shaw*, Zool. vii. p. 316; *Lanius rufus*, *Briss.*, ii. p. 147; *Id.*, Svo. i. p. 199; *Gm.*, *Lin.*, i. 301, 12, &c.; *Tem.*, Man. d'Ornith. p. 62; *Id.*, ed. ii. p. 147; *Lanius pomeranus*, *Mus. Carls.*, Fasc., i. l. 1; *Gmel.*, *Lin.*, i. 302; *Lanius minor cinerascens*, *Raii*, 19, A. 6; *Will.*, 54, § iv. l. 10, f. 2. (?); *Klein*, p. 54; *Frisch.*, C. l. M. & F.; *Bor. Nat.*, ii. p. 84; *Lanius minor rutilus*, *Klein*, p. 53; *Id.* Ov., l. 5, f. 7; *Gerin.*, i. l. 56; *Ampelis dorso griseo*, &c., *Faun. Suec.* Ed. i. p. 180, f. 2, fem.; *Kramer*, p. 363; *Dornreher*, *Gunth. Nesl. U. Ey.*, l. 41 (?); *Kleiner rother Neuntodter*, *Naturf.*, 8. s. 69, 39; *Butorola*, *Ferlotta bianca*, *Zinn.* Ov., 89, l. 15, f. 59; Another sort of butcher-bird, *Will.*, *Engl.* p. 89, s. 4; Wood-chat, *Lath.*, *Gen. Syn.* i. p. 169; *Id.* *Sup.*, ii. p. 70; *Br. Zool.*, i. No. 73; *Ib.* fol., 74. l. C. 1; *Id.* ed. 1812, p. 277; *Albin.*, ii. pl. 16; *Bewick*, i. p. 61; *Lewin*, *Birds*, i. l. 32; *Pulh.*, *Cat. Dors.* p. 4; *Don*, *Br. Birds*, 4, l. 84; Wood-shrike, *Flem.*, *Br. Anim.* p. 63; *Montagu*, *Orn. Dict.* (*Rennie's edit.*) p. 566; Wood-chat shrike, *Lath.*, *Gen. Hist.* ii. p. 14. Pie-griesche rousse du Senegal, pl. enl. 477, 2; *Lath.*, *Gen. Syn.* i. 170. 17 A.

THIS bird, both from its carriage, attitude, and manners, as well as whole conformation, unquestionably belongs to the genus of Butcher-bird, properly so called, and enters into the first of the three sections which I consider myself obliged, for the sake of distinction, to establish in the family of butcher-birds. It is found not only in Europe, but inhabits a considerable portion of Africa; since I obtained it in the inland districts of the Cape of Good Hope, and Adanson found it in Senegal. I shall not take up much time in my description of this species, as its manner of living at the Cape is precisely the same as in Europe, and as it has not sustained any variation in colour or stature.

I refer my reader, therefore, to the descriptions published by ornithologists, and particularly to that of Brisson, who has given a most accurate and detailed account. The reader, by consulting the plates in this work, representing a male and a young one of this species, which I brought from the Cape of Good Hope, and by comparing them, either with Buffon's portraits of the same species, killed in Europe*, or, which will be more advantageous still, with similar birds, found in almost every collection, may be convinced, that the species has not, in reality, experienced the slightest change at the Cape. There is, also, in my cabinet, a male wood-chat, brought from Senegal; and I can positively declare, that the slightest difference is not observable between the three individuals, although they were killed in countries so remotely situated in respect to each other.

Buffon pretends that butcher-birds are passengers in Europe,—that they regularly depart in autumn, and return in spring. I shall not confidently assert the contrary,—but maintain that such has not generally taken place in the cantons of France; for most true is it that during winter I have killed wood-chats in Lorraine, and have constantly noticed butcher-birds at the Cape, in those months in which Buffon supposes they return to France for the purpose of breeding.

Besides, if it could be proved that wood-chats retire from certain districts of France to visit and inhabit warmer temperatures, would it not be absurd to imagine that they consequently traverse in their migrations such an immense tract of land as that which separates Europe from the southern point of Africa, where this bird is likewise found? In examining my journals, moreover, I perceive that I killed some of these birds in all seasons of the year in Africa,—and in Europe I did as at the Cape. Their travels do not appear, then, to extend to any considerable distance. I have observed on many occasions, too, that in general these butcher-birds constantly frequent the same cantons; and if one of these birds, whether the grey butcher-bird, the wood-chat, or the flusher (*Lanius Collurio*), has been noticed in any place whatever, it will most certainly be seen there daily, unless it apprehend danger from the sportsman, or be alarmed by too hot pursuit. They have that suspicious disposition which is common to nearly all birds of prey, and that habitude of appropriating to themselves a domain exclusively for their own predatory excursions, the deposition of their eggs, and select habitation.

* See Buff., pl. enl. No. 9, f. 2, le mâle; and No. 31, f. 1, la female.

It is useless, I presume, to combat Buffon's idea, that the wood-chat and the flusher might with propriety form one and the same species. According to similar principles he pretends that all foreign butcher-birds, which have red in their plumage, are merely varieties of the same species. How are these notions to be reconciled with the changes which he imagines birds unceasingly undergo, in the different climates which they inhabit; and why should the red only be free from change? The male wood-chat is rather larger than the female; the latter is easily distinguished by the absence of that deep red colour on the head and behind the neck, which is the peculiar attribute of the male.

In its young age this bird is so different from its appearance at a later period, that, in this state, it has been described by many ornithologists as a mere variety of the flusher,—an error into which Brisson has been led by Aldrovand, who first mentioned this bird without having any knowledge of it; see Brisson's Ornithology (ii. p. 154), who likewise describes this variety of age, under the name of the variegated red-backed shrike (*L'écorcheur varié*), avowing his uncertainty whether it was not the female of the flusher. I refer the reader for other particulars to figure 2 of plate 64 (*Oiseaux d'Afrique*), in which this bird is represented, and which is beyond all question a wood-chat in its first young age, and not a variety of the flusher. I am certain on this point, having examined and pursued, both in Africa and Europe, more than twenty broods of this species, and having reared several young ones.

ON THE WOOD-CHAT.

BY H. M. D.

YOUR correspondent A. T. makes mention of his having shot a female wood-chat (*Lanius rufus*, as described by Bewick), which was in company with a male red-backed shrike (*Lanius Collurio*), and also of his never having been able to meet with the male wood-chat nor the female red-backed shrike, which confirms my opinion that Bewick has mistaken either the female or the young of *L. Collurio* for the female *L. rufus*; but I rather think it to be the latter. Indeed, I feel very much mistaken if (*L. rufus*) is a native of Britain at all. However, I should feel very much obliged to any of your correspondents if they could point out any instance of the male bird being seen in this

country; if not, I shall consider it as a foreigner, and not to be a variety of the red-backed shrike, as some naturalists have supposed it to be, an error which I can easily prove; for being abroad this last summer, where wood-chats are in great abundance, I had both the opportunity of finding their nests and of shooting both the old birds and the young, all of which I found differing greatly from the red-backed shrikes, in every respect. I had also the opportunity of watching their habits, and found them to be very shy, much more so than the red-backed shrike; and, like the ash-coloured shrike (*L. Excubitor*), keeping watch upon the end of a decayed twig, or upon the tiptop of a tree, and keeping a good look-out upon their pursuer, whom they seldom allow to get within gun-shot. The female differs little from the male; her colours are more dingy, and the patch of chestnut on the back of the head is not quite so bright, and her breast is a great deal more marked with wavy lines (more or less, according to age), but never totally disappearing, as in that of the male. I here take the liberty of sending you a sketch of a male bird, which I shot in April last at Geneva. I have in my possession at present the male, female, and young of *L. Collurio*: the young bird is precisely the same as that described by Bewick under the title of the Wood-Chat, and in general appearance differs little from the adult female; yet, on looking at them closely, one can observe that each feather, on all the upper parts, is fringed with dirty-white, which gives it the appearance of being larger than the old bird, which might probably have led to its being mistaken for another species. I decidedly agree with your very able correspondent Mr. Blyth, that it is absolutely necessary, in collecting birds for SCIENCE, and not for the paltry motive of placing them in cabinets to please the eye, that one should collect different specimens in their different liveries, according to their age and the season of the year; a plan which I have no doubt, if universally followed, would prevent our so frequently meeting with so many doubtful species as we find amongst the families of the falco, picæ, tringa, colymbi, mergi, and most of our sea birds. Mr. Blyth, in his description of preserving birds, mentions, that on mounting the skin of a bird, the general fault of bird-stuffers consists in the filling of it out with a great deal too much tow or other stuffing, especially about the neck; but there is a very simple plan of obviating that, in the following manner, by stuffing the bird with cork, which is more durable, and less likely to be attacked by moths or other insects than anything used. After the body is stripped of its skin, procure a piece of cork of sufficient size; and hav-

ing measured the body with a pair of semicircular compasses, cut the cork nearly to the proper dimensions; then take a rasp, and having removed all the unevenness occasioned by the knife, so as to make the artificial body exactly of the same size as the real one, insert a wire at the shoulder (a), and bring it out at the breast (b), and bend the end into the cork (c), so as to make it steady; then apply the compasses to the neck, and having measured it, take some tow (d) and twist it round the wire (e) till it is exactly the proper size; so that no difficulty will be found in the stuffing, and the sewing

may be drawn quite tight, without any danger of destroying the shape and proportion of the bird. Should the cork be found not to be thick enough, place one piece above the other, and drive a small wooden peg in at each end, and proceed as before. Although it is hinted by T. C. that the young of the starling may be the solitary thrush (*Turdus solitarius*), perhaps he is not aware that its plumage is tinged with blue, and in France goes by the name of *Le merle solitaire, ou bleu*.

I had almost forgot to mention, that when stuffing a bird with cork, the precaution should be taken to damp the skin well with wet tow, in case it should become too dry.

A friend of mine informs me, that while taking a walk on Sunday the 12th, which was remarkably close for the season of the year, he was very much surprised at seeing (between the hours of three and four in the afternoon) quantities of midges and small flies, which were dancing about in their aerial sports, though frequently annoyed every now and then by the appearance of their great enemy the bat, who seemed to be making a luxuriant feast, flying and darting about as if it had been the middle of summer; a circumstance which perhaps you may think worthy of a place in "*The Field Naturalist*."

January 14th, 1834.

RETROSPECTIVE REMARKS.

BY EDWARD BLYTH.

FROM a comparison of the original coloured drawing of the cuckoo (or rather *Coccyzus*), mentioned at page 7 of the *Field Naturalist's Magazine* for January, 1833, with Wilson's figures and descriptions of the *Coccyzus carolinensis* and *C. erythrophthalmus*, I am inclined to dissent from the opinion expressed by Mr. Fennell (at page 61 of the present volume), that Mr. Ball's bird will most likely prove identical with one of these American species. I entirely concur with Mr. Fennell in placing but little dependence on coloured representations of animals, as they are but too generally executed; but the drawing now in question bears such evident marks of the most scrupulous accuracy, that I hesitate not to assert, judging from it alone, that the species which it represents is distinct from either the *C. erythrophthalmus* or *C. carolinensis*. In size and general proportions it approximates more to the former; but differs, in being about an inch shorter, in the very dissimilar colour of the bill, and in wanting the characteristic space of bare wrinkled skin, of a deep red colour, which encircles the eye of the American bird. From *C. carolinensis* it differs, in the much smaller comparative size of the bill (in this resembling *C. erythrophthalmus*), in being about two inches shorter, and in the different colour of the whole under parts, which in the Carolina coccyzus are pure white. Various minor diversities might also be mentioned; but after stating the above, I conceive it hardly necessary to describe them, as the differences just related, I think, are sufficient to show that this is a distinct species. Indeed, it is far from being likely that so many specimens of an American bird, possessing no greater powers of flight than the common cuckoo of this country, should have been met with east of the Atlantic; to me it appears more probable, that, when the natural productions of the interior of Barbary, at present but very partially known, shall have fallen more under the observation of Europeans, this coccyzus will be found to range, perhaps extensively, in that vast but almost unexamined region. It is remarkable that no mention is made of this bird in the late edition of Mr. Selby's work.

Since writing the notice to which Mr. Fennell refers (page 65), of the brilliant night-shining eyes of certain moths, I have observed this phenomenon in a great variety of instances. It can never be observed when the moth is quite at rest; but when flying, or when about to fly,

the appearance is, at times, extremely beautiful. The fact, however, I find, is familiar to most entomologists; though perhaps it may be novel to many who, like myself, have hitherto conducted their entomological researches chiefly in the day time. That it should be observable in *Plusia gamma* and its congeners is, I think, rather singular, as these insects fly very much by day, and in the brightest sunshine.

Your correspondent T. C. (page 70), has favoured you with some remarks on the supposed torpidity of swallows. I was so fortunate last November as to succeed in tracing one of these torpidity reports to its foundation. First I heard that several swallows had been found by the workmen, when repairing some part of Streatham Church, Surrey; of course I was all animation, and inquired of my informant, "who told him so?" He referred me to another man, who said, "Some swallows had certainly been found there," and gave me his authority for so saying. I inquired again, and again, and again, and at last I discovered the actual truth—that two dead swifts, in a skeleton state, had been found in a hole in the steeple! So much for the torpidity of swallows, and for an account of several swallows being found in the steeple of Streatham Church. I am not aware of any author who has mentioned the fact, that the common swallow (*H. rustica*) sometimes builds in the hole of a tree: a season or two ago, as I was walking by a row of lofty elms at Sydenham, Surrey, I observed a boy descending one of them with a bird's nest, which, to my surprise, contained three young swallows, that he had just taken from a hole in the tree. This, no doubt, is the original and natural situation for a swallow to construct its nest in; although in a country like England, where more convenient situations abound, it may but very rarely be known to select a hollow tree for this purpose.

