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Great Nature ever young, but full of eld
Still moving, yet immoved from her sted,
Unseen of any, yet of all beheld.

SPENSER'S *Faërie Queene*.

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THE ZOOLOGIST

FOR 1859.

Reason and Instinct. By the Rev. J. C. ATKINSON, M.A.

IF now we turn to investigate the phenomena which bear upon our last position we shall find ourselves not without a series of facts on which to form a judgment, but still with a series comprising fewer and less closely connected facts than we shall desire.

We have, on the one side, the example of the white man, who, forsaking many of the peculiarities and extricating himself from the action of many of the influences of civilized life, assumes the habits and undergoes the vicissitudes, physical and psychical, of savage life. I refer to the professional hunters, the trappers, voyageurs, "mountain men," of the Far West. "Wild as savages," "Wild and half savage," are the descriptive epithets applied to them by one who knew their class well, and had spent no small portion of his adventurous manhood among them and in the scenes mainly frequented by them.

And, on the other, we have the evidence afforded by the condition of those wretched human creatures who are known to have fallen lower and lower in the grades of humanity; in other words, to have lapsed to the very lowest depths of barbarous or savage life: I mean the Bushmen of South Africa, the Diggers or Yamparicas of Western America, and the like. Both the tribes named—if indeed they can be with propriety styled tribes at all—present many of the characteristics of the lower animals, and but very few of the ennobling distinctions of humanity, and even those few shining with a miserably obscured light.

As to the psychical condition of the Bushmen, I must be content to repeat part of a description already given (Zool. 5584) of their habits and condition, physical and psychical. "No picture of human degradation and wretchedness can be drawn which exceeds the re

abasement and misery of the Bushmen, as we find it displayed by the most accurate writers who describe this people without houses or even huts, living in caves and holes of the earth. These naked and half-starved savages wander through the forests in small companies or separate families, hardly supporting their comfortless existence by collecting wild roots, by a toilsome search for the eggs of ants, and by devouring, whenever they can catch them, lizards, snakes and the most loathsome insects. It is no matter of surprise that those writers who search for approximations between mankind and the inferior orders of creation fix upon the Bushmen as their favourite theme. The desire of revenge is one of the strongest of their passions; it urges them to the most barbarous acts; they commit the most frightful outrages under the impulse of momentary irritation. Their eagerness for vengeance is so urgent as to render them indifferent on whom they wreak it, provided the sufferer be of the same country as the offender." Add to this, that where vicinity to the residence of owners of flocks and herds, or the numerical strength of their hordes permits it, marauding propensities, quite equal in intensity to those of the lion or the wolf, display themselves, and are indulged quite as regardlessly as by either of those animals, while the poisoned shafts of the Bushmen are more dreaded by the herdsmen whose cattle are attacked,—as well as more than as dangerous to them,—than the fangs of the fiercest lion; so that it has often become necessary for the industrious Griquas or Bechuanas, whose neighbourhood was infested by some horde of these Lilliputian savages, to resolve to attack the Bushmen and accomplish their destruction at whatever cost.

As to the condition of the Digger, precisely parallel to that of the Bushman, Lieutenant Ruxton will bear testimony. Speaking of a journey taken by certain persons, he says, "They came upon a band of miserable Indians, who, from the fact of their subsisting chiefly on roots, are called Diggers. A few of these wretched creatures came into camp at Sundown; they appeared to have no other food in their village but bags of dried ants and their larvæ, and a few roots of the yampah. Their huts were constructed of a few bushes of grease-wood piled up as a sort of breakwind in which they huddled in their filthy skins."—(Far West, p. 102). "They were now entering," he continues, "a country inhabited by the most degraded and abject of the western tribes, who, nevertheless, ever suffering from the extremities of hunger, have their brutish wits sharpened by the necessity of procuring food, and rarely fail to levy a contribution of rations, of horse or mule flesh, on the passenger in their inhospitable

country. The brutish cunning and animal instinct of these wretches is such, that although arrant cowards, their attacks are more feared than those of bolder Indians. These people—called the Yamparicas or Root Diggers—are, nevertheless, the degenerate descendants of those tribes which once overran that portion of the Continent of North America now comprehended within the Boundaries of Mexico, and who have left such startling evidences in their track of a comparatively superior state of civilization. They now form an outcast tribe of the great nation of the Apache. The Apaches and the degenerate Diggers pursue a cowardly warfare, hiding in ambush, and shooting the passer-by with arrows; or dashing upon him at night when steeped in sleep, they bury their arrow to the feather in his breast.”—(Id. 181).

Such then is the effect of moral and physical retrogression—for both these tribes, I repeat, are known to have retrograded in the scale of humanity—upon the human creature. He becomes all but an inferior animal in his obedience to instinctive impulses, and scarcely more raised above the brute by any exercise of the higher gifts of Reason, than are some of the craftier and more intelligent brutes over the remainder of the great family they belong to. That is the accomplished result of the downward movement continued until it seems to approximate towards completion.

The earlier stages are seen in the accounts given of the class of men referred to a little above; the class, I mean, of “Mountain men” or “Trappers.” Here is a description of one of them:—“The last in height, but the first in every quality which constitutes excellence in a “Mountaineer,” whether of indomitable courage, or perfect indifference to death or danger; with an iron frame capable of withstanding hunger, thirst, heat, cold, fatigue and hardships of every kind; of wonderful presence of mind, and endless resources in times of peril; with the instinct of an animal and the moral courage of a man.”—(Far West, 235). Again, “The trappers of the Rocky Mountains belong to a “genus” more approximating to the primitive savage than perhaps any class of civilized man. Their lives being spent in the remote wilderness of the mountains, with no other companion than Nature herself, their habits and character assume a most singular cast of simplicity mingled with ferocity, appearing to take their colouring from the scenes and objects which surround them. Knowing no wants save those of Nature, their sole care is to procure sufficient food to support life, and the necessary clothing to protect them from the rigorous climate. When engaged in their avocation, the natural Instinct of primitive man is ever alive, for the purpose of guarding

against danger, and the provision of necessary food. Keen observers of Nature, they rival the beasts of prey in discovering the haunts and habits of game, and in their skill and cunning in capturing it. Constantly exposed to perils of all kinds, they become callous to any feeling of danger, and destroy human as well as animal life with as little scruple and as freely as they expose their own. Of laws, human or Divine, they neither know nor care to know. Their wish is their law, and to attain it they do not scruple as to ways and means. They may have good qualities, but they are those of the animal; and people fond of giving hard names call them revengeful, bloodthirsty, drunkards, gamblers, regardless of the laws of *meum and tuum*,—in fact, White Indians. Their animal qualities, however, are undeniable. Strong, active, hardy as bears, daring, expert in the use of their weapons, they are just what uncivilized white man might be supposed to be in a brute state, depending upon his Instinct for the support of life. During the hunt the Trapper's nerves must ever be in a state of tension, and his mind ever present at his call. His eagle eye sweeps round the country, and in an instant detects any foreign appearance. A turned leaf, a blade of grass pressed down, the uneasiness of the wild animals, the flight of birds, are all paragraphs to him written in Nature's legible hand and plainest language. All the wits of the subtle savage are called into play to gain an advantage over the wily woodsman; but with the natural Instinct of primitive man, the white hunter has the advantages of a civilised mind, and, thus provided, seldom fails to outwit, under equal advantages, the cunning savage."—(Adventures in Mexico, 241, 244). And this character, in a variety of delineations of great force and breadth, and to the general accuracy of which the writer pledges himself, is shown to be anything but a mere ideal. The mountain man is seen to be no insufficient match for the Indian in any of the peculiar qualifications for maintaining a savage existence possessed by the latter, and even to a degree, often a considerable degree, acquires the peculiar keenness of vision and intuitive perception of locality and direction, which, in their full development, are found only in the savage. But at the same time, out of that peculiar line in which their faculties are wontedly exercised, the higher portions of man's intellectual nature are as little apparently employed as possessed. Eager for collision with the Indian, who is instinctively—it may with the utmost truth be said—regarded as their natural foe; gratifying their thirst for his blood—if the chances of the contest so permit—with a savage, inextinguishable lust; planning their attack and executing it as stealthily and remorselessly as the lion or the bear; or

prosecuting their object of hunting and trapping as craftily and pertinaciously, and with as much eagerness and preoccupation as the savage man or the savage animal; or pairing—for so it can only be called—with an Indian woman or possibly two, perhaps with their consent, perhaps after their purchase from some other trapper, perhaps after a sort of Rape-of-the-Sabines wooing, and then as lightly dissolving the brief union by sale or desertion; or, on revisiting scenes of life less savage than their wonted one, indulging their animal passions of sexual lust and drink and gluttony, and fighting at the least provocation like so many brute beasts and with almost less restraint;—they do indeed show what are the steps trodden in the downward direction from civilized life to uncivilized, and so mainly tend, no less than the Bushman and the Digger, to support our last position,—that, if by any chance man treads in a backward order the steps he has already imprinted in his passage from the uncivilized to the civilized state, he, at the same time, and as if inevitably, becomes clothed upon again with some of his instinctive habits and loses some of the finer functions of Reason: and that, at the same time, it is most difficult to attempt to define at what point,—or indeed, if at any point,—this process at length stops short.