I have a few observations to offer on T. C.'s "Notes on Birds." The habit of the goldfinch, of placing its two feet upon its food (an almond or piece of apple, for instance), and pecking it while held firm in that situation, in the manner (as T. C. justly observes) of a genuine *Parus*, is, I believe, among the *Fringillidæ*, peculiar to the crossbills (*Loria*), and to the genus *Carduelis*. I have noticed it in the American goldfinch, and in the common siskin of this country (*C. spinus*); but none of the linnets do so, not even the common redpole, which in many respects so closely resembles the siskin. If a piece of almond be given to the redpole, it will take it up in its bill, nibble off a small portion, and lay the remainder gently on the perch beside it, but it has not the least notion of holding it between its feet.

The great variations in the plumage of the common starling are governed by fixed laws, and quite uninfluenced by season. The bill of the male does not acquire its yellow colour till about six months after its first moult; that of the female, I think, not until the second or third year. I have shot both male and female starlings with yellow bills, at all seasons of the year. Great numbers are always brought into the London markets during the months of January and February, where they may be procured in almost every state of plumage; some beautifully glossed, with hardly a spot on the under parts; others speckled all the way down; some with yellow bills, others without. The females are most readily distinguished by the invariably larger size of the spots upon the belly.

T. C. is evidently unacquainted with the true greater redpole, which is a very different species from the common linnet, either in its summer or winter dress. It appears to be a rare bird in collections; and though it visits us occasionally in considerable flocks, yet its appearance is very uncertain, many years sometimes elapsing between its visits. Such is the case at present. About six years ago, the London bird-catchers took vast numbers of greater redpoles,—but since that time I have not been able to procure a single specimen, though the common species has been abundant. I learned that half a dozen of them were taken last winter in the neighbourhood of Croydon; and this is the only instance of their capture which has come to my knowledge since the season in which they so abounded. The common red-pole and the twite are in these parts extremely regular in their appearance, and the linnet is more or less plentiful with us throughout the year. The greater red-pole very closely resembles the common species in form, and in the markings of its plumage; but is considerably larger, exceeding the twite in size, and the feathers on the back are margined with dull white, or stone colour, whence it is termed by the bird-dealers the *stone redpole*, in contradistinction to the common species. Mr. Selby is consequently mistaken in applying this name to the common or lesser red-pole linnet (*Linaria pusilla*; *Fringilla linaria*, Auct.).

The only distinct notice of this bird which I can find in the works of the various British authors which I have consulted, is contained in a note affixed by Mr. Selby to his description of the lesser redpole. “A large variety of this species,” says that gentleman, “is noticed by Temminck, and which is sometimes met with in this country. * * * * In size it nearly equals the common linnet, but the markings and colour are those of the lesser redpole.” To this he adds, “in the edition of

1833,—“I am now inclined to think that these birds will not be of a distinct species, but only extra-sized specimens of the female of *Lin. minor*.” Having myself examined a considerable number of greater red-poles, both British and from the neighbourhood of Lake Ontario, I feel no hesitation in saying that they are a distinct species. I have seen them in every state of plumage which is observable in the common red-pole; both males and females,—some of the former having beautiful red breasts; I have invariably observed the whitish or stone colour edgings on the plumage of the upper parts, which give them a characteristic appearance, quite different from that of the common red-pole; and, lastly, I have never noticed any remarkable variation of size, nor other approximation to the common species, which, were it a mere variety, we might reasonably expect to find. In its wild state, I am informed by the bird-catchers that it associates much with the gold-finch. Its song I am unacquainted with, — but its usual call-note resembles that of the lesser red-pole.

Before quitting this subject, let me guard the inquirer against a very common source of error, by means of which many naturalists have been misled. The greater red-pole, being generally a rare bird, is unknown to a great many dealers, who, when asked for a stone red-pole, will often endeavour to sell a fine male of the common species under that name, thereby causing the purchaser, naturally enough, to suppose the two species to be identical. From this practice it probably came to pass that in all our works on British ornithology the provincial name *titlark* is affixed to the *Anthus pratensis*, instead of to the *A. arboreus*; the former species being universally known to dealers and others, in every state of plumage, by the name *pipit lark*. The common red-pole is thus often fraudulently sold under the name of *stone red-pole*, which probably occasioned Mr. Selby to say, in his description of the former, “that it is frequently taken by the bird-catchers, by whom it is called the *stone red-pole*.” Those who know the genuine stone red-pole will be at no loss to recognise the appositeness of its provincial name.

Chaffinches of both sexes remain plentiful in this part of Surrey throughout the winter: the females congregate in large flocks, and frequent the open country;—whilst the males mostly continue solitary, and are chiefly found in gardens, and other places in the immediate vicinity of houses.

A few black-caps, babillards, sedge-warblers, grey-flycatchers, and wry-necks, usually linger in the south of England until the last week

in September; but being at this season mute, they are but rarely noticed.

The adult cuckoos leave us about the last week in July or the first in August; the young of the year remain until about the middle of September, when they form into small flocks of six or seven, and migrate in society.

Your correspondents have favoured N. N. with two methods of establishing a rookery; by fixing some old nests on the trees on which they are wanted to build, and by placing rooks' eggs in the nest of the first magpie that builds in the desired locality,—which latter method appears to have been successful in three instances. I think I can suggest a third plan, though I am not aware that it has ever yet been tried. Suppose a nest of young rooks were to be brought up tame (and, like the rest of the *Corvidæ*, they are susceptible of great attachment to their owner); would they not select for nidification, on the ensuing spring, any trees of convenient size which grew nearest to the place where they were reared? They do not, however, *invariably* select high trees, and perhaps, under such circumstances, they might not. Some time since I observed a rookery in Warwickshire, some of the nests of which were not above ten feet from the ground.

It would appear from E. P.'s communication (page 109), that the bearded tit (*Calamophilus biarmicus*, Leach) is a migratory species in Cornwall. It is observed in most places to forsake its breeding place in the autumn, but does not leave the country, being found throughout the winter dispersed in small parties along the coasts of Suffolk, Essex, and Sussex, wherever a sufficient growth of reeds affords it a suitable locality. Many are brought to the London markets, during the winter, from the Essex marshes.

What species does E. P. intend by the name "blue bird?" The *Parus cæruleus*? Surely not the blue-grey or solitary rock-thrush (*Petrocincla cyanea*, Vigors)?

Allow me, in conclusion, to congratulate your readers, and the lovers of natural history in general, upon the many accessions made to the number of your correspondents, from all parts of the country. The number of field observers is evidently fast upon the increase, and will still continue to increase; and the more natural history is studied, the more and more popular it will become,—the prophecies of certain sagacious persons, who call it the mere rage of the day, and say that it will soon blow over, notwithstanding.

Tooting, Surrey, Feb. 14th, 1834.

ON SAGACITY AND INSTINCT.

BY T. C.

THE more I have considered the subject, the more I am inclined to believe that animals possess, when in a state of domestication, some degree of the *reasoning faculty*, or at any rate sagacity, which, if it do not amount to reason, is far superior to mere instinct.

Instinct is implanted in all animals *solely* to enable them to provide for their immediate wants, and it extends only so far as they themselves are concerned; it is given to all according to their necessity, to prevent their several species from becoming extinct, and all have instinct adapted to their natures. The worm which is cut to pieces by the spade of the husbandman, “the poor beetle which we tread upon,” and all those which we consider the meanest of God’s creatures, have as much instinct as the “cunning” fox and the “sagacious” elephant, because it extends only so far as their necessities: it teaches them to procure proper food for themselves and their young; to defend them from or elude the attacks of enemies; to construct their habitations of suitable materials, and in a manner adapted to their respective natures. It actuates the bird when it builds in some safe retreat, and gathers certain substances wherewith to construct its nest; when it flies from clime to clime, over vast tracts of land and over trackless seas; or when it darts from its nest, affecting lameness, to entice the intruder from its young to itself: it teaches some to retire to their roosting places when the sun sinks beneath the horizon, and others to sally out in quest of that prey which nature has destined to form their food; and it teaches the cuckoo to deposit her egg in the nest of a stranger, and the owner to nourish her young in preference to her own. But the cuckoo has no *reason* for acting as she does; she never attempted to build her own nest, or to feed her own young; she needs no trial nor experience; she does not consider whether the bird into whose nest she drops her egg will feed the young with food adapted to its nature, or whether it will be able to turn out its brethren and take possession of the nest; she needs no instruction, nor does she *reason* in any way, but, guided by a power to her far superior to reason, she seeks only those nests which nature has adapted for the reception of her eggs, and trusts her young only to those birds which will procure proper food for the nestling.

This is the principal difference between reason and instinct.

“ Reason serves when press’d,
But honest instinct comes a volunteer.”—POPE.

Instinct acts without consideration, without reflection or thought; it needs no instruction, nor experience, nor trial, but its impulses are mechanical, and its effects certain. Witness the bee; what can exceed the beauty and regularity of the honey-comb? What labour and reflection would it not have cost *man* to build it? It is formed in the best possible manner for strength and economy of room; but the architect acts without any plan or model; has no idea of what the fabric will be when completed, nor has it thought what will be the best method of forming it; but it has no idea of any other plan than that which it adopts, and acts without experience and without instruction, guided solely by instinct, thus in many instances superior to reason.

There is another wide difference between these faculties: as instinct requires no previous trial to insure its effects, but is implanted in all animals from the time of their birth, so it is susceptible of no improvement; domestication, on the contrary, impairs it; for inferior animals, as well as man, lose in some measure their powers of discerning what food is wholesome and what is not, and hence require medicine and artificial means to preserve their health. Man, in a savage state, has more *instinct*, but less *reason*, than when civilised; and domesticated animals have less *instinct*, but more of what is called *sagacity*, than when in a state of nature. Animals are the same now as they were a thousand years ago; they never desire to discover new kinds of food; nor do birds build with different materials, or improve in their architecture, or alter in any way, but feed as their parents fed, and build as their parents built, and have the same habits and manners as they had “in the beginning.” But how is it with *rational* man? He is always inventing and *altering*, if not improving: his manners differ with every century, and almost every year; he is different in many respects now to what he was a hundred years ago; and the stately palaces of the present day bear no resemblance to the Indian’s wigwam, or the hut of the Hottentot. Thus reason is ever varying, but instinct remains the same; and for this reason, as well as for many others, it is better adapted to the brute creation, because all have been made for some purpose; and if they changed their natures as man does, there would be an end to all order, and the laws of nature would be entirely subverted.

Instinct is always admirably adapted to the habits of the animals to which it has been given; and in examining the works of nature, and observing the action of this wonderful faculty, we cannot avoid being struck by the infinite wisdom and beneficence of the Creator; and though in some instances we may notice peculiarities, the reasons for which we cannot comprehend, we have no right to expect nature to conform to rules laid down by ourselves, and it is no reason because to our limited understandings habits which we observe are incomprehensible that such reasons do not exist; we have no right to question the wisdom of the great Creator, nor to imagine, because these peculiarities do not agree with our ideas of perfection, that it is an error on the part of the Maker of all.

But I have been led deeper into the mazes of this most interesting subject than I intended; and I shall now merely mention one or two facts in illustration of my first proposition, "that animals (*some* animals) possess, when in a state of domestication, some degree of the reasoning faculty."

I had, when a school-boy, a Newfoundland dog, which I was in the habit of taking out, twice a week (half-holidays); and he knew so well when those days came, that he would howl piteously, if by any occurrence he was not taken for his exercise: he was a great favourite, and a most "sagacious" animal.

A spaniel, with which I was acquainted, would always insist upon accompanying any member of his master's family who went out, and frequently when his company was anything but agreeable; but on Sunday he never attempted it, nor would he even think it worth while to rouse himself from before the fire.

Now, if I go too far in stating this to be direct *reason*, it is certainly not *instinct*; these dogs could not possibly know the interval between two periods, but must have known from other circumstances the days when they were to remain at home and when they might go out. Would *instinct* teach the horse to obey his master? or would an animal possessed of *mere instinct* show such evident traits of attachment and docility as the horse, the dog, and the elephant, not to quote the multitude of anecdotes which we have on record of the astonishing "*sagacity*" of these noble animals? Would instinct alone teach the shepherd's dog to scour the hills for miles around, and gather every stray sheep to the flock, or select his master's sheep from among any number of strangers? Instinct might instruct the dog to find his master, or

his master's home ; it might teach the carrier pigeon to seek the spot where it was hatched, and where it had always been fed, but it would not teach this bird to carry a letter to a strange place and return with an answer ; and if a pigeon were to do this, it would be something more than mere instinct. The cat, if removed to a vast distance from its home, will return ; but the dog will find his master, and evince affection for *him*, and not for his house ; and this is the difference between instinct and reason. In the first instance, the cat is only attached to her home, because there she has always found food and shelter ; but the dog would not remain if his master left it, but would follow him ; and instinct, I am convinced, is not the only faculty employed in this instance.

I knew a horse, which, if put into a *box* or shed by itself, would *open the latch*, and thus escape. Now, instinct would have taught him to kick at the door, and get out by violence, and not to effect his purpose by this deliberate and indirect manner ; but he must have observed the effect previously, and employed, if not *reason*, a higher faculty than instinct.

Some of your readers may recollect the elephant which a few years since performed at the Adelphi Theatre, and, as far as I am a judge, showed as much talent and reason (or *sagacity*, or whatever else it may be called), as any of the other performers. Witness also Ducrow's horses ; and I might relate numerous anecdotes of what is called "*sagacity*" in animals ; but as they may be seen in almost every work upon the subject, as well as in the "*Percy Anecdotes*," I will not trespass further upon your time and pages, but refer your readers to the works mentioned ; and in conclusion merely say, that there are, as I conceive, different grades of reason, from the most enlightened man to inferior animals ; from the philosopher to the herdsman ; from the white to the black (but here I speak *generally*, for we have many negroes who would shame the majority of Englishmen in literary attainments), and from the black to the savage ; and I do not know in what respect the cannibal is superior to other animals : he possesses *instinct*, but no more, and perhaps not so much *reason* as the horse, the dog, or the elephant.

I have often wondered at the extraordinary though well-known habit of the cuckoo, of laying in the nests of other birds, but have never been able to account for it. Since writing the above, however, I have thought, as this bird no doubt lays several eggs, and as I know from

experience the young are very ravenous, that possibly *one* young one requires as much food as the parents could procure; they therefore provide a nurse for each, and hence the reason for the young cuckoo turning out all its companions, for it appears that this one charge is sufficient to occupy the whole care of its foster parents; and allowing this reasoning to be just, it will also account for the cuckoo's not *sitting upon even one egg*; for how could she build her nest, and hatch one egg, and at the same time provide for the hatching of the others?

NOTES FROM GRAVESEND.

BY ORNITHOLOGUS.

THE hybernaculum, or winter retreat of the swallow tribe, presents a question which naturalists, from Linnæus downwards, have been unable to solve. It appears to me that this arises in a great measure from the want of corresponding societies in different parts of the world, which would communicate to each other the exact periods of their departure and return, and thus eventually elicit the truth. This remark is founded on the assumption that they do actually migrate; but it will be, at the same time, advantageous to pay attention to all those circumstances connected with this remarkable genus that may transpire in our own country, as a careful collation of such facts, *nantes in gurgite vasto*, will contribute essentially to determine a point at once so mysterious and so interesting. Under this impression, I mention a circumstance which fell under my own observation, and which seems to favour the idea of their remaining torpid during the winter months. During the severe winter of 1830-31, a labourer, while threshing in a barn, had his attention drawn to a swallow which flew from one bay (as it is called) to the other. It flew so low that it almost touched him, and so feebly that he not only had sufficient time to determine its species, but nearly succeeded in knocking it down with his flail. It, however, managed to reach the top of the corn on the opposite side, and did not again appear. Here we have a strong instance, as I before observed, in favour of their torpidity, as, even admitting this to have been a young bird hatched late in the summer, it must have existed for some months in a state of inactivity, from which it only emerged for a short time when disturbed by some accidental circumstance. I have

frequently questioned the labourer (who is an intelligent man) as to whether it might not have been a bat ; but he persists in maintaining his opinion, and declares he could not by possibility have been mistaken. Your correspondent T. C. seems to ridicule the idea that birds could exist in this state for so long a period. What does he think of that theory which supposes that they remain under water during the winter, and which, absurd as it is, has met with more than one advocate? Notwithstanding the foregoing case, however, I am bound, as an impartial observer, to notice some of the arguments in favour of migration, which, I must confess, are numerous and convincing. Every one must have observed those immense flocks of swallows which, at the time of their supposed departure, (or rather antecedently to it,) seem by their rapid evolutions to be exercising their wings and strengthening themselves for some arduous journey.

“ The air

Floats as they pass, fann'd with unnumber'd plumes.”

What motive can we assign for this unusual congregation, but that “ intelligent of reasons,” they are preparing themselves for their approaching migration? I consider the objection by no means fatal which asserts that they could not remain so long on the wing as the supposed distance of their winter quarters must require them to do ; for if we once admit the principle of migration with regard to any of the feathered race, what bird is so well calculated for the undertaking as the swallow, which has been always deemed the emblem of swiftness, and moreover procures its food at all times in the air ? Such being the case, the migration of the *motacilla* genus, and some others, is far more surprising to me than that of the *hirundines*. It is well known that the nightingale, for instance, scarcely moves a hundred yards from the spot where he first locates himself during the whole summer ; and yet we have still stronger grounds for supposing that he “ wends his way to distant climes,” than the swallow does so, as no one, I believe, has ever asserted that the former passes the winter in a state of torpor. This applies also, though not perhaps in an equal degree, to the black-cap (*M. atricapilla*, Linnæus), and some others, none of which are remarkable for prolonged flights while in this country.

With regard to the naturalization of the golden pheasant, and other natives of the “ gorgeous East,” the following facts will show that it might easily be effected. I had a share in bringing up two of these birds, which fortunately proved male and female. They certainly

require great attention when young, principally in supplying them with the proper food, and this at stated periods. These were fed regularly every two hours throughout the day; but no particular precautions were taken to screen them from the cold, as they were kept in an open coop (in front), with merely the addition of a wire frame at night to screen them from the rats. During the day they had the run of a grass plat, the coop being shifted weekly to a fresh spot. In this manner they grew rapidly, and both arrived at maturity. I should mention that they had the advantage of having an extremely careful hen for a mother, which is a highly necessary point, as I have had whole broods, both of partridges and pheasants (but especially the former), trampled to death by the clumsiness or over anxiety of their foster parent. The great impediment to breeding from these birds (in a state of captivity) is the extraordinary *ferocity* of the male. He is, in fact, a perfect Blue-beard. The individual, whose history I am relating, not only destroyed the female that was reared with him, but also killed two more in the two consecutive years, and has therefore ever since led a life of *blest celibacy*. I do not know how to account for this strange moroseness of disposition. Perhaps it arose from his having only one partner on whom to bestow his affections, as they are probably salacious, like the rest of this family. Be this as it may, he still lives to *repent of his barbarity*. He has survived the severe winters of 1829-30, 1830-31, although his sole protection from the cold has been a coop by no means air-tight, into which he is driven at night, and always enters it with apparent reluctance. But the circumstance I am about to mention affords a still more decisive proof of their capability of enduring the inclemency of our climate. Whilst in company with a party who were pheasant-shooting the year before last, the beaters sprang a very fine cock gold pheasant, which was known to have escaped from a menagerie more than a year before! It has frequently been seen subsequently, and the keepers moreover report that they have noticed a variety which they considered was the offspring of this bird and the common pheasant.

I was much pleased, a few days since, to hear the delicate warble of the golden-crested wren (*Motacilla regulus*). It had taken its station in a low but bushy fir-tree, so that I was enabled to approach almost close to it. It is very seldom that such an opportunity presents itself, and I was agreeably surprised to find its song so varied. One of your correspondents says, that in confinement these birds are so extremely susceptible of cold, that the least exposure to it is fatal. This is very

remarkable, when we reflect that this little bird is one of the few of that genus (*motacilla*) which endure the utmost rigours of our winter. Did not their sudden death arise from some impropriety of food, rather than from the cause to which it was ascribed? The straw which your correspondent T. M. G. observed the sparrows purloining was probably carried away for the sake of the *corn* left in the ear, and not for the purpose of forming a nest at so early a period. I have now a hen canary, which is a most beautiful singer. What is remarkable is, that she still continues her warble, although she has paired with a cock, so that they are often singing simultaneously. My paper warns me to conclude these desultory remarks. I fear you will deem them

“Non bene junctarum discordia semina rerum;”

but I am emboldened to forward them by your former kindness.

Gravesend.

ON THE TOTAL AND PARTIAL EXTERMINATION OF ANIMALS.

BY JAMES FENNELL.

THAT the number of species of animals now upon this globe is less than formerly, is an unquestionable fact. Some species of animals, we shall presently see, have totally disappeared from the earth,—while others are daily becoming scarcer, and gradually approaching to their general departure.

The important and extensive science of geology has revealed to us many surprising truths relating to this subject. It tells us of the existence at one period of the mammoth, elephant, rhinoceros, hippopotamus, bison, hyæna, bear, crocodile, &c., in England; and from the circumstance of no human bones occurring among these numerous fossil remains, induces the supposition that man, and such of the above-named creatures as are now extinct, were not contemporaneous beings, the creation of the former being subsequent to that of the latter. The presence of the elephant at one time in this and other countries the most cold and northern, in which it does not and cannot possibly exist, appears a strange fact, but one which perhaps might easily be explained, were we disposed to entertain the views of some modern and shrewd philosophers who, from matter of fact, not theory have arrived at the

conclusion, that there ever has been, and is still going on, a gradual and regular change in the earth's polarity, and consequently in its temperature. The author of the "Menageries," when speaking of fossil bones, observes, that though it has been usual to refer the destruction of the animals to which they belong to the great Deluge, yet "it does not in the least invalidate the authority of the sacred books to believe that other causes of the destruction of life may have been called into action, previously to, or simultaneously with, that great event, of which so many undoubted traces may be found. A very general belief now prevails amongst geologists, that the climate of the northern hemisphere has undergone an important change, and that its mean annual temperature must once have resembled that now experienced within the tropics.* Shells and corals, having an affinity with species now living in warmer latitudes; remains of reptiles belonging to hot climates, such as turtles, tortoises, and crocodiles; fossil plants, such as palms of the most luxuriant growth, which could only have been produced under the influence of high temperature; and, above all, the bones of the quadrupeds of the tropics: all these, which have been found in such abundance in Europe, have naturally pointed out that a great change of this nature must have taken place." The same writer remarks, that, "the theory of a slow change of temperature produced by the new formation of great masses of land, has derived considerable support from the well-known facts connected with the remains of the Siberian elephants." Some excellent remarks upon this subject are made by Mr. Lyell, who considers it fair to infer, that "the same change of climate which has caused certain Indian species of testacea to become rare, or to degenerate in size, or to disappear from the Mediterranean, and certain genera of the sub-appenine hills, now exclusively tropical, to retain no longer any representatives in the adjoining seas, has also contributed to the annihilation of certain genera of land mam-mifera, which inhabited the continent at about the same epoch. The mammoth (*Elephas primigenus*), and other extinct animals of the same era, may not have required the same temperature as their living congeners within the tropics: but we may infer that the climate was milder than that now experienced in some of the regions once inhabited by them,—because in Northern Russia, where their bones are found in immense numbers, it would be difficult, if not impossible, for such animals to obtain subsistence, at present, during an arctic winter. It has

* Lyell's Geology, vol. i. p. 92.

been said, that as the modern northern animals migrate, the Siberian elephant may also have shifted his place during the inclemency of the season; but this conjecture seems forced, even in regard to the elephant, and still more so when applied to the Siberian rhinoceros, found in the frozen gravel of that country, as animals of this genus are heavy and slow in their motions, and can hardly be supposed to have accomplished great periodical migrations to southern latitudes. That the mammoth, however, continued for a long time to exist in Siberia after the winter had become extremely cold, is demonstrable, since their bones are found in icebergs, and in the frozen gravel, in such abundance as could only have belonged to herds which lived at one time in the district, even if those northern countries had once been clothed with vegetation as luxuriant as that of an Indian jungle. But if we suppose the change to have been extremely slow, and to have consisted not so much in a diminution of the mean annual temperature, as in an alteration from what has been termed an "insular" to an "excessive" climate,—from one in which the temperature of winter and summer were nearly equalised, to one wherein the seasons were violently contrasted,—we may, perhaps, explain the phenomenon. Siberia, and other arctic regions, after having possessed for ages a more uniform temperature, may, after certain changes in the form of the arctic land, have become occasionally exposed to extremely severe winters. When they first occurred at distant intervals, the drift snow would fill the valleys, and herds of herbivorous quadrupeds would be surprised and buried in a frozen mass, as often happens to cattle and human beings, overwhelmed in the alpine valleys of Switzerland by avalanches. When valleys have become filled with ice, as those of Spitzbergen, the contraction of the mass causes innumerable deep rents, such as are seen in the *Mer de Glace* on Mont Blanc. These deep crevices usually become filled with loose snow; but sometimes a thin covering is drifted across the mouth of the chasm, capable of sustaining a certain weight. Such treacherous bridges are liable to give way when heavy animals are crossing, which are then precipitated at once into the body of a glacier, which slowly descends to the sea, and becomes a floating iceberg. As bears, foxes, and deer now abound in Spitzbergen, we may confidently assume that the impeding of animal remains in the glaciers of that island must be an event of almost annual occurrence. The conversion of drift snow into permanent glaciers and icebergs, when it happens to become covered over with alluvial matter, transported by torrents and floods, is by no means a rare phenomenon in the arctic regions. During a series of

milder seasons intervening between the severe winters; the mammoths may have recovered their numbers, and the rhinoceroses may have multiplied again,—so that the repetition of such catastrophes may have been indefinite. The increasing cold, and greater frequency of inclement winters, would at least thin their numbers,—and their final extirpation would be consummated by the rapid augmentation of other herbivorous quadrupeds, more fitted for the new climate.”* Besides the mammoth (*Elephas primigenius*), the following animals are in the list of extinct beings, of whose history nothing is known but through the medium of post-mortem examinations of their remains,—viz., the mastodon, of which Cuvier supposes there were five species; rhinoceros tichorinus; rhinoceros incisivus; rhinoceros leptorhinus; megatherium; megalonyx; elasmotherium; megalosaurus; ichthyosaurus; plesiosaurus; ammonitis; together with several undescribed species of fish and insects.

Perhaps few large animals co-existent with man have become extinct, with the exception of a singular species of gallinaceous bird, the dodo; though probably many species of insects and other small beings, on which attention has but lately been bestowed, have passed unnoticed into oblivion.

The extinction of the dodo (*Didus*) is supposed to have taken place towards the conclusion of the seventeenth, or the commencement of the eighteenth century. Its disappearance may be ascribable to its not having been able to defend itself from the attacks of those who pursued it for its flesh†, in consequence of its having been incapable of flying, owing to the shortness of its wings,—and unadapted for running, owing to the shortness of its legs and the unwieldiness of its body. The only places which it is known to have inhabited are, the isles of Bourbon, Mauritius, and Roderigue. Bourbon and the Mauritius having become colonised previous to Roderigue, it is conjectured to have disappeared from them some time prior to its extermination in the latter place. It would seem, from the circumstance of no efforts having apparently been made to retain the breed in either of the countries which it inhabited, and the neglect of a timely transmission of individuals, in a preserved

* Lyell's Geology, vol. i. p. 96.