J. C. ATKINSON.

Danby Parsonage, Grosmont, York.

The Black Rat (Mus rattus).—This species, usually considered rare and almost extinct, has occurred in large numbers on board a ship lately arrived from Bombay: whether they were on board on her departure from England, or whether she became infested with them at one of the foreign ports, I am unable to say; but most of those caught were of large size, and were probably on board for many months. With them there were also a few of the common brown species, in the proportion of perhaps one to three.—*Robert M'Lachlan; Forest Hill, December 13, 1858.*

Bats flying in the Sunshine.—It is not usual for bats to fly about during a bright sunshine in an afternoon, as described by Mr. Holdsworth (Zool. 6257). I have no doubt that these bats, described as of a larger size than usual, were only some old ones which had been disturbed from some old building or some "ivy-mantled tower" in the neighbourhood, by workmen or other intruders upon their quiet roosting-place. During the last two summers bats have made their appearance at the church I attend, much, I fear, to the amusement of some of the juvenile male portion of the congregation; for many Sundays, as soon as the organ was played, these bats came out from the belfry, near the organ, and flew about until some of the young ones fell exhausted into several of the pews of the church.—*H. W. Newman.*

PS. On looking again at Mr. Holdsworth's communication I find it is dated the 12th of September; this was an unusually hot and sultry day for the time,—the ther-

mometer stood at 76° in the shade in Gloucestershire at 2 P. M., with a dead calm; this extraordinary heat might have brought these bats out a couple of hours before their usual time: two days previously the temperature was ten degrees cooler.

Scraps from the Far West. By THOMAS BLAKISTON, Esq.,
Lieut. Royal Artillery.

Fort Carlton, Saskatchewan River,
January 14, 1858.

Dear B——,

In a letter to J——, which I suppose you will see, I have given a description of my journey from Hudson's Bay to this out-of-the-way place, which will give you some idea of "Voyages and Voyaging in the Fur Countries," the isolated portion of Red River Settlement, my winter employment, position of Fort Carlton, what I have done in the way of collecting, and the distance a letter has to travel to reach England. You will observe that I have entered into no particulars concerning Ornithology, the reason being that a mere dry collection of observed facts could not be interesting, and I refrain at present from drawing any general conclusions until I have compared my observations with those of others, which I cannot do until I have leisurely ran through the 'Fauna Boreali-Americana,' by Richardson and Swainson, which is the great authority on this country. However, as you have more knowledge of North-American Ornithology than myself, and as you may have some opportunities of referring to works on the same, perhaps the following notes concerning the birds observed during a boat voyage from Hudson's Bay to Lake Winnipeg and up the Saskatchewan River, in the fall of 1857, may be interesting.

The first portion of the journey is from York Factory, lat. 57°—long. 92½°, in a general S.W. direction, about 300 miles to the North end of Lake Winnipeg, in lat. 54°, during the first three weeks of September. This may be despatched in a few words.

Eagles. Observed on one or two occasions.

Fish Hawk. Often seen.

Hawks. A good many, but none identified.

Belted Kingfisher. Not uncommon.

Shrikes. One, which I take for *Lanius borealis*, I have preserved.

Turdus migratorius. A few observed.

Warblers. I consider I saw *Sylvia æstiva*.

Wren. One species of *Regulus (calendula)*.

Tits. *Parus hudsonicus* and *P. atricapilla*.

Sparrows. *Fringilla iliaca*, *F. pennsylvanica*, *F. canadensis* and *F. hyemalis* seen and shot.

Redpole. Considered I saw some flying over.

Bunting. *Emberiza Savanna* shot at York Factory in August.

Grackles. *Quiscalus versicolor* sparingly; *Q. ferrugineus* common.

Raven. *Corvus corax* everywhere; but no crows.

Jay. *Garrulus canadensis* also everywhere.

Woodpecker. *Picus arcticus* shot, and *P. auratus* seen.

Pigeon. A couple of stragglers observed.

Grouse. None seen, but plenty of droppings in some places. From description I have no doubt the ruffed and Canada grouse are found East of Lake Winnipeg.

Plover. One flight observed.

Sandpipers. *Tringa remipalmata* shot in Hudson's Bay; *T. americana* shot in the river; *T. vocifera* very common from the sea to Lake Winnipeg at the season.

Geese,—the greater part of which I considered *Anser canadensis*. Observed a migration first on the 16th of August. York Factory, and continually seen along the route.

Ducks. Mallard most common; greenwinged teal, not rare; golden-eye and buffel-headed ducks were distinguished, and others observed, among them, I think, were the scaup and wigeon.

Cormorant. A species observed two or three times.

Two species of tern were observed at the mouth of Hayes' River, Hudson's Bay, and one on Lake Winnipeg.

Loon. Great northern diver not uncommon on the Lakes, but never seen in rivers.

No birds of the swallow tribe were observed.

All this time I had been travelling over ground that is perpetually frozen, and at York Factory is found to thaw only to the depth of three or four feet during summer. Norway House stands just on the dividing line between perpetually frozen ground and that which entirely thaws, and this line appears to run from the south of Hudson's Bay to the north end of Lake Winnipeg, and in going west tends to the north.

The second part of my journey, you will see, lies between 53° and 54° N. lat., until Carlton is reached, which is but seven miles south of the former, and in long. 106½° W.

Lake Winnipeg divides two portions of country very different both in geological formation and external aspect, and having traversed the densely wooded part of primitive formation, we now enter a region of "drift," geologically speaking, under which lies limestone. After passing the Grand Rapid and Cedar Lake the whole country is nearly level, and being but little elevated about the river is nearly all swamps, until you reach above Cumberland House, which you will see marked on the map.

This is a great *rendezvous* for wild fowl, and where I was so astonished at the immense numbers, which I have mentioned in a letter to J——. After this you gradually rise, step by step, to the great "prairie levels," the cutting of the river becoming deeper and deeper, until, at Carlton, you have risen about 400 feet above Lake Winnipeg. Wood gradually disappears, except along the river, and here, at some distance from the river, you lose wood altogether, and in other parts you have only a small growth of poplars and willows, a tree of the pine family being a rarity.

Now, as you may have a faint idea of the country through which this river passes, I will commence with the ornithological notes.

From the Autumnal Equinox to October 23.

Eagles. Were occasionally seen during the whole time, but not identified.

Fish Hawk. Only observed once or twice.

Hawks. 1. A small species was observed, spotted under parts. 2. A large species of supposed buzzard, entirely of an ash-colour, without the white rump. 3. Supposed hen harrier in adult plumage; also one in plumage part ash and part red-brown, with the white rump. 4. A good-sized dark-coloured species. 5. One, of which I have a specimen not made out.

I have an account of some mallards and teal chased by a couple of hawks and our boat, which I noted at the time while the scene was fresh in my mind, and hope to have the pleasure of reading the same to you from my note-book, when we meet again. I also observed the small species mentioned make a swoop at a belted kingfisher, nearly as large as itself.