† Herbert, an old traveller, who gives a strange description of the bird, states that it was more pleasant to the eye than to the palate; but Legaut, another old traveller, in his account of the bird, as translated from the French by Mr. Thompson, says that it was “extremely fat, and of most excellent flavour, especially when young.”—J. F.

state, to the museums of different countries, in none of which, at the present day, does one perfect specimen exist, that the destruction of the species must have been carried on so quickly that its eventual extinction was not anticipated. With the exception of the specimen once contained in the museum of Tradescant at Lambeth, and which is said to have been transferred by Dr. Ashmole to the Ashmolean Museum of Oxford, in which it is recorded to have remained until 1755 (at which period it was destroyed on account of its having become decayed), no entire specimen appears ever to have found a place in the cabinet of the naturalists. The only remains ascertained now to exist of this creature are in the Ashmolean Museum, which contains a bill and leg of the Tradescant specimen; in the British Museum, which contains a single foot, once belonging to the collection of the Royal Society; and, lastly, in the Paris Museum, which is enriched by the possession of, according to Mr. Lyell, "the head, sternum, and humerus of the dodo," sent thither amongst some fossil bones discovered under a bed of lava in the Isle of France. A disparity has been observed between the size and length of the foot in the British Museum and that in the Ashmolean Museum,—which observation has induced some to suspect that this country must have either contained two different specimens, or else one whole specimen, and only the leg of another. If the latter suspicion be correct, then the difficult question presents itself, whether this disparity is to be ascribed to a difference of age, sex, or species. The accounts given by various writers are so dissimilar, that, assuming them to be correct, one might indeed suspect that more than one species of dodo existed.

Since the disappearance of the dodo, some other creatures of smaller size have become extinct, probably in consequence of the scarcity or complete eradication of those wild plants that constitute their food. To what other cause can we refer the loss of our Hampstead butterfly* (*Vanessa Hampstediensis*), which has not been seen for upwards of a century; our scarce swallow-tailed butterfly (*Papilio podalirius*), which has not been seen since the time of Ray; and, our straw May-frilary butterfly, which has not been seen since the time of Petiver? It is not difficult to imagine that the loss of a few species of weeds may have produced all this destruction of animal life, for we well know that some animals are so restricted in their diet

* Vide Stephens's Illustrations of British Entomology, vol. i. page 5, for figures and further information respecting this species.—J. F.

that they will eat only of one particular species of plant, and will perish sooner than feed upon other plants, though closely allied to, or mere varieties of, their favourite food. This is instanced most conspicuously perhaps in the case of the larva of the ringlet butterfly (*Hipparchia hyperanthus*); of the brown heath butterfly (*Hipparchia pamphilus*); of the nettle-butterfly (*Vanessa Urticæ*); and in the case of almost all the aphides: the first of these feeding exclusively on the annual poa-grass; the second on the dog's-tail grass*; the third on the nettle; and most of the various species of the last example living entirely upon a single species of plant, only certain parts of which in some instances give nourishment to one particular kind of aphis, from which circumstance it is not uncommon to find the leaves, stalks, &c. infested by different species. The prevention, then, of any animals like these from becoming extinct, it will be seen, must depend upon the existence and wide distribution of those peculiar plants from which they derive their sustenance.

Leaving that division of my subject relating to the total extinction of animals, the consideration of their partial extermination, with special reference to the British Kingdom, now claims our attention.

Naturalists are well aware that as the cultivation of the earth, the chief employment of mankind, progresses, certain animals either, from fear, compulsion, or other causes, recede in search of other quarters where they may rest undisturbed and in the full gratification of their wants, until once more being encompassed by the further advance of cultivation, and again subjected to the assaults of man, they gradually diminish in numbers, and eventually become extirpated. The enclosing of land, the felling of timber, the sports of the field, and similar acts, have also driven and are now driving many animals from our island.

To the followers of the chase we may attribute the extermination of the wolf, bear, wild boar, and beaver from this country.

Pennant, when alluding to the extirpation of wolves, confesses that he cannot state for certain when the last wolf was destroyed in Scotland; but says, upon the authority of Hollingshed, that the flocks in that country suffered extensively from their ravages in the year 1577. He adds, also, that he is informed that at the time of his then writing (1768) none were to be found there. It is said, however, by more recent writers, that the last wolf that inhabited Scotland was killed at Lochaber, by Sir Ewen Cameron of Lochiel, about the year 1677. A

* Insect Miscellanies, page 24.

writer in later times states, but upon what grounds does not transpire, that wolves were not extirpated from Scotland until the end of the seventeenth century. In England several attempts were made to destroy the whole race of these ravenous animals, whose constant depredations rendered such attempts very justifiable*. King Edgar, at about the year 972, (not during the tenth century, as the author of the "Menageries" states,) with a view to their destruction, dispensed with the punishment of those who had committed certain offences, upon their producing a specified number of wolves' tongues; and the Welch, instead of paying to him their wonted tribute in money, were demanded to produce three hundred wolves' heads every year, which great number was furnished, but not without considerable difficulty and the incurring of much risk, for the space of three years, at which time (975) the royal exacter died. After his decease it seems this exaction was abolished, on account of no wolves remaining in Wales at that time. From the death of Edgar the increase of wolves appears to have been allowed to go on in England, without the interference of the legislature, during the space of three hundred and six years, until at length Edward the First, in the year 1281, issued a proclamation for their destruction†, which seems to have been fully and speedily effected, as no mention is found of their existence in a wild state in this country subsequent to the adoption of this measure. More than four centuries had elapsed after the extermination of wolves in England, before they were totally destroyed in Ireland, which land was not rid of them until about the year 1710, when the last presentment for their destruction is said to have been made in the county of Cork. It is affirmed, that occasionally during hard winters, wolves make their appearance in France‡; and that "several were seen in the forests near Boulogne, in 1818§."

* "To look back into the Saxon times we find that in Athelstan's reign, wolves abounded so in Yorkshire, that a retreat was built at Flixton* in that county, to defend passengers from the wolves, that they should not be devoured by them; and such ravages did these animals make during winter, particularly January, when the cold was severest, that our Saxon ancestors distinguished that month by the title of *wolf moneth*. They also called an outlaw *wolfshed*, as being out of the protection of the law, proscribed, and as liable to be killed as that destructive beast."—Pennant.

† Camden, as cited by Pennant, states that certain persons at Wormhill in Derby, held their lands on condition of their pursuing and killing the wolves that infested the country.—J. F.

‡ Menageries, vol. i.

§ The Zoological Gardens, in Regent's Park, contain a specimen from France.—J. F.

The brown bear (*Ursus arctos*) was once wild in this country, and afforded to the lovers of the chase much amusement. At what time the last English bear was destroyed does not appear, but it was probably after the reign of Queen Elizabeth, as bear baiting was then a favourite amusement; though the bears employed for the purpose might have been brought from abroad, as the importation of bears is known to have been carried on long previous to their extirpation from this country. The last bear wild in Scotland is said to have perished in the year 1057.

Wild-boars were in former times common in Britain; but the enclosing of land, and the intentional worry to which they were subjected, have long extirpated the whole race. The time at which they became extinct in this country seems not to have been recorded. The celebrated Welsh legislator, Hoel Dda, is said to have prohibited his grand huntsman from chasing wild-boars at any other time than between the middle of November and the beginning of December. "William the Conqueror punished with the loss of their eyes any that were convicted of killing the wild-boar, the stag, or the roe-buck; and Fitz-Stephens tells us, that the vast forest that in his time grew on the north side of London was the retreat of stags, wild-boars, &c."*

That sagacious and amusing animal, the beaver (*Castor fiber*), once dwelled in our lakes and ponds; but the value of its fur found it so many pursuers that the species has long since disappeared. It is supposed to have become scarce at the end of the ninth, and to have become extinct in the twelfth century. Pennant states that Giraldus Cambrensis, in his *Itinerarium Cambriae*, remarks that when he travelled through Wales in 1188, beavers were only found in the river Teivi. The skins of beavers forming so extensive and lucrative a trade, causes them to be eagerly sought after in Canada and the other countries which they at present inhabit; and such numbers are annually destroyed, that the unwelcome prospect presents itself of their soon becoming universally extinct. Indeed, it is reported, that they have already become scarce in North America.

The *Urus Scoticus*, or wild-bull, was formerly common in England and Scotland. William Fitz-Stephens mentions among the animals inhabiting the forest situated on the north of London, wild-bulls. They have long since, however, been extinct; but the precise time when they became so has not been recorded, though it is generally supposed to have been prior to the death of Henry the Eighth in 1547. The breed was

* British Zoology, vol. i, p. 44.

destroyed by horsemen, who drove them singly from the herd towards places where musket-men were stationed in readiness to kill them. The prevailing colour of all the wild species was white, and their markings were always alike in different individuals. Some remains of the *urus* are said to exist at the present day in a reclaimed state at Chillingham Castle, Northumberland; Gisburne, in Craven, Yorkshire; Wollaton, Nottinghamshire; Leine Hall, Cheshire; Charby, Staffordshire; and in Hamilton Palace Park, Scotland. From the non-appearance of the *urus* in the catalogues of animals now indigenous to foreign lands, it would seem, indeed, that in its wild condition it is not only extinct here, but everywhere. It may be observed, in passing, that our common domesticated animals of the bovine tribe are of much larger stature, and are considered by naturalists to be either entirely of foreign extraction, or an improved produce originally obtained by crossing the wild with the exotic species.

It is a curious fact that the common ass was once extinct in this country for several years, and that we owe those that are now in use to a second importation from Spain. It is stated to have been "entirely lost among us during the reign of queen Elizabeth." Hollingshed informs us that in his time, "our lande did yeelde no asses." But we are not to suppose that so useful an animal was unknown in these kingdoms before that period, for mention is made of them so early as the time of king Ethelred, about four hundred years preceding; and again in the reign of Henry III.; so that it must have been owing to some accident that the race was extinct during the days of Elizabeth. We are not certain of the time it was again introduced, probably in the succeeding reign, when our intercourse with Spain was renewed; in which country this animal was greatly used, and where the species is in great perfection.*

The discovery of an otter (*Lutra vulgaris*) now-a-days is a very uncommon occurrence in this country, though once they were plentiful, and even so in the neighbourhood of the metropolis. Walton, in his "Angler," published nearly two hundred years ago, has introduced an otter-hunter, who repairs for sport to the small streams in the neighbourhood of Tottenham, Middlesex. "Hunting the otter was a favourite pastime in Britain; but it has now fallen greatly into disuse; a few otter-hounds are, however, still to be found. His Grace the Duke of Buccleuch has some braces of them. During Queen Elizabeth's

* British Zoology, vol. i. p. 12.

reign, large packs were kept for this diversion, which was eagerly practised by the young nobles *." That otters were scarce in Hampshire in Gilbert White's time, appears from his mentioning with such delight that one was brought to him shot within his own parish.

The badger (*Meles Europæa*), an animal that is frequently made the object of much diabolical cruelty, has become considerably rarer in England than formerly, though not so much so as the otter.

The cat, though never a native of our island, yet was once wild in it. Wild cats are now, however, very scarce, and only to be found in our least frequented woods and forests †. They were the most ferocious animals we had, and therefore it behoved the people to destroy them as quick as possible; and we accordingly find that sportsmen, by whom they were considered as beasts of the chase, sallied forth for that purpose. A specimen of the wild cat, from Scotland, may be seen in the gardens of the Zoological Society.

It is a well known fact, that our indigenous black rat (*Mus rattus*), a species which was formerly universally diffused throughout Great Britain, has become nearly extirpated in consequence of the introduction of the more powerful brown rat, generally called the *Norway* rat, though it appears not to be an inhabitant of that country, but a native of Persia, from whence we received it. Pennant states, that they arrived in England about forty years before the time of his then writing (1768), and in Paris about seventeen years prior to that period, or not until three-and-twenty years after their appearance in this country. A modern writer, but of no celebrity, asserts that they appeared in France towards the middle of the sixteenth century, and were first observed in the neighbourhood of Paris. "Its first arrival, as I am assured," says Goldsmith, "was upon the coasts of Ireland, in those ships that traded in provisions to Gibraltar; and perhaps we owe to a single pair of these animals the numerous progeny that now infests the

* Brown's Sketches of Quadrupeds, p. 157.

† Perhaps it will be long ere this country becomes entirely destitute of wild cats; for the existence of wide woody forests, well stocked with live prey, frequently tempts cats reared in houses to forsake their domesticated life for one more natural, and on that account, perhaps, preferable. "In Jamaica," says a female writer on Natural History, "the domestic cat will sometimes become wild from the quantity of food at all times to be found in the woods and mountains." I have been informed that wild cats are at present more restricted to the hills and woods of Scotland and Ireland than of England.—J. F.

whole extent of the British Empire *." America, according to Pennant, received its stock of brown rats by a ship from Antwerp. "Pallas tells us that they arrived at Astracan in the autumn of 1727, in such numbers, and in so short a time, that nothing could be done to oppose them. They came from the western desert, and traversed the waves of the Volga, which unquestionably must have swallowed up part of their horde. They have not advanced any farther north, and are not to be found in Siberia †." The brown rat has diffused itself almost over the whole of those countries just particularised. In Scotland they do not seem to have established themselves so generally as in England and Ireland. Cuvier says that in some parts of France the brown rat is not known; and Dr. James Mitchell, in an interesting lecture delivered some time since at one of the metropolitan institutions, in adverting to the invasions made by the brown rats, stated that though they had appeared in London in considerable abundance, yet they had not hitherto extirpated the black rat, which was to be found in the society of the former, in many of the large distilleries and breweries. As the few black rats that remain are continually being routed by the stronger and larger species, we now and then hear of their appearing in different places, to which they probably resort to avoid their annoyers. In the catalogue of the Zoological Gardens, published in 1831, it was stated that the black rat (*Mus rattus*) had lately appeared in various parts of London; and a correspondent to this Magazine has informed us that they have recently made their appearance at Ballindalloch, Scotland. (Vide page 102.) So scarce, however, were black rats in Goldsmith's time, that he says he does not remember ever to have seen one.