Owls. I have but twice noted an owl as seen. Having hard work during the day I was asleep generally during the whole night; but, at any rate, this open country is not well suited to these birds.

Belted Kingfisher. Common, but not observed after the 7th of October, at "Mosquito Point," lat. 53°—50° N., long. 102°—53° W.

Specimen examined minutely, apparently differing in nothing from Nova Scotia specimens.

Robin. Only once seen on the 18th of October; there was no doubt about it, for I had a near view, but missed killing him; this I considered rather curious, as I had not seen any since near Hudson's Bay, six weeks previous.

Hermit Thrush (*Turdus solitarius*). Observed at Cumberland House on the 4th of October. I saw it several times, but had no gun.

Wren. One which appeared like *T. hyemalis* was once observed.

Ruby-crowned Regulus. Occasionally observed, specimens closely examined. Gold-crest not seen.

Blackcap-tit (*Parus atricapillus*). Very common.

Cassin in his 'Birds of Oregon, California, &c.,' which I think I showed you at Richmond, makes out a species which he calls the "Northern Chickadee or Longtailed" (*Parus septentrionalis*), and puts down the habitat as "Missouri, Utah, Rocky Mountains." I can see no difference between those I have shot here and specimens preserved in Nova Scotia, which I never doubted being the *P. atricapillus*. I shall keep a sharp look out, and procure several specimens, of which I shall send L—— one for comparison. If the one here is the *P. atricapillus*, I think the other should rather be called western than northern.

Shore Lark. Observed for one week, in small parties, from the 4th of October.

Fringilla iliaca. Not after the end of September.

F. pennsylvanica. Not west of Lake Winnipeg.

F. canadensis and *F. hyemalis*. Always in company, and the most common birds until the 14th of October, when the last of the former, and the 18th of October, the last of the latter, were seen, they being solitary stragglers. I have a specimen of the former.

Redpoles. Not certain.

Snow Bunting. Observed in small flocks from the 8th of October (four days after the shore lark); in a few days they arrived in considerable numbers, and were in large flocks at Fort Carlton. For departure of them you will hear by another letter.

Purple Grackle. Observed sparingly, except about the little cultivated ground at Norway House and Cumberland, after which (October 4th) are not seen.

Rusty Grackle. Common along river banks until the 20th of October.

Raven. I need hardly say was always to be seen, and, so far from

being solitary, is always in pairs, and occasionally a number together. On the roosting of these birds at Carlton you will hear at a future time.

Magpie. First seen on the 7th of October at Mosquito Point, where the belted kingfisher was last seen. Observed occasionally at Carlton, where it resides the winter. Not seen between Hudson's Bay and Lake Winnipeg.

Blue Jay. Seen only on two occasions, the 12th and 16th of October. One shot and examined.

Canada Jay. This companion of the voyagers is seen everywhere, and never refuses "pemmican" when he can get it.

Redbellied Nuthatch. In company with blackcap-tit and *Regulus* on two occasions at the end of September, not far west of Lake Winnipeg; a specimen preserved. You will observe that on this side of Lake Winnipeg no Hudson's Bay tits were seen.

Woodpeckers. 1. A large species, perhaps *Picus pileatus*, seen middle of October; also supposed, 2. *P. villosus* once at same time of the month. 3. *P. pubescens*, shot and examined, end of first week of October, and again on the 14th. 4. *P. varius*. A specimen preserved, and another shot at the end of September. 5. *P. auratus*. Supposed seen.

Ruffed Grouse. Sparingly as far as near the "Forks" of the Saskatchewan, where the north and south branches meet.

Canada Grouse. Seen on two occasions below the "Forks."

Sharptailed Grouse. First seen where the ruffed grouse ceased, inhabiting the partially wooded parts of these plains in numbers. I have many notes concerning them, which I hope to perfect by observing their spring and summer habits. They are said to collect in great numbers and *dance*.

Plover. One decided flock was seen; and although it may appear rather late, a solitary golden plover was shot near here on the 3rd of November, and preserved.

Sandpiper. Two or three species were observed, but none identified.

Totanus vociferus. Almost always to be seen, until the beginning of October, a single one being seen flying over on the 16th. This bird does not apparently require soft mud, but appears as much at home where all is rock.

Snipe. The single squeak of the snipe was heard one evening while waiting for ducks.

Geese. Numerous during the whole voyage, but most particularly so in the low swampy country below Cumberland, which has been

mentioned. I distinctly recognised by examination *Anser canadensis* and *albifrons*, but I shot one which resembled the former, except in size, and I was assured by the Indian "bowsman" that it was the young of that bird; however, I cannot reconcile the considerable difference in size, I therefore give you the particulars:—Length $27\frac{1}{2}$ inches; wing $16\frac{1}{2}$ inches; extent $54\frac{1}{2}$ inches; bill, legs and feet black; nail of the upper mandible dark brown,—that of lower horn-colour; bill along the ridge $1\frac{1}{2}$ inch; eye hazel; upper tail-coverts, from end of tail, $2\frac{1}{2}$ inches. It differed from Wilson's description in the following points:—lower part of neck and breast light ash; upper part of back brown; end of feathers lighter; rump nearly black; upper tail-coverts, belly, vent and under tail-coverts white; under surface of wings nearly black; wings reach about end of tail; sides ash-brown, tinged with lighter; legs and feet sometimes after death assume Wilson's colour. Do you consider this the young of *A. canadensis*, or may it be *A. Hutchinsii*? Geese were in numbers at a saline lake near here on the third of November, at which time ice covered portions of the lakes. I hope to do something during my spare time in the way of waterfowl on their arrival in spring.

Ducks. Mallard the most common duck throughout, from Hudson's Bay, although usually not seen in large flocks. Had not left Carlton till November; in fact, as long as there is open water, ducks and geese remain.

Wigeon. Observed sometimes in immense flocks.

Greenwinged Teal. Common.

Goldeneye. Considered to be seen, and many which were not made out.

Goosander. Was shot a couple of days below Carlton, and is preserved.

Cormorant. A few were observed before the close of September.

Pelican. Supposed from markings to be *P. americanus*, observed in numbers at the "Grand Rapid," where the Saskatchewan enters Lake Winnipeg, on the 25th of September, and, a few days after, a scattered one or two. I believe they do not range East of Lake Winnipeg, and they tell me here they are seldom seen; however, I put little confidence in what I am told by casual observers, as I have been so often deceived by them.

Tern. One species observed on Lake Winnipeg.

Gull. About three species observed on Lake Winnipeg; one specimen was procured in one of the small lakes, and they were observed as late as the 2nd of October.

Loon. Supposed great northern diver, seen at beginning of voyage.

And now I have run through my list, and hope that the comparing these notes with the observations of others will afford you some amusement: I shall be glad when I receive any general conclusions which you may draw from the same.

Of the progress of the season, suffice it to say, that in the beginning of the time comprised in this second part of my voyage, Nature was in her "fall" dress, and, before I reached Carlton, ice was forming along the banks and in the small bays of the river.

While we were in that land of waterfowl below Cumberland, I witnessed a shower of feathers: as we sailed up a reach of the river with a fresh breeze, without the knowledge of a human being within many miles of us, it appeared to be snowing; this was nothing more than small feathers, and we supposed that at some Indian Camp in the swamps to windward the operation of goose-plucking must be going on; these feathers had likely travelled many miles, and would continue while the breeze lasted.

I hope that you may be at some place where you may be able to refer to the 'Fauna Boreali-Americana,' and I should feel much obliged if, from the perusal of it, you would call my attention to points requiring special observation. At present I feel myself on ground trodden by those more capable, and with greater facilities than myself, as Ornithology is only secondary with me, on account of duty requiring so much of my time; but once at the Rocky Mountains, which I hope I may be ordered to cross, I shall consider myself on new ground.

* * * * *

I have a young "half breed" under instructions in the way of skinning, who I hope will be of great use to me next summer while travelling, as my time is not my own.

* * * * *

There is a species of grosbeak, which, as well as the pine grosbeak, has been here all winter, but is not so numerous as the latter; I cannot identify it by Wilson or Brewer's Synopsis, and in my Journal have therefore called it for distinction "yellow-fronted grosbeak," however, if as you wish, and I hope for your sake, you are at present stationed in Dublin, you will have no difficulty in procuring the 'Fauna Boreali-Americana' from the Dublin Society's library, and no doubt make the bird out. I therefore, as I have two specimens of each sex now before me, will attempt a description:—

Male and female differ little in size, are from $7\frac{1}{2}$ to 8 inches ; the closed wing $4\frac{3}{4}$ to $4\frac{1}{2}$ inches ; bill light dull greenish yellow ; eye dark hazel or brown ; feet flesh colour ; claws brown.

Male. Top of head, primaries, and first secondaries, tail-coverts, tail and line at base of bill black. Front, line over eye, rump, abdomen and under tail-coverts bright yellow. Throat, cheeks and neck dark olive, fading gradually towards yellow on back and breast. The secondaries near the body white, which, when wing is closed, forms a pure white patch. Shoulder of wing tinged with yellow.

Female. Head, cheeks and back dark ash, fading to light drab on rump. Under parts light drab-ash, with throat whitish, with an indistinct black line from base of bill on each side of throat. Base of bill (as in male) margined with a thin line of black. Tail and tail-coverts black, each tipped with white. Primaries and other coverts black, the six interior primaries marked with white below the coverts, and all now more or less tipped with same. Secondaries variegated with black, white and drab-ash. Abdomen and under tail-coverts dull white. Shoulder of wing tinged with, and auxiliary plumes yellow. Tinge of greenish yellow on hind neck and breast.

It is really a very handsome bird ; and, from Brewer's short description, I should consider it to be *C. vespertaria*, but this description leaves out many points. This bird, I see, is quoted to be in the 'Fauna Boreali-Americana ;' however, the habitat given by Brewer is "Columbia River."

THOMAS BLAKISTON.

Occurrence of an Eagle in Dorsetshire.—A sporting friend of mine has just informed me that an eagle has been shot, within the last week, at Abbotsbury, about nine miles from here, along the coast. My friend tells me it stood nearly three feet in height, and that its legs were nearly the size round of his arms : if this is correct, there is every probability that the bird is a golden eagle. I have, however, written to several parties, in order that I may examine the bird, so as to verify the species for my Dorset Fauna.—*William Thompson ; Weymouth, December 12, 1858.*

Occurrence of the Goshawk in Norfolk.—A female goshawk, in the plumage of the first year, was shot at Hempstead, in this county, about the 23rd of November. This species, although only an occasional visitant at uncertain intervals, has of late years become even more scarce than formerly, which renders the present instance of its appearance on this coast more worthy of notice. The last specimen obtained in this district was an immature male taken in a trap at Catfield, in April, 1854 ; and another male, also in its first year's plumage, was killed at Stratton-Strawless, in November, 1850, which shows that stragglers may be met with both in spring and autumn. Adult birds of this species very rarely occur in this country ; probably the only one known to have

been killed in Norfolk is a male in the Norwich Museum, taken at Catton in 1841: in the same collection is also an immature female, shot at Hingham in the following year.—*H. Stevenson; Norwich, December 6, 1858.*

Notices of Ornithological Occurrences in Norfolk in October and November, 1858.—A few mealy and lesser redpoles, siskins and twites appeared about the first week in October, and left us again in a day or two on their way southward: the arrival of these birds early in the season usually indicates the approach of sharp weather, and in this instance was followed soon after by the intense frosts which we have lately experienced. On the 22nd of October a fine roughlegged buzzard, in nearly adult plumage, was shot at Seething: the specimens obtained in this county are principally young birds. An immature female of the longtailed duck was shot, about the same time, at Blakeney. About the 28th of October an unusually large number of woodcocks were met with in all directions, after a strong gale: a single specimen was picked up dead, close to this city, having flown, in the night, with such force against the wall of a house as literally to smash the frontal bone: within the last fortnight upwards of eighty-three woodcocks were shot, in one day, in some coverts belonging to Lord Hastings, in the vicinity of the coast. On the 10th of November a young hen harrier, male, was shot at Northrepps, near Cromer: these birds appear at the present time to be almost exterminated as residents in this county. On the 12th of November a storm-driven specimen of the little auk was picked up dead at South Walsham: this is the only one I have heard of this season. Whilst snipe-shooting (which birds were extremely plentiful on the Broad and Marshes from the 12th to the 15th), on the 16th, at Surlingham, I found, towards the afternoon, large flocks of pied wagtails dispersed all over the Broad, many of them clinging to the reed-stems, like the bearded tits, and smaller flights continually passing high overhead or stopping to join their companions: this was at the commencement of the severe frosts, and from the locality in which I found them, and their unusual numbers, I have no doubt that these were migratory arrivals, about to rest for the night, on their way inland. On the 19th of November a gray shrike, an adult male, was shot at Heigham, close to this city. On the 23rd of November a female waxwing was shot at Beeston, near Cromer (the frost still intense): I have not been able to ascertain if others were seen at the same time; but, during the last few years, only one or two stray specimens of this interesting but irregular visitant have been obtained: the last arrival of these birds in any quantity was in the winter of 1849-50, when such immense numbers were met with along the entire line of our Eastern counties. On the 26th of November another roughlegged buzzard, an adult female, a somewhat older bird than the last, was shot at Burgh.—*Id.; December 7, 1858.*

Occurrence of the Bohemian Waxwing at Weymouth.—On the 10th of December I had brought me a fine old male of the Bohemian waxwing (*Bombicilla garrula*): it has six tags on each wing: of course I secured it, having given five shillings for it: it had been killed about half an hour before I purchased it, and was still warm. It was first seen feeding on a haw bush (here the haws are called "pig-berries"). Gillingham, the man who killed it, fired and missed; it then flew a long distance, but returned and perched on the top of a high tree: the man told me he had very great difficulty in getting within shot a second time. This is the third notice I have of its occurrence in Dorsetshire: one was killed in January, 1850, at Abbotsbury, near Weymouth, and Rolls, the bird-preserver here, tells me one passed through his hands about ten years prior to that date. I fully expect there will be many notices from different parts of the country; I hope the correspondents of the 'Zoologist' will be particular

with their dates, as it will be of assistance in tracing their spreading over the country. I had the carcass dressed, and I find the flesh rather dark, but juicy and very well flavoured,—so good, in fact, that I shall be glad to try it again : a good plan to serve them up is with bread crumbs fried and a lemon : it should not be too much roasted ; a little paste should be put over it, to keep in the juice, which otherwise would escape, from its being skinned ; this should be taken off just before it is quite cooked, and a little flour and butter dusted over it and slightly browned, to disguise its want of a skin.—*William Thompson ; Weymouth, December 12, 1858.*

Occurrence of the Goldenwinged Woodpecker in England.—I have in my collection a specimen of the goldenwinged woodpecker, killed in Amesbury Park, in the autumn of 1836. My brother, now Member for Salisbury, saw this bird in the flesh before it was preserved ; it was brought to him just after it was shot. I have never heard of any other specimen of this bird being killed in England : it is, I believe, a native of South America. It is something like the common green woodpecker, but has more yellow on the wing, and black spots on the breast. It was preserved by Mr. Edwards, of Amesbury, and has never been out of my possession.—*George S. Marsh ; Chippenham ; December 10, 1858.*