Owing to the encroachment of cultivation and the consequent disappearance of open and seldom traversed plains, the bustard (*Otis tarda*) is now very seldom to be seen. It is one of the scarcest birds at present in this country, though once it was very abundant in different places. Though this and many other birds, nearly extirpated, may be great desiderata to the cabinet of the collector; yet it were well, and to their credit, if, upon the discovery of such living rarities in their neighbourhood, they would refrain from destroying or alarming them, for there can be but little doubt that this and other rare species, if permitted to pass unmolested, would, in a few years after a cessation of hostilities, again become plentiful, and afford to all the opportunity of observing their habits. Viewing the matter in a natural history light, I cannot but consider that the

* Natural History, vol. i. p. 21. (new edition.)

† Ibid, p. 212.

destruction of any species of bird or other animal nearly extinct, for the mere purpose of placing it among a collection of stuffed skins, is an unjustifiable and unpardonable act, the commission of which may leave a gap in the chain of beings, and, by furnishing a subject in future ages, for much fruitless discussion, speculation, and doubt, impede the progress of knowledge. The sensations of a true lover of nature, or—(if you think that designation too poetical and sentimental, as some do)—of a true naturalist, would, I conjecture, partake more of regret than of pride, upon the reflection that his hand had destroyed the last of a race of beings.

The egret and the crane were formerly plentiful throughout England, as is proved by the immense numbers that were served up at ancient feasts.* The great demand for these birds as delicacies for the table led to their extirpation in this country. No mention can I find of the time at which the egret became extinct among us; but it must have been prior to the time at which Pennant wrote (1768), as he observes that he had not met with a single specimen, but took his description of the bird from one in Dr. Mauduit's cabinet at Paris.

The crane (*Grus cinerea*), it is well known, is not now a resident in this country, as it was in the days of Aldrovand and Willoughby, when they bred in our marshes, and a fine of twenty-pence was inflicted upon those who removed or destroyed its eggs. Ray says that in his time they abounded during the winter in Lincolnshire and Cambridgeshire. William Turner, the old English botanist, in his account of the principal birds of Pliny and Aristotle, published in 1544, mentions his having frequently seen the young birds in our marshes. Pennant upon

* Since writing the above I have seen Selby's new volume of Illustrations of British Ornithology; and I find that he suspects, with Dr. Fleming, that the egret of our ancient gourmands was nothing more than the lapwing (*Vanellus cristatus*). He adduces certainly some very strong facts to disprove that their bird was the egret, but he does not prove by research or otherwise that they designated the lapwing the egret. His principal and only point for objecting to the conclusion that the bird in question was of the latter species, is derived from the circumstance of the early writers not having mentioned it as a native of Britain. "Willoughby, in his description of the Lesser White Heron (which is without doubt the bird now under consideration), expressly states that the specimen from which it was taken was obtained in Venice; and he never alludes to this bird as inhabiting or visiting the British Islands. Pennant is the only writer who adduces any evidence of the egret having been killed in Britain; and even that evidence is far from being conclusive, as it only amounts to his having once received from Anglesea the feathers of a bird shot there, which he conjectured to be those of the egret."—Selby's Illustrations of British Ornithology, vol. ii. page 22.

learning, after instituting strict inquiries in the above counties, that the species was entirely unknown there, justly concluded that they had forsaken our island.

The stork (*Ardea ciconia*), many years back, was occasionally seen; but the country having become more populous, they have not been observed for years. I have consulted several works, with the view of learning when they were last observed, but can find no instances with dates prefixed.

It is perhaps owing to the disappearance of retired places suited to the establishment of heronries, that herons in this country have become so rare. The heronries recorded to be in existence in England at the present day do not amount to more than *eleven*. The places at which those heronries occur are as follows—viz. Wanstead Park, Essex; (vide *Field Naturalist*, vol. i. p. 359); Colonel Wilson's estate, Diddlington, in Norfolk, (*Zool. Gardens Illustrated*, vol. ii. p. 142); Windsor Great Park, on the borders of Bagshot Heath; Penshurst Place, Kent; Cobham Hall, Kent; Mr. Bethel's seat, Hutton, near Beverley in Yorkshire; Lord Carnarvon's seat, Pixton; Gobay Park, on the road to Penrith, near a rocky pass called Yew Crag, on the north side of the romantic lake of Ulswater; Cressi Hall, six miles from Spalding, in Lincolnshire; Downington-in-Holland, in Lincolnshire; Brockley Woods, near Bristol; and Brownsea Island, near Poole, in Dorsetshire.

The wood-grouse, or cock of the wood (*Tetrao urogallus*), once inhabited Ireland and Scotland, but has been extinct in the former country for nearly seventy years, and in the latter for fifty years. Wood-grouse now and then find a place at our tables; but such individuals, according to Bullock, are imported from Sweden. "It is to be regretted," says Sir William Jardine, "that some of our extensive and wealthy northern proprietors do not attempt the introduction of the wood-grouse; extensive pine or birch forests, with quiet, would be all the requisites; and the birds themselves, or their young, could very easily be obtained, and at a trifling expense*."

It is notorious that the felling of trees for timber has operated to a great extent towards the diminution of rookeries. "In many counties very few rookeries remain, where once they were considered as a necessary appendage, and regularly pointed out the abbey, the hall, the court-house, and the grange†."

* White's Selborne, p. 21—note. † Knowledge for the People, Part iv. p. 104.

When this country presented a more extensive and secure abode for birds of a solitary disposition, it is probable that several of those species of owls, now so rarely seen, were common in it. The long-eared owl (*Strix otus*), the eagle owl (*Strix bubo*), the snowy owl (*Strix nyctea*), and the little owl (*Strix passerina*), are extremely scarce; and the only localities for the less rare, but yet not common, short-eared owl (*Strix brachyotus*), are Norfolk, the northern counties of England, the north of Scotland and its islands.

The bad taste which induces proprietors of land to destroy old trees on account of their decayed state, is supposed by Selby to have occasioned the redstart (*Sylvia phœnicurus*) to have become scarce in Northumberland. "For some years past," says he, "the redstart has become of comparatively rare occurrence in Northumberland; but without any apparent cause for this change in the line of its migration, unless it may be attributed to greater attention having been latterly bestowed upon the management of woods, &c., and a consequent deficiency of old and decaying trees, for the purpose of nidification, and stone-walls having, during the same period, so much given way to the use of hedges for inclosure."

The grey lag goose (*Anser palustris*) has, in consequence of the extending prevalence of cultivation*, become very scarce in the fens of Lincolnshire, and the other places indicated by the earlier writers as their breeding quarters. "The draining and cultivation of these marshy tracts," says Selby, "under progressive agricultural improvement, and the increasing population of the kingdom, has, however, banished these birds from their native haunts; and they are now, comparatively speaking, of rare occurrence, and, as far as I can ascertain, only met with in small flocks during the winter."

The dotterel (*Charadrius morinellus*, Linnæus) has become nearly extirpated in some parts of England in which it was once common, owing to its having been shot in great numbers for the table. But a less useful purpose, it is said, has for some time been causing it to

* With reference to the scarcity of this species of goose, owing to the appropriation of their favourite haunts to the purposes of cultivation, I may perhaps be excused quoting the following pithy piece of old rhyme, which on the present occasion is very *àpropos*.

" 'Tis bad for either man or woman
To steal a goose from off a common;
But who can plead that man's excuse
Who steals the common from the goose?"

become scarcer and scarcer in the vicinity of Keswick, in Cumberland, where considerable quantities are destroyed merely for the sake of its feathers, which are extensively used in the manufacture of artificial flies for anglers *. Selby observes, that the bird is scarce on the moors of Cumberland, but does not appear to be aware of the cause of its scarcity.

Besides the above-mentioned mammalia and birds, there are some smaller animals, lower in the scale of animated nature, that have become nearly or totally extirpated from the British Islands.

We are told that the patron saint of Ireland banished from that land all the toads and noxious reptiles†. We are informed by Goldsmith that the frog (*Rana aquatica*) was designedly introduced into Ireland some years before those all-conquering animals, the brown rats, (of whose influence in expelling the black rat I have already spoken) took possession of that country, and it was observed to multiply amazingly. "The inhabitants," he states, "were pleased with the propagation of a harmless animal that served to rid their fields of insects; and even the prejudices of the people were in its favour, as they supposed that the frog contributed to render their waters more wholesome. But the Norway rat (brown rat) soon put a stop to their increase; as these animals were of an amphibious nature, they pursued the frog to its lakes, and took it even in its own natural element. I am, therefore, assured that the frog is almost extinct in that kingdom; and that the Norway rat, having no enemies left to destroy, is grown less numerous also ‡."

The natterjack (*Rana rubeta*) has become so scarce in England, that it was questioned, a short time ago, in the Magazine of Natural History, whether it was still to be found here or not. From the replies that were elicited to this query, it appears that though rare and local, yet it is not extinct.

Were I better acquainted with Ichthyology, a branch of Natural History which is too much disregarded at the present day, I have but little doubt that I might furnish a few instances of the extermination

* Knowledge for the People, Part iv. p. 103.

† Not having sufficient credulity to believe in the Saint's power, I am disposed to think that some peculiar quality of the soil, water, or atmosphere, is the real cause of toads, &c., not being found in Ireland. Toads, &c. are not the only animals not to be found in Ireland, for the mole (*Talpa Europæa*) does not exist therein, on account, it is supposed, of the general moist nature of the country.—J. F.

‡ Natural History, page 210.

of fish; but I do not remember to have either read or heard of any, though I am aware that it has been observed that several species of fish have diminished in number in consequence of the introduction of steam-packets on our rivers. The influx of nauseous and poisonous filth and refuse from sewers and manufactories has also contributed to produce the same effect.

It is not alone in England and the countries adjacent that certain species of animals are progressing towards their extirpation. Bonaparte tells us that in "Canada and the densely peopled parts of the United States, *wild turkeys* were formerly very abundant; but, like the *Indian* and *buffalo*, they have been compelled to yield to the destructive ingenuity of the white settlers, often wantonly exercised, and seek refuge in the remotest parts of the interior. Although they relinquish their native soil with slow and reluctant steps, yet such is the rapidity with which settlements are extended and condensed over the surface of the country, that we may anticipate a day, at no distant period, when the hunter will seek the wild turkey in vain."

We have now seen the influence of man and other agents exerted sometimes designedly, sometimes unintentionally, in extirpating various species of animals in different parts of the world, and driving them from one quarter to another where they may rest with less chance of being annoyed. But whilst man has been the principal cause of the extirpation of the animals herein mentioned, he has been instrumental to the dissemination of others, by introducing them into countries where previously they did not exist.

Paddington, 22nd February, 1834.

HINTS FOR COLLECTING WATER BIRDS.

BY C. PARSONS, ESQ.

AQUATIC birds are subject to so much variation from age and change of season, that several specimens of each are essentially requisite to form a complete collection. The annual changes many of them undergo, have led to various errors in books on ornithology,—but they are better understood now, and have been accurately pointed out by late writers; it would, therefore, be useless to describe them minutely here. I shall merely notice them, to show how many specimens of each sort

are necessary to exhibit the birds in every variety of plumage, and also the times, as far as I am able, when they may be obtained in greatest perfection.

As the plover family, following the bustards, connects the waders with the land birds, I will begin with them:—and, first, of the golden plover (*Charadrius pluvialis*), four specimens of which will be requisite,—one in summer with its black breast, one in winter when it quite loses it, one in March when acquiring it, and a young one in autumn: and the same may be said of the grey lapwing (*Vanellus melanogaster*); the young of this species very much resembles the young of the golden plover, but may be distinguished from it by the black feathers under the wing. These birds are seldom seen in flocks, but generally in little bunches of four or five, and very frequently a few are interspersed with a flock of dunlins.

Of the ring dotterel (*Charadrius hiaticula*), an old male and female and the young will be sufficient.

The lapwing (*Vanellus cristatus*) is handsomer the latter end of April and May than at any other time of the year; the whole plumage is more vivid, the black on the breast enlarged, and the crest longer: the female is not quite so bright in colour, and the young have but a very short crest till after the moult.

The sanderling (*Calidris arenaria*), it will be necessary to have at least three specimens of,—the old in summer and winter, and the young in autumn, and if one or two in change be added, it will be better; the young have all the feathers of the back widely margined with white, and after the moult become plain grey till the spring, when they again change,—the middle of the feathers of the back get black, and are edged with rufous.

The oyster-catcher (*Hematopus ostralegus*) loses the white on the neck in the summer months; one should be got then, and one in winter; the young have the feathers of the back and wings margined with brown.

The heron (*Ardea cinerea*) does not acquire its beautiful crest, and long flowing feathers of the breast, till after the third year, and is rather difficult to be met with in this plumage; the young have but the rudiments of these, and in this state nine out of ten will be found, at least in this part of the world. The bittern (*Ardea stellaris*) is perfect after the first moult; one of these may be considered sufficient; the males are, however, rather the brightest coloured.

The curlew (*Numenius arquata*), and the whimbrel (*N. phaeopus*),

have but little variation of colour,—but the curlew varies very much in size, and the young of both species have the bill shorter than the old; several should be shot, and a fine long-billed one selected; any time in winter or spring will do.