Birds' Nests : Nests of the Green Woodpecker and Nuthatch.—Among the subjects which have solicited the attention of the readers of the 'Zoologist' there are few which have obtained less general notice than the nests of birds : I have supposed therefore that it may be acceptable if I were to communicate to its pages some observations which I have had an opportunity of making on the nests of such of our feathered tribes as do not frequently fall in the way of naturalists, or of which, at least, distinct accounts, drawn from personal observation, are not often met with. I will begin with the nests of the common green woodpecker and the nuthatch,—birds which I class together, not only from the great similarity of their habits, but also because I have had an opportunity of studying the proceedings of those species at the same time and in the same neighbourhood, which is on the south-east border of the county of Cornwall, in which district, I may further remark, it has been said that the last-named bird is not to be found. On the rather extensive lawns that run eastward from the ancient mansion of Trelawny there are some very ancient chestnut trees, which stand singly at the distance of several yards from each other ; and it is in such a situation that the green woodpecker usually, perhaps invariably, forms its nest, for the watchfulness of this bird is too great to suffer it to choose a place from which it shall not be able to discern an intruder at a considerable distance. In one of those trees, much fallen back from its ancient splendour of foliage and growth, I have remembered the existence of the nest for more than thirty years,—a curious instance of local attachment, which is not the less deserving of record because it is probable that they are not the same birds which have occupied the place so long : it has at least descended from one generation to another, without interruption, and an incident occurred in the course of the last summer which tends to show that it is not a small matter which shall cause these birds to forsake their long-accustomed haunt, to which their ancestors had probably resorted for many years beyond the number I have assigned to them. It is only a single tree which has thus been selected, although there are others that appear to offer equal convenience ; but the nest-holes are two in number, although I have reason to believe that they were occupied by no more than a single pair of birds : my supposition is that one of those recesses is properly the nest, in which the eggs are hatched, while the other serves as the resting-place of the male bird : one of the holes

is seven or eight feet higher in the tree than the other; their situation is conspicuous to every passer-by, and the lowermost of them is little above the giving-off of some large branches, from which the aperture of the nest may be easily reached; the opening is round, and, in appearance, seems of less size than could, without difficulty, permit the entrance of the bird; round the border the bark is pecked away for the space of about a quarter of an inch; inside this opening, for seven or eight inches, the descent is but little, but beyond this it dropped rather steeply for about two feet. The inside of the tree could be observed as wet and rotten, and the nest seemed formed out of the rotten wood. In the last week of May there was nothing in this nest, but in the first week of June there were five eggs, which were coloured by this rotten wood, but when washed they were beautifully white, and then it appeared also that their contents could be discerned through the shell: the eggs were taken away by a friend, who assisted in the examination of these nests, and the opening of the nest was firmly plugged up with a turf of grass: when, however, I came to examine it again a new opening had been made into the passage, immediately above the place where the turf had raised an obstruction, and this had been done by pecking in a circular form an orifice fitted to the former opening, with just so much of descent as to join the old passage close behind the obstruction. At this time the opportunity of a ladder was taken to examine the higher of those openings into the tree, the uppermost having, before this been beyond our reach: the floor of this nest or resting-place was covered with old rotten wood, and there were also found two or three feathers of the male bird, which bird was also seen to fly out of this hole. As there can be no doubt that successive generations of woodpeckers have been reared from this tree, and sometimes the brood has consisted of several individuals, it seems not the least remarkable circumstance in the history of this bird, that the local attachment of a single pair should be accompanied with a strong disposition to wander to a distance in the younger portion of the woodpecker community. The nest of the nuthatch is also in the body of a chestnut tree in a garden belonging to the mansion at Trelawny: the hole by which the entrance was effected was about three inches in diameter, and consequently much larger, in proportion to the size of the bird, than that of the woodpecker; but the opening was reduced to about an inch and a half by a border of mortar plastered round it: the passage went inward to the distance of three or four inches, and then descended six or seven inches more, where was the nest,—formed of what seemed the inner bark of a birch or plane tree,—dry and almost flat; it contained one young, living bird: the bed of this nest was formed of rotten wood, and was wet, covering over two addled eggs, which were stained with the colour of the rotten wood; it appeared probable they were the produce of the former year.—*Jonathan Couch; Polperro, Cornwall, December 3, 1858.*

Swallows in November.—On Friday, the 12th instant, I was passing by Ewell church, and observed two swallows flying about. I watched them for some time, and pointed them out to several persons who were passing, so that there can be no doubt as to their identity. The sun was shining brilliantly, but there was frost on the ground in the shade. The swallows assembled in large numbers here on the 14th of October, and none were to be seen the next day; but I observed one straggler about ten days afterwards.—*Samuel Gurney; Carshalton, November 14, 1858.*

Late brood of Starlings.—A pair of starlings have recently made a nest in a hole by the side of a water-tank on the roof of my house; the hole is so dark that one

cannot see whether the four nestlings are nearly fledged or not.—*C. Fox; Middleton Lodge, near Richmond, Yorkshire, December 4, 1858.*

Occurrence of the Tree Sparrow at Penzance.—I last evening examined, in the flesh, a good specimen of this species, which had been obtained very near this place in a meadow with hedgerows, by Mr. Vingoe. I have not hitherto known any example to have occurred in this locality, nor do I know of any record of its having been found in Cornwall before, except in one instance, in the neighbourhood of Falmouth, where I remember observing the specimen preserved in the Museum.—*Edward Hearle Rodd; Penzance, December 16, 1858.*

Occurrence of the Parrot Crossbill (Loxia pityopsittacus) near Brighton.—I saw this bird, "in the meat," at Mr. Swaysland's shop; it had been caught the day before (Monday, November 2, 1858), at Bognor, by a bird-catcher, in clap-nets: the bird bit his fingers so much that he dared not place it among the newly-caught goldfinches, and was therefore obliged to kill it. It had a very large beak, with the cross not nearly so much developed as in *Loxia curvirostra*; there was a little yellow on the head. It was curious to find such a bird, apparently a long way from any of its appropriate food.

Beautiful Variety of the Partridge.—I yesterday saw a very strange and beautifully pied variety of the common partridge, which was shot by a gentleman's gamekeeper, near this city. The bird in question is nearly of a pure white; the throat is slightly mottled with a few ash-coloured feathers; the breast and belly are pure white, a slight bar of light ash-coloured feathers marking the place of the ordinary horse-shoe on the breast; the extreme primary feather of each wing is mottled with white and rufous; the second primary has a slight buff tinge along its shaft; the other primaries and the secondaries are white; scapulars white, slightly barred with rufous; back white, barred with a rich rufous; upper tail-coverts white; tail silvery brown, mottled with white and rufous. The bird is as fat as any partridge I ever saw, and altogether is a singular variety. Pied varieties of the partridge are not very common: I have seen silver birds, and I have heard of one being shot which was of a uniform buff colour. The bird-stuffer who is preparing the bird I have been describing has had many years' experience, during which time he has set up several varieties of the partridge, but he assures me he never saw one so strangely pied as this bird.—*Murray A. Mathews; Merton College, Oxford, November 10, 1858.*

Occurrence of Baillon's Crake, and its Nesting in England.—Several instances of the occurrence of this bird, during the present year, have come under my notice. It will no doubt be interesting to the readers of the 'Zoologist' to hear of authentic cases of its nesting in England. I have a fine male bird, which was shot in our fens in July; this appeared, from its internal state, to have been breeding, and led me to suspect that this species had nested in this district: this I found had been abundantly proved by the detection of a nest, on the 6th of June, containing six eggs, which were shown to me by Mr. Baker, naturalist, of this town. Some birds were shot also near the same locality about the same time: these, however, were unfit for preservation, and the eggs were much, but not irremediably, broken; one has been kindly given to me, and, though a little fractured, I value it highly, as one of the first British examples yet taken. A second nest was discovered in the first week of August, and, in this instance, the hen bird was taken on the nest: the eggs seven in number, had been sat upon for some time, and had lost the usual fresh bloom, yet still are very characteristic specimens: these were brought to me by Mr. W. Farren, of this town, in whose

possession they now are: the female is a fine specimen, in good plumage. The spotted crake has also occurred in our fens in greater numbers than usual.—*A. F. Sealy*; 70, Trumpington Street, Cambridge.

Black Swans Breeding at Carshalton.—My black swans hatched off a brood of six cygnets on the 12th inst. The weather was intensely cold, and one morning, when they were three or four days old, they were frozen into the ice; but they did not in any way suffer from it. This is the third time they have bred this year: the first time was on the 29th of January, when they brought off eight cygnets; the second time was in the summer with seven, making a total of twenty-one young ones in ten months. I should be glad to know whether any of your correspondents can bring forward a similar instance of fecundity in the black swan.—*Samuel Gurney*; Carshalton, November, 1858.

The Pomarine Skua and other Sea Birds.—I was very well pleased to read Mr. Rodd's note on the pomarine skua (Zool. 6267), as it somewhat confirms an idea of mine, that the pomarine is far from being a scarce bird, and would readily be met with anywhere on our southern coast, if looked for about the middle of October, when it is making its migration southwards. This species is well known to the sailors at Torquay, who call it and Richardson's bird "Irish lords;" why, I could not discover. A sail on Torbay would well repay an ornithologist staying at Torquay in October. Let him cross the bay towards Berry Head, and then beat about its mouth, and note what he sees. Countless small flocks of "Mers" (i.e. guillemots) will stud the waters all round him, and will take but little heed of him as he passes among them. Kittiwakes, old ones and the beautiful "tarrocks," will hover over him, and scan his boat with curious eyes. He will see the "speckled divers" (i.e. the red and black-throated divers) ever and anon rising to the surface and shaking their wings before they dive down again into the blue deep after their prey: but these are wary birds and will not easily be approached. I was somewhat struck by seeing a specimen of the red-throated diver, in most perfect summer plumage, which was shot on the bay about the 15th of last October: it was in magnificent plumage, and did not appear to have commenced the autumn moult. But to return to the bay: look at that long line of dark-coloured birds flying rapidly across the horizon seawards; those are shags and cormorants, either seeking some favourite fishing stations or hastening to their perching stations on some distant cliffs. But what are those strange little birds which are flying rapidly all over the bay, and never seem to rest, save when they souse for a moment into the water, and, submerging themselves for a second or so, rise again into the air, and skim as before hurriedly over the bay? Those are the "mackerel corks," as the sailors call them,—the little Manx shearwaters,—which have been attracted by the shoals of small mackerel fry now swarming in the bay. You note how swift and straight their flight is, and when you examine their wings you are struck by their resemblance to those of a plover's, and mark the long tertiary feathers. Ever and anon you see small flocks of the common scoter crossing the bay, and the little oceanic ducks hurrying seaward by twos and threes. But what you justly consider the sight of all is to watch the noble gannet make his strange downward plunge from a height in the air into the sea below. What a time he stays underneath! and how the spray flies as he plunges in with the velocity of a cannon-ball! The gannet is not easily shot, unless he is so gorged with fish that he cannot fly; he then becomes an easy victim, for he cannot dive unless he can rise into the air, and gather momentum by precipitating himself downwards. But you are watching those large dark birds which are bullying and chasing the kittiwakes; the "Irish lords" are plying their nefarious trade; you

see one or two of them settle on the water, and find that you can sail towards them. These birds will let you get close to them, and are so tender that a very slight wound will bring them down. See, you have a couple of them lying on the water, wounded : you pick them up, and find them both pomarines, the one an old bird, with the two central tail-feathers elongated and rounded at their tips ; the other a young bird, in the rich chestnut-coloured garb of the bird which is so well figured in Yarrell's third volume. You may perhaps be fortunate enough to shoot one or two of Richardson's bird, but you will find that they are young ones, and you will hardly secure two alike. A friend and I shot five pomarine and two Richardson's skuas during a very short stay at Torquay. Three of our pomarines were fine adults. I also saw several other specimens of adult birds which had been killed about the same date by other shooters. —Murray A. Mathews ; Merton College, Oxford, November, 1858.

Pomarine Skua (*Lestris pomarina*) near Brighton.—Of this bird I cannot do better than quote the interesting account sent me by the Rev. R. N. Dennis, Rector of East Blatchington, Seaford, Sussex :—"With a strong south wind and spring tides the salt water runs through the shingle bank and overflows some twenty or thirty acres of grass land in front of the little town of Seaford, and on this temporary salt-water lake storm-driven sea fowl occasionally rest. A raised causeway leads across the common from the town to the battery, and it was from this causeway that Willy Banks, the bricklayer, shot the pomarine skua on the 7th of October, 1858, the bird fell winged, and was brought out by his dog : his brother saw three or four more birds, which he described as of the same species, but did not think, as he says, 'of any account,' which, I suppose, means not worth powder and shot. I had passed the spot but a short time before, so that the bird had not long been in, and what surprised me a little was, that it must have come in when the tide was ebbing and the gale sinking. It is perhaps a little remarkable that on that same Thursday twelvemonth,—i.e. October 8th, 1857,—I shot two pomarine skuas and a Richardson's skua, during a tremendous southerly gale : a little flock of eight were resting on the flood at the lower part of this parish, and they had not only found shelter but a good feeding-ground too, as they were gorged with earth-worms brought to the surface of the salt water. The stomach of the bird shot this year contained nothing but a little green, swallowed (no doubt) accidentally with its prey." I saw the above mentioned specimen at Mr. Swaysland's "in the meat," it was a male bird, very old,—in fact quite aged,—with a most powerful beak, enough to kill any gull ; it was just getting the two black feathers of the tail, being in autumn plumage.

Occurrence of Sabine's Gull (*Larus Sabini*) at Brighton.—This rare bird was shot in the equinoctial gale of Thursday, October 7th, 1858, in Hove, near Brighton. The head was not "dark or ash-colour," being an immature specimen, in autumn plumage, and, on dissection, found to be a male bird. I saw it just after it had been skinned by Mr. George Swaysland, naturalist, 4, Queen's Road, Brighton, where it may be seen for sale.

Remarks on the Southern Petrels.—Of all the birds that inhabit the southern seas the albatross is the best known ; every one going for the first time round the Cape of Good Hope looks out with interest for his first sight of this far-famed bird, and generally he is disappointed ; the bird he is pointed out is often of a dirty brown colour, large enough certainly, but surrounded by shoals of smaller ones, who have flown as far and braved the same dangers as the "wanderer" himself, these sadly take away from the grandeur of the scene. Nevertheless, an old fellow ; in his full whi

plumage is a magnificent sight, as he, with outstretched wings, sails over the surface of the sea,—now rising high in the air, now, with a bold sweep, descending till his lower wing all but touches the crests of the waves as he skims over them; suddenly he sees something floating on the surface of the water, and he prepares to alight; but look how changed he is! Instead of the fine noble bird, all grace and symmetry, his head goes back and his back goes in, down drop two enormous webbed feet, straddled out to their full extent, and, with a hoarse croak, between that of a raven and a sheep, he falls “souse” into the water: here he is at home again, breasting the foam like a cork; presently he stretches out his neck, and, with immense exertion of his wings, runs along the top of the water for seventy or eighty yards; at last he gets sufficient *momentum*, and, tucking up his legs, he is fairly launched in the air. The albatross (*Diomedea exulans*) breeds in Prince Edward’s Island, and others in about the same latitude; they congregate there in August and September, although a few always remain at sea: they breed on high flat plains, and lay one white egg; the nest is of the shape of a frustrum of a cone, with a slightly hollow top, made chiefly of dirt, which they obtain chiefly by digging a circular ditch and throwing the earth towards the centre, until they have heaped it up twelve or eighteen inches high, forming a miniature Martello tower. In January the parents leave their young, who remain behind in their nests until the next breeding season; while they are there it is difficult to imagine how they exist, as no old birds are seen to approach them for months together; next year, when the old birds arrive, they visit their former nests, and, after a little billing and cooing with their young (to make up, I suppose, for their neglect) they very unceremoniously turn them out, and, sending them, like a sailor boy, to find their “bread on the water,” repair their nests for the next brood. They walk very badly, using their wings to help them, and cannot rise from a flat surface. The average breadth across the wings is about 10 feet, but they vary a good deal, reaching from 9 to 12 feet,—the accounts that make them 18 and 20 feet are fabulous; the length, from the tip of the beak to the end of the tail, is about 3 feet 6 inches. It is of no use describing so well-known a bird; so I will only remark that some of them have a rose-coloured ring round their necks, but I do not know if this is a distinct species, or only marks the sex. The albatross is not found north of the 30th parallel of south latitude, and abounds most between 38° S. and 47° S.; they monopolize nearly the whole of Prince Edward’s Island and Kergueland’s land. There are three species of albatross:—the great albatross (*D. exulans*), the one we have been mentioning; the black-backed albatross (*D. melanophrys*), called by sailors the “Molly hawk” or “Nelly;” and the sooty albatross (*D. fuliginosa* or *D. fusca*, Audubon), which sailors call the “Cape hen” or “pea-u.” The yellow-nosed albatross (*D. chlororhynchos* of Latham) is, I suspect, only a variety of *D. melanophrys*. The Molly hawk is smaller than the albatross, being only 7 feet across the wings and 2 feet 7 inches in length; its back between the wings is of a dark brown colour: unlike the albatross, it sometimes dives for its food, but does not appear to be very fond of it, generally preferring to let a mutton bird fish it up, then, giving chase and running along the water croaking and with its wings spread out, oblige the poor beast to drop it, which it then picks up before it can sink. The sooty albatross is about the size of the last-named bird, of a sooty complexion and with a head very much like a jackdaw’s: it is a magnificent flyer, sometimes not moving its wings for an hour at a time; they breed in the cliffs, and their nests are consequently very difficult to get at; it has a very bad habit of screeching at night.—*F. Wollaston* *Halton, Lieut. 23rd R. W. Fusiliers.*

On the Occurrence of the Derby (Lichia glaucus, Cuv.) in Mount's Bay. By R. Q. COUCH, Esq., M.R.C.S., &c.