The young turnstone (*Strepsilas collaris*) differs much from the old—and specimens of each should be procured. I am not aware they undergo any change from season, but have never seen them except in the month of August, when they frequent our coast.

The birds comprising the *Tringa* genus are subject to so many changes, that a considerable number of each is requisite to illustrate the species properly. The dunlin (*T. variabilis*) varies so much, that, except during the winter months, it is difficult to find two specimens that are exactly alike. In addition to the summer and winter plumage of this group, several others in the intermediate states will add great interest to a collection; they should be killed at different times in the autumn and spring, to show the gradual change of colour; and two or three young ones at different times in the autumn. Of the ruff (*T. pugnax*) the variety in summer is almost infinite; three or four, presenting the greatest contrast, should be selected. A female, or reeve, a male in winter, and a young one in autumn, which very much resembles the female, should also be added. The beginning of May will be found the best time for getting the males in perfection.

The red-shank (*Totanus Calidris*), green-shank (*T. Glottis*), and spotted red-shank (*T. fuscus*), differ considerably in summer and winter; the young but little from the winter plumage of the adult. They have but little sexual difference, a characteristic, indeed, of the whole genus *Totanus*. The green sand-piper (*T. ochropus*) I have never seen except in the autumnal months, when I have shot the old and birds of the year, which differ sufficiently to require specimens of each; as does also the common sand-piper (*T. hypoleucus*).

The godwits become beautifully red in the spring. The male of the common godwit (*Limosa rufa*) is much smaller, and in summer of a brighter red than the female; one or two of these should also be got when in change, and the young in autumn. May will be found the best month for getting these and all the various species of sand-pipers in their summer plumage in the greatest perfection; if deferred till later, and until they begin to breed, the feathers of many get rugged and shabby.

A well selected assortment of these families forms perhaps the prettiest and most interesting group of British birds that can be got

together; it is, however, a difficult task; many of the species are exceedingly rare, and most of them shy and difficult of approach,—and frequenting the marshes, sea shores, and wastes, are not so generally known as land birds, which are constantly before us; and it is to be regretted that so many of them are disfigured, and their beautiful proportions and elegant attitudes entirely destroyed in setting up; they are difficult birds to do well, and it is impossible for any one to give a natural air to them who has not made himself acquainted with the living animals; but whether a duck, a sand-piper, a hawk, or a warbler, they are, by the generality of bird-stuffers, all done on one principle; the consequence is, that if one is well done, the others are sure to be spoiled,—and I think it will generally be found that they do large birds better than small ones. Bird-stuffing cannot be done or explained by fixed rules; every group of birds requires something peculiar to be observed, either in fixing the leg wires, the degree of fulness which should be given them, and many little particulars only to be acquired by practice, but without a knowledge of which birds never look well; and admitting a bird to be properly stuffed and ready for mounting, here if the artist be not acquainted with the attitudes of the species he is at work upon, all his former care in stuffing will not enable him to give his bird a correct and lively appearance, but it will look, as stuffed birds, and particularly sand-pipers and their affinities, too often do, stiff and unsightly, without any resemblance of nature.

But to proceed; and next of the gallinule (*Gallinula chloropus*), of which an old and young one should be procured; the red on their bill is brightest in the spring, and the young do not acquire it at all till the second winter; the female is not quite so bright as the male.

The coot (*Fulica atra*) varies but little; the male has rather a larger frontlet than the female, and in the young it is very small.

The phalarope (*Phalaropus platyrhynchus*) undergoes similar changes to the knot and godwit, and has been called, according to season, the red and grey phalarope; it is of course desirable to get them in both dresses, but they are not often to be met with.

Of the grebes old and young are quite requisite. A fine old crested grebe (*Podiceps cristatus*) has an exceedingly curious appearance, but it is not very easily got in that state, although the young are common enough, they do not get quite perfect till the third winter. The Dabchick (*P. minor*) is also three years before it gets its black chin and perfect adult plumage.

I come now to the web-footed tribes (*Palmipedes*)—and first of the

Terns : these should all be got on their first arrival here in spring, they are then in beautiful feather, and I must caution the collector to be very particular in keeping the birds he shoots as clean as possible, a hint to be attended to in all birds killed for preserving; but more particularly requisite in these, as the feathers are very delicate, and the beautiful gloss on them can never be restored when once they are soiled or made bloody; they are also very liable to run at the mouth, which is sure to stain the feathers; to prevent this a piece of cotton or tow should be put in the mouth and through the nostrils as soon as shot, and always avoid (when possible) carrying them in the pocket, a better way is to tie a piece of string to their legs and sling them under the arm by a belt, I always find that I injure them less so than in any other way. They lose their black heads in winter, but are not with us then; I have, however, frequently shot them in autumn just before they leave, with the head half white. The Sandwich Tern (*Sterna cantiaca*) I have killed in this state, and have also had the pleasure of bringing home the beautiful eggs of this fine bird from some Salterns at the mouth of the river Blackwater in this county, and also from the Fern Islands, on the Northumberland coast. A young of all the species should be obtained before they take their departure.

In the gulls, the variety of plumage from the young to the perfect state is exceedingly great. The black-backed gull (*Larus marinus*) requires five specimens; an adult bird in summer and winter, the young before the first moult, one the first winter, and one the second; the third winter they are perfect. I never noticed any difference of colouring in the sexes. The same number of specimens are required for the lesser black-back (*L. fuscus*) and the herring gull (*L. argentatus*), they being the same time in immature plumage; the young of these three species are very much alike. The common gull (*L. canus*) must also have five specimens; the old in summer and winter, the young before moulting, one the first winter, and one the second; they are nearly perfect then, having only a little brown on the tail, and in the spring are quite so. Of the black-headed or laughing gull (*L. ridibundus*), four specimens will be sufficient; one in summer with its black head; one in winter, and two young ones; one before the moult and one after; the following spring their plumage is complete; they assume their black head in March, and the latter end of that month or beginning of April should be obtained: if killed later in the summer the black on the head is not near so fine, and the gloss on their breast in a great measure lost.

Wild geese exhibit so little variety that one of each sort will be sufficient. The two species, the grey goose (*Anser palustris*) and the bear goose (*A. ferus*) are apt to be confounded; they are however easily discriminated by the bill. The bernacles (*Anser Bernicla*) I have noticed a considerable difference in; but whether mere variety, or whether the young are not perfect the first winter, I do not know. The brent goose (*A. Brenta*) varies in size, the smaller ones are the females; the young have the feathers of the back and wing coverts edged with brown, but there is scarcely difference enough in them to require more than one specimen. The sheldrake (*Tradenna vulpansa*) must have three, a male, female, and the young; and if the male be got in the spring it will, I think, be found brighter in colour than if killed in winter.

The several species of ducks differ much in sex: the females of most are clad in the same plain garb, and the young males in general much resemble them. A young of all should be obtained.

A mallard and duck of the *Anas Boschas* will be sufficient, in addition to a young one. A male and female pintail (*Dafila caudacuta*); the female of this species may readily be distinguished from others by its more slender and elegant shape. I believe the male acquires his full plumage after the first moult. A male, female, and young male wigeon (*Mareca fistularis*) will be required. The old male has the whole of the wing coverts of a pure white. The eider duck (*Somateria mollissima*), being two or three years acquiring perfect plumage, in addition to the old, at least two young males will be necessary in different degrees of perfection. It is useless particularly to notice the scoup duck, golden eye, and others, as they all vary in the same manner, and the like number of specimens should be got of each. The young males may soon be recognised; if examined, a feather or two in different parts will be seen breaking out into the gay markings of the old, at first hardly perceptible, but gradually increasing till complete.

Care is requisite in stuffing these birds not to make them larger than natural; to attend to the shape of the back, and not make the bird round; and, though last not least, to avoid stretching the neck beyond its proper proportions, as their skins will extend a great deal beyond the real size of the birds.

The goosander (*Mergus merganser*), though by no means an uncommon bird, is not often seen in its perfect plumage, those that are killed being generally young, or dun divers, as they are called. We have them here, but it is a rare thing to see an old bird; perhaps the greater part of the old do not come so far south.

Two or three young gannets (*Sula alba*) should be got in different stages of perfection. They are first of all covered with white down, but I never saw one in that state; they then become brown all over, in this stage called boobies by the fishermen, and are not perfect till the third or fourth summer.

I am not much acquainted with the rock birds, therefore will say nothing about them; and I have already extended this paper to a greater length than I intended.

Southchurch, March 7, 1834.

AMAZON ANT (*Formica rufescens*, LATREILLE).

BY THE EDITOR.

THIS is a species whose history was first investigated by the younger Huber, and whose economy is so extraordinary as almost to exceed belief. The details, indeed, have hitherto been credited chiefly if not solely on the well known veracity of Huber; but in the autumn of 1832 we had an opportunity of verifying them, both in the Black Forest and in Switzerland, where the species is found chiefly on the borders of the great pine forests.

The species has not hitherto been found in Britain, and we were unsuccessful in our attempt to bring over from the Black Forest a nest of live ones, which we had placed in a box for the purpose. This ant is of a pale reddish colour all over, the female larger than the worker, and of a clear colour: the male, pale black. We think that it will prove most interesting to the reader to give Huber's narrative in his own words.

"On the 17th of June, 1804," says he, "whilst walking in the environs of Geneva, between four and five in the evening, I observed close to my feet, traversing the road, a legion of amazon ants. They moved in a body, with considerable rapidity, and occupied a space of from eight to ten inches in length, by three or four inches in breadth. In a few minutes they quitted the road, passed a thick hedge, and entered a pasture-ground, where I followed them. They wound along the grass without straggling, and their column remained unbroken notwithstanding the obstacles they had to surmount; at length they approached a nest inhabited by dark negro ants (*F. fusca*), the dome of which rose above the grass, at a distance of twenty feet from the

hedge. Some of its inhabitants were guarding the entrance, but, on discovery of an approaching army, darted forth upon the advanced guard. The alarm spread at the same moment in the interior, and their companions came forth in numbers from their underground residence. The amazon ants, the bulk of whose army lay only at the distance of two paces, quickened their march to arrive at the foot of the ant-hill; the whole battalion, in an instant, fell upon and overthrew the negro ants, who, after a short but obstinate conflict, retired to the bottom of their nest. The amazon ants now ascended the hillock, collected in crowds on the summit, and took possession of the principal avenues, leaving some of their companions to work an opening in the side of the ant-hill with their teeth. Success crowned their enterprise, and by the newly-made breach the remainder of the army entered. Their sojourn was, however, of short duration, for in three or four minutes they returned by the same apertures which gave them entrance, each bearing off in its mouth a larva or a pupa; they retraced the route by which they had arrived, and proceeded one after another, without order or regularity. The whole army might be readily distinguished in the grass by the contrast afforded by the amazon ants and the white eggs and pupæ they had captured. They repassed the hedge and the road, in the place they had previously crossed it, and then directed their course through a field of ripened corn, where I experienced the regret of not being able to follow them.

“I now retraced my steps towards the scene of the recent assault, and there found a small number of negro labourers, perched upon the stalks of plants, holding in their mouths the few larvæ they had rescued from pillage; these they shortly carried back to their former station.

This feature, so prominent in the history of this ant, of whose name I was ignorant, induced me to give them the appellation of amazon or legionary ants, as being most analogous to their martial character; which denomination I still retain.

I returned the following morning at the same hour, by the route I had observed the amazon army take, in the hope of acquiring some knowledge of the phenomenon of which I had been a witness, when I discovered the habitation of one of these martial hordes.

I observed on the right of the road a large ant-hill, covered with ants of that species. They formed into column, set forth in a body, and fell upon one of the habitations of the negro-ants, which, experiencing little or no opposition, they entered. One party immediately returned,

bearing in their pincers the purloined larvæ; another party, less fortunate, quitted the scene of attack, without reaping any advantage from their expedition: the former took the road to their own citadel; the latter marched in a body upon a second ant-hill, tenanted by the same species as the first, where they made ample booty. The whole army, now forming two divisions, hastened to the spot from which it had taken its departure. I reached the garrison a little before them; but what was my surprise to observe all around, a great number of that identical species they had gone forth to attack. I raised up a portion of the building, I still saw more; this induced me to regard it as one of the habitations that had already been pillaged by the amazons, when my suspicions were removed by the arrival of the amazon legion at the entrance, charged with the trophies of victory. Its return excited no alarm among the negro ants, who, whilst the legionaries were descending with their booty, so far from offering opposition, were even seen to approach these warriors, caress them with their antennæ, offer them nourishment, as is the custom with those of their own species, take up some of the larvæ, and carry them into the nest. The amazons remained within the rest of the day: the negro ants kept their station some time without, but retired before night.

“No enigma ever raised my curiosity so high as this singular discovery; and I had the satisfaction of finding near my own residence several ant-hills of the same kind, not a little astonished at being the first to notice their existence.

“Conscious of the great advantage of having them so near me, I determined to devote the whole of my time to them. As I was extremely impatient to ascertain the nature of the connexion between these different species, I opened one of their dwellings, and there observed a great number of rufescent mingled with ash-coloured ants, which gave me some general idea upon this head. The latter were busily engaged in re-establishing the several avenues, hollowing out galleries, and carrying below the exposed larvæ and pupæ. The amazons, on the contrary, passed over the larvæ, &c., with indifference, not once deigning to lift them, or take any part in the labours going forward; they wandered for some time over the surface, and then retired to the bottom of their citadel.