The Derby seems to be a somewhat rare fish, even in the localities in which it is most commonly taken ; but in British waters this is, I believe, its first recognized visit. By the kindness of the fishermen of Mousehole and Newlyn I have generally an opportunity of examining the rare fish captured in the neighbourhood of the Land's End, and from one of them I received the specimen from which the following description is taken. It was captured in a drift-net employed in the autumnal mackerel fishery, in deep water, off the Runnel Stone, at the western entrance to Mount's Bay.

The length of the specimen is 13 inches ; it is deep from the ventral to the dorsal margins, and is very much compressed laterally. The general shape of the body is fusiform, being much contracted at the root of the caudal fin, and the head is small and much pointed anteriorly. The general colour is dark ; the dorsal surface is of a deep bluish black tint, somewhat similar to the mackerel, but much deeper ; this tint terminates somewhat abruptly in a grayish neutral tint above the lateral line ; and this inferiorly gradually fades away into a silvery white, with patches of red and yellow, which disappear soon after death. On the anterior and middle of the sides are traces of five perpendicular bands, similar to what is observed in the pilot fish ; above they blend into the dark colour of the back ; about the lateral line they are distinct, but below they again fade into the surrounding tints. The lateral line is straight posteriorly, and continues so till it arrives nearly on a plane with the origin of the dorsal fin, when it gradually arches up so as to reach the head above the margin of the gill-covers. The head is small and short ; the jaws, when closed, are sharp or pointed,—lower jaw longest ; the teeth are numerous, small and irregular. The eye is small and bright, irides yellowish red, and situated much interiorly ; moustache smooth.

The surface of the body is covered by numerous small scales. The head and gill-covers are smooth.

The caudal fin is large, for the size of the fish, deeply falcate and strong ; the external fin-rays are stout, strong and closely arranged ; the central ones are short and membranous. The dorsal and abdominal fins arise nearly opposite to each other and rather posteriorly to the middle of the body. The anterior rays of the dorsal fin are muc-

longer than the others, marked with a large black spot, but they rapidly get shorter posteriorly, so that the anterior part of the fin is somewhat falcate in shape; the fin posteriorly is small and reaches to within about half an inch of the tail. Anteriorly to the dorsal fin are six large and long spines pointing obliquely backwards, and anteriorly to them is another long spine more or less imbedded in the skin which lies horizontally and points forwards. The abdominal is similar in shape to the dorsal; anteriorly it is marked with a large dark spot, and the fin-rays are there longer than the others; and anteriorly to the fin are two long and large spines, which obliquely point backwards. The ventral fins are small and close together. The pectoral fins are small and short, and arise on a plane anterior to the ventral, and very near the gill-covers, and about the lower third of the body.

This fish was taken in deep water, and as it is rolled up in the net and much entangled, it seems to be a species of great muscular power, and consequently it swims with great rapidity.

Judging from the authors to which I have access, there seems to be much obscurity resting on the genus *Lichia* and the species included in it. To secure accuracy of representation in the present case my friend Alexander K. Mackinnon, Esq., has kindly taken a photographic portrait of it for me. This gentleman has very liberally and kindly taken the portraits of many of our Cornish fish, and many of them are exquisite specimens of the art.

Most of the old writers on Natural History, as Aristotle, Ovid, Pliny, Oppian, Athenæus, &c., mention the glaucus; and Pliny calls it glauciscus, which is supposed to be the same; but Cuvier doubts whether any, or at least most of those so mentioned, are the same that bear the name at the present time, and he seems also to think that the fish anciently bearing the name was the maigre (*Sciæna Aquila*). Rondeletius appears to be the first author who applied the name to the present species: he speaks of three species of glaucus, the first of which he calls by the provincial name "cabrotte;" the third of these is figured in Johnston's 'Historia Piscium,' pl. 1, fig. 11, and by him is called sinuosus, and so marked on the borders of the gill-covers with twisted lines. Ray, in his 'Synopsis Piscium,' considers these as distinct species; the generic name *Lichia* here first appears, and is said by him to be the common name of a species of this genus at Rome and Leghorn; but *this* he distinguishes from the three of Rondeletius. There seems to be some confusion as to the origin of the name: Rondeletius says it is from its colour, but it is used as a

proper name both by Ovid and Pliny, and therefore not to be put in a feminine shape.

The present species is, I think, the *glaucus* of Rondeletius, and therefore the *Glaucus secundus* of Ray, p. 94.

The *Lichia Amia* of Cuvier is the *Scomber Amia* of Linnæus and *Amia* of Aldrovandus and Ray. The *glaucus* of Cuvier has a characteristic figure in his great work 'Ichthyologie,' but the only other species he mentions is *Lichia Vadigo*, a native also of the Mediterranean; it has a longer body and a shorter tail than *L. glaucus*. It is true he has another species, but that belongs to the Coast of Africa.

I have been favoured with coloured tracing of two figures, from Col. Hamilton Smith, of *Lichia glaucus*, and this, by comparing the coarse wood-cut of Rondeletius with the recent fish, enables me to identify the species; but coarse as the cut is, it is very characteristic: he says, however, that the moustache is rough; in my specimen it is smooth.

The difference between this description of Rondeletius and the specimen I have in my possession is so small that there can be no doubt that he refers to this species.

R. Q. COUCH.

Penzance, December 7, 1858.

Occurrence of the Black Fish (Centrolophus pompilus, Cuv.) in Mount's Bay.—A small specimen of this fish came into my possession last autumn twelve months, which was captured in a mackerel seine, in Groavas Lake, in Mount's Bay: it was nine inches long, and presented all the markings of the larger specimens which I have examined.—R. Q. Couch; *Penzance, December 7, 1858.*

Correction of an Error.—In the 'Zoologist,' (Zool. 5959) is a notice of the capture of *Notidanus griseus*, "a shark new to Britain, at Banff," by Mr. Edward; but if you will turn to Vol. iv. for 1846, p. 1337, you will there find it both figured and described, and I sent the MS. to you. Excuse my reference to the subject, but I thought it an oversight, and would remind you of it.—*Id.*

Abundance of Colias Edusa in 1858.—In June I took two very fine females and saw a third; in August and September the insect was very plentiful, and I took a great many, likewise five of the white variety: on the 15th of October, being a fine warm day, it was flying in great numbers on Norton Common, close to the sea; I had no net with me but I succeeded in capturing, with my bat, a fine white variety of it, which makes the sixth taken by me this season, and on Sunday, the 7th of November, I saw one very much worn: I should like to know if they have been seen in any other place so late as this.—H. Rogers; *Freshwater, Isle of Wight, December 1, 1858.*

Food-plant of Lycæna Agestis.—I have perused with great interest the different articles which have lately appeared in the 'Zoologist' respecting the identity of *Lycæna Artaxerxes* and *L. Agestis*, as well as on the habits, haunts, &c., of the latter species. As I have never had an opportunity of seeing *L. Artaxerxes* in its native localities, I cannot presume to express an opinion respecting the former part of the subject; but as I may say that I am tolerably well acquainted with the habits of *L. Agestis*, which occurs in this neighbourhood in abundance, I am induced to trouble you with these few lines, especially as I observe that many of your correspondents are either pledged to an opinion, or have had but limited opportunities of seeing *L. Agestis* in anything like profusion. I cannot help thinking also that much misapprehension arises from entomologists believing that what takes place in one locality must of necessity occur everywhere else. In the present instance the controversy respecting the connexion of the insect with *Helianthemum* or *Erodium*, strongly reminds me of the well-known fable of the "Chameleon," Mr. Harding's last communication especially, which is much in the style of the disputant who exclaims,—

"And when before your eyes I've set him,
If you don't find him black I'll eat him."