“But at five in the evening, the scene undergoes a complete and almost immediate change; the amazons leave their retreat, become restless, and assemble on the outside. They are all in motion; none, however, move but in a curved line, and in such a way, as quickly to

return to the outer wall of their garrison ; their number increases each moment, they describe greater circles, a signal is communicated, they pass from one to the other, striking as they proceed with their antennæ and forehead the breast of their companions ; these, in their turn, approach those advancing, and communicate the same signal, it is that of departure ; the result satisfactorily proves it. We see those receiving the intimation put themselves at the moment in march and join the rest of the troop. The column becomes organised, advances in a straight line, passes over the turf, and removes to a considerable distance. Not a single amazon is any longer to be seen near the garrison. The advanced guard sometimes halts until the rear guard comes up, and then diverges to the right and left without advancing ; the army forms anew, and again moves forward with rapidity. There is no commander-in-chief, every ant is in turn first, each seeking to be foremost ; some, however, move in a different direction, pass from the front to the rear, then retrace their steps and follow the general movement. There are always a small number constantly returning to the rear, and it is probable in this way the movement of the whole army is governed.

“ At a little more than thirty feet from their own residence they stop and explore the ground with their antennæ, much in the same way as dogs when searching for game. They soon find a subterranean negro ant-hill, to the bottom of which its inhabitants have retired. The amazon ants, unopposed, penetrate an open gallery ; the whole army enter, seize upon the pupæ, and return through the several apertures, immediately taking the road to their garrison. It is now no longer an army disposed in column, it is an undisciplined horde. The amazons run after each other with rapidity, and the last comers from the stormed city are followed by some few of its inhabitants, who endeavour to wrest from them their prize ; an effort in which it but rarely happens they are successful.

“ I return to the garrison to be once more a witness of the reception given to these plunderers by the ash-coloured ants, with whom they dwell. I observe a considerable number of pupæ heaped up before the door ; each amazon, on its arrival, deposits its burthen, and then returns to the invaded ant-hill ;—their auxiliaries suspend their labours in masonry, and come forward to the pupæ, which they carry one by one into the interior. The negroes are also frequently seen to unload the amazons, after having amicably touched them with their antennæ, when the latter yield to them, without opposition, the pupæ they have purloined

“Let us still follow this army of plunderers on their second return to the attack of the nearly ruined ant-hill. Its inhabitants, however, have had time to recover themselves, and to station a strong guard at each of the entrances. The amazons, who are in small numbers at first, take flight as soon as they perceive the negroes in a state of defence; they return to the main body of the army, and advance and retreat several times successively, until they are in sufficient force; they then throw themselves, en masse, upon one of the galleries, driving away and putting in confusion its inhabitants. The whole army now enter the subterranean city, and seize upon the larvæ, which they carry off in great numbers, and in great haste. They never take any of the parent ants prisoners, their sole object being the possession of their offspring. Upon their return to the garrison the most friendly reception is still given to the amazons, who,—their associates having arranged the produce of their first harvest,—either deposit their load at the entrance, or consign it to those in attendance, who hasten to place it in the interior.

“Could one for a moment suppose that these intrepid warriors would return a third time to the pillage? This time, however, they had to undertake a siege in regular form, for the individuals from whom they had twice successively taken larvæ and pupæ, had lost no time in throwing up trenches, barricading the several entrances, and reinforcing the guard of the interior, as if fully aware of this third attack from their adversaries. They had, moreover, brought all the little pieces of wood and earth within reach, with which they had blocked up the passage to their habitation, in which they were posted in force. The legionaries at first hesitated to approach, but rambled about or returned to the rear until sufficiently reinforced; they then, upon a given signal, rushed forward en masse with great impetuosity, and began removing with their teeth and feet the many obstacles that opposed their progress. Having succeeded, they entered the ant-hill by hundreds, notwithstanding the resistance of its inhabitants, and carried off their prize to their garrison. But this time, in lieu of remitting to their associates their plunder, they carried it into the under-ground chambers themselves, where they remained the rest of the day.

“On the 23rd June, at half-past three, when the sun was extremely powerful, a few of the amazons quitted their abode, and after taking a survey of the environs, re-entered; a moment after, others, but in trifling number, came to take the air at the entrance of one of the galleries, where they seemed to await the favourable moment for com-

mencing their expedition. At a quarter before five they sallied forth in crowds, and appeared extremely restless; some advanced into the meadow, whilst others remained on the ant-hill; but a few, returning to the rear, by the effect of that tactic we have elsewhere noticed, arrived at the garrison and gave the signal for departure, by approaching in turn, and striking with their antennæ all their compatriots, who immediately put themselves in march to join the army. This warlike phalanx took a direction different from that of the preceding evening, but soon stopped in their course, and separated in search of some ant-hill; but experiencing no success, they again formed and continued their march, until they alighted upon one hidden in the grass, at about fifty paces from their own dwelling. The ash-coloured ants, frightened at the unexpected arrival and number of the amazons, took flight, leaving the latter to make ample booty of larvæ and pupæ, which they carried off to their own abode.

“Another army, infinitely more numerous than the first, now issued from the garrison, and took a different direction in their march, which was somewhat tedious; they passed untouched several ant-hills inhabited by a different species, but finding at length a nest of ash-coloured ants, they attacked it with their usual fury, and returned laden with pupæ and larvæ. I was a witness every day during the summer to these invasions.”

Another species of slave-making ants (*Formica sanguinaria*, Latreille), whose proceedings are somewhat different, will be detailed in a subsequent page.

NOTES UPON INSECTS.

BY SYLVANUS.

It is a trite but no less true remark, that the structure of every creature is fitted for the life it is designed to lead: however minute, or however vast the size of the animal, this equally applies in all instances throughout the creation. The more familiar the illustration which we select of this great law, the more forcibly are we impressed with a sense of the mightiness of the Creator. We will choose from out the varied host of insects, two for examination and comparison—which every reader, however young, must have observed, viz. the beetle and the

butterfly. The first (which belongs to the order *Coleoptera**) has every part of its body formed for strength, and in the most of instances is well supplied with the organs both of offence and defence†. The first pair of wings form an effectual protection to the under pair, and likewise to the abdomen. By some authors they have been denominated the “wing sheaths,” but they are more properly wings, although they “are so horny and stiff, that they have no close resemblance to what are called wings in other insects‡.” The use which the work just quoted assigns to these first pair of wings is, “to cover the second pair in a state of repose, and to balance the body, perhaps by their weight, in flying.” These reasons I consider perfectly satisfactory; but there is one point left which deserves mention: I allude to the humming noise which some beetles make in their flight, attributable to the rapid displacement of the opposing particles of the atmosphere, produced by the quick passage of the insect through it. Your intelligent correspondent Solitarius, at page 406 of the first volume, speaking of the gnat (*Culex pipiens*), says he conceives it possible, that “it may learn its situation in a dark room by the variations produced upon its piping noise, (which may thus be as serviceable to it in the dark, as its sight in the day time,) to avoid breaking its wings, &c. He also conjectures that “the humming of the cockchafer (*M. vulgaris*), the dung beetle (*G. stercorarius*), and many other insects,” may be referable to the same cause. With all due deference to the ingenious observations of this gentleman, I would humbly remark, that the latter conjecture does not appear to be borne out by facts. How is it, it may be asked, has the proverb “as blind as a beetle,” arisen, but from the well-known stupid tendency of beetles to fly direct against any obstacle which may occur in their course, by which many of those kinds which fly about in the dusk of the evening are stunned and captured. Besides,—the rapidity of their flight would not give them much time to employ the instinct for which Solitarius gives them credit. The question is very interesting, and to the lover of Entomology, is very important. Experiments might be made which would throw some light on this subject. In the next number (if deemed worthy of insertion) I shall resume these notes.

Camberwell, February 26th, 1834.

* Derived from the Greek *κολεος*, a sheath, and *πτερον*, a wing.—S.

† For instance, the large forceps of the *L. Cervus*.

‡ Alphab. Ins. page 54.

THE EDITOR'S ALPHABET OF INSECTS*.

THE first edition of the "ALPHABET OF INSECTS," though more comprehensive than any other elementary work in English, did not contain several particulars, which were omitted for fear of swelling the size and increasing the price of the book. Many of these omissions have been supplied in the present edition, in consequence of the proprietors finding that the extensive demand would remunerate them for the additional expense; and on the same principle, a number of new engravings have been introduced, chiefly from the splendid work of M. Straus Durckheim on the Anatomy of the Cockchafer, published at the expense of the French Institute. As many of our readers who possess the first edition may not meet with this, and may not be aware of the important additions, we shall here give an extract, as a specimen of a work which we sanguinely hope will be of no inconsiderable use to those who are beginning the study, as well as serve to show those who are advanced what is doing by our neighbours on the Continent.

"FOOT-COMBS AND FOOT-BRUSHES OF INSECTS.—Most people may have remarked, that flies are ever and anon brushing their feet upon one another to rub off the dirt, and equally assiduous in cleaning their eyes, head, and corselet with their fore legs, while they brush their wings with their hind legs. In the foot of the common blow-fly there are two rounded combs, the inner surface of which is covered with down, forming a fine brush; and some crane flies have three such combs on each foot. Mr. Blackwall denies that what are here termed combs exist, as they are represented by Bauer, on the edge of the membrane of the flies' foot, and says, the appearance of this is caused by minute short hairs. But though I should be more disposed to trust so celebrated a microscopical observer as Bauer, yet it is of little moment to the office of a comb, which I have here ascribed to the foot, whether it is hairs or serratures. I have also observed the water measurer clean its feet, though not by crossing them like the fly, but merely by wiping them upon one another.

"In the case of the large green locust†, the structure of the instrument is more obvious; and it being important to keep the soles of its feet

* Alphabet of Insects, for the use of Beginners. 2d edition, revised, with numerous additions. London, 1834.

† In Latin, *Acrida viridissima*.

clean, to enable it to walk up glass or other smooth substances, it is not contented, like the fly, with brushing them one on another, but will, like a spider, as first recorded by me, go over the foot with its jaws, mumbling off every bit of dust, a process which Swammerdam mistook for chewing the cud.

“MUSCLES OF THE LEGS AND FEET.—Beginning with the haunch, Straus-Durckheim describes in the cockchafer four flexor muscles in the fore leg, three in the mid leg, and five in the hind leg, without mentioning two others attached to the latter, which he supposes rather to be pertractors of the abdomen. Opposed to these are the extensor muscles of the haunch, one strong one in the fore leg; a short one and a long one in the mid leg; and three in the hind leg. Besides these, there are a flexor and an extensor to that which I have called the third piece of the haunch.

“Muscles of the right fore leg and foot in the cockchafer magnified eight times. Fig. 1, *a, b, c*, extensor muscles of the trochanter cut across; *d*, flexor also cut; *e*, the trochanter; *f*, extensor of the leg; *g*, flexor of the leg; *h*, extensor of the foot; *i, l, l*, the flexor of the foot, the tendon being the long white line in the centre; *k*, the leg; *m*, extensor of the claws; *n*, the flexor of the claws; *o*, the foot; *p*, the claws. Fig. 2. Haunch of the same laid open; *a*, the third flexor muscle; *b, c, d*, extensors of the trochanter; *e*, the flexor of the trochanter; *f*, the rotula; *g*, the trochanter. Fig. 3. Thigh of the same; *a*, portion of the extensor of the leg; *b, c*, the two side parts of the flexor.

“The thigh, in each of the three pairs of legs, has only a very feeble

abductor muscle, and as it is but very slightly movable, there is no antagonist abductor.

“ The shank has a strong flexor muscle, and a more feeble extensor in each of the three pairs of legs.

“ The foot, in each of the three pairs of legs, has an extensor and a flexor in each of the joints. The last joint includes a flexor and extensor for moving the claws.

“ **STANDING * OF INSECTS.**—The centre of the pressure † in insects being usually either in the base of the abdomen or in the hind corselet, the three pairs of legs are of course inserted in advance of it ; and hence, did they stand perpendicular to the body like the legs of quadrupeds, it would be impossible for an insect to alight on its legs without being upset.

“ To obviate this, the legs extend to a considerable length from the body, and not only so, but the first pair project obliquely forward, and the third pair obliquely backward, while the second pair are, in some species nearly at right angles to the body, and in other species, project obliquely forward or obliquely backward, according as the position of the centre of pressure requires for the stability of the animal. In two-winged flies, for example, the mid pair of legs projects obliquely forwards, as may be seen in the figure.

“ Figure of a Crane Fly ‡ to show the position of the feet, as extending the base within which falls the line of direction of the centre of pressure.

“ The singular pendulum-like motion, exhibited by some species of long-legged flies while their feet are quite stationary, may be referred

* In Latin, *Statio*.

† See Alphabet of Physics, p. 38.

‡ In Latin, *Tipula oleracea*.

perhaps to the same cause as the similar motions of caged animals in a menagerie. When they are observed to perk up their hind legs in the air while they are standing on their fore legs—a common practice among gnats—it is probably to ascertain, from the agitations of the air, the approach of danger, as they are extremely timid.”

CHAPTER OF VARIETIES.

OF WHAT USE ARE THE AIGRETTES OF CERTAIN OWLS?—Whilst minutely examining a specimen of the little horned or scops owl* (*Scops Aldrovandi*, Ray), in my collection, I observed that the feathers which form the aigrettes or tufts upon the head were much rubbed and worn. This would seem to imply that these hitherto considered ornamental tufts are of some decided use to the bird,—but what that use can be, I cannot imagine. These feathers do not appear in the least worn, in the specimens which I possess of the two British species of *Otus*.

E. BLYTH.

Tooting, Feb. 4th, 1834.

HABITS OF THE TAWNY WOOD-OWL, OR SCREECH-OWL (*Uhu stridula*, Selby; *Strix Aluco* of Linnæus).—An owl of this species, which, with its wing cut, enjoys the range of a large garden in this neighbourhood, is in the constant habit of burying whatever food it cannot eat; scratching up the earth with its feet, and covering up its treasure as carefully as any fox: it does not, however, like that animal, suffer it to remain until it becomes putrid, but returns and scrapes it up again, generally in the course of a few hours. It frequently rests itself sitting, like the African serpent-eater, the cassowary, and various *Grallatores*, upon the whole length of the *tarsus*, selecting generally an angle of the garden wall away from the sun, against which awkward place it has rubbed and much injured the appearance of its tail; this circumstance led me to suppose at first that the habit was not common to the species, as the tails of the wild birds are always perfect; but probably in a state of nature they contrive to fix upon situations where no injury to their plumage can take place.

E. BLYTH.

Tooting, Surrey, Feb. 4th, 1834.

* Shot in Kent.

WINTER BIRDS.—In the last number of the “Field Naturalist,” I mentioned having seen sparrows carrying off feathers during frost, and now beg to state a still more curious instance of unseasonable nestling, which has just come to my knowledge.

A gentleman residing in this city, so early as a fortnight after Christmas, found at East Cliffe, in East Lothian, the nest of a hedge chanter (*Accentor modularis*, Cuvier) with one egg in it, which he blew and ascertained to be fresh. My authority is most respectable, and, were I at liberty to give his name, would I am sure not be doubted.

During a sudden fall of snow about ten days ago, I observed that all the house sparrows in the neighbourhood retired for shelter to the crevices of an old brick building; and it was very amusing to see them peeping out every little while to ascertain if the storm was over. As it is in the direction of this building that I have generally observed them to fly with feathers and other materials, it seems probable that the suggestion of the Editor, as to their constructing roosting nests, is correct.

T. M. G.

Edinburgh, February 21, 1834.

MODE OF CATCHING SMALL BIRDS.—As the spring is now coming on, and a great deal of interest has been excited with regard to our summer warblers since the publication of Mr. Sweet, I wish to make known to you a mode of catching them, which I have partially tried myself with success. I procured a slender wand of about 18 inches in length, and hung from it at different distances a number of nooses formed of single horsehairs. I bored a hole in a tree, where I thought it likely for birds to fly past, and inserted the wand into it, so as to present the appearance of a natural branch, with the nooses hanging some distance below. It was merely an experiment, for I could catch nothing but the common brown wrens by the method recommended by Mr. Sweet, and I was fortunate enough to capture first the lesser whitethroat, which is a bird not very often seen from its habits of concealment; it took a fly from the hand the first day, and it learnt to eat bread and milk immediately; by throwing some flies into it I kept it in perfect health for some time, until it eventually escaped. I afterwards set nooses in other places, and caught a good many other commoner birds, especially on some rails covered with thorns which crossed a brook, and were much frequented by birds for the purposes of bathing. I caught even so large birds as blackbirds and thrushes with single hairs, but they got entangled in more than one noose, so that I cannot say whether one hair alone

would hold them. I believe I also captured a specimen of the bird described as having an appearance and size between the nightingale and common white-throat, but it died the next day. It was in the autumn that I used these nooses, and without any bait, but I have no doubt in building time the hair would itself be a bait; and birds do not seem to have the least fear of it. The nooses might be used like a net in an open part of a hedgerow, and the birds driven into them. I have no doubt the sedge bird might be very easily caught by driving him up and down a drain, and having a number of nooses suspended from a string across; and also those warblers which frequent furze, as the Dartford warbler, furze chit, &c. might possibly be taken. I am very little of an entomologist, and I therefore should like to elicit from some of your correspondents this coming summer, a mode of breeding particular sorts of insects, in addition to the common meal worm, for the feeding of summer birds.

C. W. S.

Stepney.

HABITS OF SWALLOWS PREVIOUS TO MIGRATION.—For several years past I have observed, that after the swallows have reared their young, and they are become strong on the wing, they assemble in vast quantities on the roofs of the highest houses, from which they fly off at a given signal made by some of the flock (no doubt by the old birds, which may be thus expressed, *twit, twit, twit*, repeated several times in succession), and perform their various evolutions in the air. After being absent a short time they return again: this practice is kept up for several days: after which they may be seen sporting in the fields, and *frequently alighting* on trees and bushes. A day or two previous to their departure they assemble in a large flock, and at night roost on the willows and trees in an adjoining marsh, near the sea-shore, at a short distance from the town. I have observed them in this place of an evening, in the beginning of October, and the day after there was not more than two or three to be seen; so that I concluded they must have migrated in the night, or very early the next morning, as I was on the spot shortly after daybreak.

After having made the above observations four years since, I saw, on a fine day in the depth of winter, a solitary swallow (*H. rustica*) skimming the surface of a pond. The weather for some time before had been very cold. This bird must have remained in a state of torpidity for several weeks previous to the time I saw it.

Penzance, Cornwall, Feb. 5, 1834.

OAKS GROWN IN HYACINTH GLASSES.—An occurrence has lately taken my attention, which is possibly not unworthy of notice, as illustrative of the efforts made by natural productions to discharge their functions in some other way, if interrupted in the ordinary way of discharging them. The case was one of the rearing of an oak plant in a hyacinth glass, according to the mode described in your first volume, p. 177. The acorn having been suspended on a thread fastened round it, as there described, in due time the germ burst the shell and made its appearance at the smaller end; but in thereupon proceeding downwards, the radicle was intercepted by the lower part of the shell, which was not open enough to allow it to pass free. The radicle was accordingly bent upwards; when penetrating along the length of the acorn horizontally, within the shell and of course within the thread which surrounded the shell, it made its way out at the *larger end*; and thence passed down at a right angle into the water, where it is now luxuriating several inches deep, and with every prospect of the plumula shortly shooting upwards, and becoming a tree in proper season.

RURICOLA.

Holywood, Feb. 12th, 1834.

DR. KNOX ON THE STRUCTURE OF THE FOOT OF THE HORSE*.—He demonstrated the navicular bone of the horse's foot not to be a sesamoid bone, nor a peculiar structure formed expressly for the horse, but the *Epiphysis* of the *Os pedis*, or coffin-bone. This was proved satisfactorily by a direct appeal to structure. Besides anticipating results of practical consequence from this discovery, the author is led to observe, that an organ may be displaced and employed to perform different functions in different animals,—that the epiphyses of bones are intended by nature to form separate bones in a vast variety of animals,—and that they may often lead to the discovery of the type of the skeleton in fossil remains of extinct animals.

DAILY FLIGHT OF ROOKS (*C. frugilegus*).—It is a daily habit with the rooks belonging to the rookeries situated several miles to the eastward of this town, from the end of one breeding season to the commencement of the next, to fly to the west. I have often observed them on Sennen Green, near the Land's End, at which place and in the neighbouring fields they remain all day, seeking food, accompanied by jackdaws

* Read before the Royal Society of Edinburgh.

and gulls; the former appear to be very sociable at this time of the year, but the latter often have desperate battles with them, the rooks generally coming off victorious. About an hour or two before dark the rooks assemble together, mount in the air, and wing their way to their respective homes.

I may also state that, when the weather is fine, they may be seen in the morning, flying at a great height over the town (*from east to west*). If it happens to be blowing strong, they fly very low; and I have frequently observed them, when they have not been able to get forward, to remain in the fields near the town. When this is the case, they return earlier than usual.

E. P.

Penzance, Cornwall.

OBSERVATIONS* ON THE WILLOW WREN (*S. trochilus*), AND OTHER BIRDS.—This bird is a regular summer visitant in this part, but some of them remain with us all the year. A few days since I saw one climbing the branch of an elm, seeking for food in the interstices of the bark. I was also shown one, about the middle of last month, by a gardener, which was caught the evening before by his son: and one evening in January, 1833, whilst out catching birds for specimens, I observed two willow wrens comfortably perched, side by side, on a small twig in the thickest part of a strawberry tree, one of which I captured; it lived several days, and ate freely of boiled egg, chopped fine. This bird is seldom seen in the summer, on account of its shyness.

The loon and dunlin visit us regularly in the autumn, and remain till spring; also the crested shag, northern diver, and golden plover, when the winter is severe.

E. P.

Penzance, Feb. 5.

THE STARLING.—On the morning of the 25th of February (1834), I observed several starlings flitting amongst the trees in Lincoln's Inn Gardens, amidst the smoke and din of London.

The gardener informed me that there had been a nest of these birds in the gardens. Is it, or not, an unusual place for this species of bird? Probably they were the progeny of some tame birds which had escaped from confinement.

* Omitted in my last communication of migratory birds in this neighbourhood; a list of which see p. 109 of this volume.

E. P.

They first attracted my attention, as they flew from tree to tree, pursued by sparrows, who seemed to deem them intruders on their long-possessed domain. In your edition of *Montagu's Dictionary*, it is stated that the natural notes of this bird are a *shrill whistle*, and a chattering noise. The latter remark appears correct, but I do not concur in the expression *shrill whistle*. I would rather say, a *melancholy or plaintive whistle*. In the same work, it is said, in confinement it is very docile, and is *taught to imitate* the human voice, and to whistle tunes. But it has great natural powers of imitation, according to *Mr. Lowe*, in his work on the *Orkneys*. "I have," says that author, "often been much diverted to hear a couple of cock *stares*, perched upon two opposite chimneys, trying to excel one another in imitating all the noises below—the crowing of cocks, cackle of hens, barking of dogs, mewing of cats, particular notes of different wild birds; all this intermixed with its own *natural harsh discordant squeak*."

Mr. Knapp terms their call "a *fine clear note*, that in particular states of the air may be heard at a considerable distance." I presume these naturalists are speaking of different notes; though *Knapp* afterwards speaks of their chattering "*in a low song-like note*."

These and such like discrepancies involve the subject of natural history in much difficulty. If you think any part of this letter fit to be published, you will probably, in a note, clear up the ambiguity.

Yours, &c.

J. B. (B. V. B. V.)

ON CATS.—As you have occasionally given us some observations on the domestic cat, and as you solicit even the slightest information upon any thing relating to Natural History, I am induced to trouble you with the following particulars as to a cat of the large black and white kind now in my possession, which, though (I believe) more than twelve years of age, is in good condition and as lively and playful as a kitten.

My object principally is, to correct two errors which some naturalists have fallen into; namely, that the cat seldom or never lives beyond the age of ten years, and that it is always attached to the house and not to the person of its owner.

Being at lodgings in London in 1824 and 1825, the cat above alluded to, which then belonged to the people of the house, attached itself in a particular manner to my wife and me, so much so that it was never contented but in our apartments; and when we happened to be absent for a short time, it was quite disconsolate, though, till this feel-

ing had been first evinced, we had taken no particular notice of it. The cat (which is a female) had a kitten with her nearly half grown when we were about to leave London for the country, in September 1825, and my wife wishing to take the kitten with her, I proposed to take the mother also ; and they were accordingly put together into a basket, and accompanied us on our journey. The unconscious kitten was full of play, even in this state of confinement, to the no small annoyance of its mother, who seemed to be gravely contemplating on weightier matters, perhaps connected with the change occasioned by her unexpected trip. We travelled in a circuitous route upwards of 140 miles, occasionally stopping for one, two, and three days, at different places, till at last the cats were apparently quite reconciled to their new mode of life. When the basket was opened at the places we visited, the mother would at first, for a moment, look wildly and suspiciously around her ; but when she found her friends standing by and speaking kindly to her, she immediately resumed her confidence and composure, and would walk about contentedly whilst we were in view, till called again to her basket, which she would enter without the least reluctance, evidently showing that she was really attached to our persons, and not to any place in particular, and was perfectly satisfied whilst she knew we were near her. We left her at a friend's house in the country, upwards of twenty miles from this place, for more than a year, and ultimately, when we came to settle here, took her home with us, she never having appeared to forget, but always recognised us when she saw us, and stayed contented where we were without any apparent inclination to leave us or return to her former habitation ; and this has likewise since been the case when we have occasionally changed our residence in this town. I have no doubt that want of kindness and attention very often prevents personal attachment in these animals, and is many times the destruction as well of them as of our own species, and it is certainly very inexcusable and cruel to neglect or ill-treat the brute creation placed under our care.—“ A good man is merciful to his beast,” and he or she who is not so is not a friend to humanity, nor fit to have the management of children.

De Ville, the Professor of Phrenology, in the Strand, extends his observations to other animals, as well as to man ; and in a course of lectures he delivered here a short time since, he remarked upon the generally received opinion that cats were attached to the house, and not to the person, stating that there were exceptions to the rule, and that where this was the case, the animal would be found to possess a more

than usual rotundity of head, which, I must acknowledge, in justice to Phrenology as a science, I think is so far sufficiently exemplified in my cat.

P. S. Two or three of the *Musca domestica*, or common house fly, made their appearance again in February, the last of the winter stock having disappeared only on the 16th of January; so that owing to the mildness of the winter we have not been deprived of their company more than five or six weeks. On the evening of the 1st of March instant, I saw a bat on the wing. The fruit trees are showing their blossoms, and the willows are covered with catkins or male flowers.

Southampton, March 3, 1834.

M.

LADY-BIRDS.—In the spring of 1830, having accidentally walked to some sand hills (cliffs) in the neighbourhood which are covered with that kind of grass, provincially called Marram, I was much surprised to find that the whole surface of the ground appeared to be covered with ladybirds (*Coccinella*) of various kinds.

In the space of an hour or two I collected as many as fifty-two kinds, distinctly different from one another; five of these were larger than the common ladybird (*Septem punctata*), but in general they were of a very small size.

On returning the next day to the same spot, I could scarcely find a single individual, which I attributed to a strong wind which had blown from the shore all night; and on descending to the beach I found that my conjecture was true, as multitudes of ladybirds, left by the receding tide on the shore, were dead.

As I took no note of the circumstance at the time, I cannot exactly say in what month this happened, but I think it was in May.

I should be much gratified if any of your readers are able to assign any cause for the collection of so many different species of *Coccinella* in such a situation.

C. B.

January 23rd, 1834.

11.10.83