It does not follow because Mr. Harding finds *L. Agestis* where *Erodium* grows that it should not also occur where *Helianthemum* is found, and that it does so must be admitted by all who are at all acquainted with the chalk downs of the South of England, and Mr. Harding is certainly much mistaken when he wishes to make it appear that the insect is almost confined to the localities he mentions. *L. Agestis* is often very abundant on the Downs in this neighbourhood, where the *Helianthemum* is also plentiful, being dotted all over the soft short turf; whereas *Erodium*, if it occurs at all, cannot be in any quantity, as it prefers, I believe, the sand, of which there is little or none in this locality. At Caterham also (still on the chalk) it is very common (more so in August than in May), I find it flying in company with *L. Alexis* and *L. Corydon*, and sometimes with *L. Alsus* and *L. Adonis*. Here again the soil is chalk, and the commonest plants are *Hypericum*, *Origanum*, *Helianthemum*, plenty of wild thyme, &c., but not, I think, *Erodium*, or at any rate very little, as I have never observed it at all. I have also taken *L. Agestis* at different times in localities so far from the chalk or sand that I am certain there was neither *Erodium* nor *Helianthemum* within miles; and, both this season and last, the insect occurred on the bank of a canal at Norwood, far from either of the above plants, and so far from the localities where it is found in abundance that I cannot think it could have been driven there by stress of weather. I cannot help thinking therefore that the larva will be ultimately found to feed on more than one plant, or at any rate on some one of more general distribution than either of those which are now believed to be its food-plants; this question, however, I trust will be decided next season, as this controversy will no doubt lead many to look for the larva. I am, however, exceedingly surprised at a man of Mr. Harding's experience asking why the insect is not found in plenty where *Helianthemum* is abundant? My reply is that it frequently is, and that I should have thought that Mr. Harding must have visited Riddlesdown in August at some time or other; if so, he must have been aware that both *Helianthemum* and *L. Agestis* were common there, and if he has not I advise him to do so, and I am convinced that "one trial will sufficiently prove the fact."—*W. H. Morris; Croydon, December 3, 1858.*

Notes on the Food of Sphinx Convolvuli.—The Editor of the 'Zoologist' says (Zool. 6311), "I agree with Mr. Harding that the fact of an insect settling on the blossoms of a plant proves nothing as to the food of the larva: *Sphinx Convolvuli* obtained its name from the propensity of the imago to suck the honey of tubular flowers, but the conclusion was a most rash one, and has led hundreds to seek the larvæ among the leaves of the bindweed." The former statement is certainly true, but the latter is as certainly a curious mistake, which the Editor, as a lover of the truth, will, I am sure, allow me to correct. Roësel, in 1746, figured the larva, pupa and imago (Fas. vii. Class 1, Pap. Noct.) without a name, and says expressly that the larva fed on *Convolvulus sepium* and *arvensis*. Linneus, in the 'Systema Naturæ' (1767), quotes Roësel, and describes the insect as "*Sphinx Convolvuli*," deriving the name, there can be no doubt, from the food of the larva. Sepp again figured the larva in his 'Beschouwing der Wonderen Gods' (Tab. 49), and states that he reared it on the leaves of *Convolvulus*. Treitschke says he reared numbers on the leaves of *Convolvulus arvensis* (Schmett. von Europa, S. 139). Duponchel makes a similar statement (*Iconographie des Chenilles*). In the 'Annales de la Société entomol. Belge,' 1857, p. 40, I find the following under *Sphinx Convolvuli*, "Chenille en juillet et en août sur le liseron (*Convolvulus arvensis*, L.), la belle jour (*Mirabilis Jalapa*, L.) et quelques espèces d'*Ipomea* cultivées dans les jardins." Lastly, in Stainton's 'Manual' vol. i. p. 90, there is the following remark: "Mr. Atkinson informs me that in July, 1838, he found five or six larvæ of this insect feeding on a bed of the wild balsam (*Impatiens noli-me-tangere*) a few miles from Dolgellau, in Merionethshire, on the road to Bala." There can, therefore, I think, be no doubt that the name *Convolvuli* is derived from the food of the larva, although it would seem that sometimes other plants than *Convolvulus* are eaten. Several of the authors I have quoted say that the larvæ always hide themselves under ground or among leaves on the ground, except when they are feeding, but that occasionally their retreats are discovered by finding the excrement, the pellets of which are very large.—J. W. Douglas; Lee, December 8, 1858.

The Reason for the Specific Name of Sphinx Convolvuli.—In a note appended to Mr. Harding's paper "On the food-plant of *Polyommatus Artaxerxes* and *P. Agestis*" (Zool. 6311), Mr. Newman states that "*Sphinx Convolvuli* obtained its name from the propensity of the imago to suck the honey of tubular flowers." I should be glad to see the authority for this statement. I suppose Linné gave the name *Convolvuli* to this hawk-moth, from the food of the larva being *Convolvulus*, relying on the assertions of previous observers to that effect. Before Linné appeared, Madame Merian figured the larva sitting on *Convolvulus arvensis*, and wrote that it fed on the root. A. J. Roësel, in 1745, mentions, in his 'Insecten-Belustigung,' that the food of this species consists of the green leaves of the white and red-coloured bindweed, and not of the root, as stated by Madame Merian, and that he fed the caterpillar on the same leaves with success: he adds that the female deposits her eggs singly on the same plant, and that the caterpillar is sometimes found on the great bindweed.—T. Chapman; Glasgow, December 6, 1858.

[I am extremely pleased that my note has called forth these communications. I have always regarded Madame Merian's statement, that the larva fed on the root of the bindweed, as an error, and the transference of its *locus edendi* from the root to the leaves a plausible and probable theory, but not an established fact.—E. N.]

Sound Produced by the Larva of Acherontia Atropos.—I have read Mr. J. E. Weatherhead's account of the larva of *A. Atropos* producing a singular sound, which

he has likened to the sound produced by the sparks of an electrical machine. Has he not mistaken it for the sound produced by other larvæ feeding in his breeding-cage? for I have this season raised sixteen specimens of *A. Atropos*, and have often heard the sound so well described by Mr. Weatherhead, but always attributed it to the other larvæ in the same breeding-cage biting their food (*Carduus angustifolia*), the leaves of which are hard and scabrous. The larvæ of *A. Atropos* are very common about Poona.—*Julian Hobson, Lieut. 3rd Regt. Bombay N. I.; Poona, near Bombay, October 14, 1858.*

Specific Names: Food of the Genus Acronycta.—Sergeant Johnson brought me a full-grown larva of *Acronycta Alni* for identification on the 24th of August: it was beaten from a horse-chestnut tree, on which it fed freely. Mr. Cook, in the 'Intelligencer,' writes that he fed it upon alder; Mr. Brown, in the 'Naturalist,' that he found it on willow; Mr. Anderson fed it upon lime; I have fed it upon thorn, which it preferred to all other food offered: Mr. Greening also fed it upon thorn: a friend here fed it upon sycamore, and I have known it successfully bred upon bramble. What, then, is its food-plant? It appears to me that many species of this genus are queerly named: *A. Alni*, a general feeder, is called after one plant; *A. Menyanthidis*, which undoubtedly feeds better upon willow and whitethorn than upon anything else, after a plant I never knew it eat; *A. Salicis*, which is a variety of *A. Menyanthidis*, I possess bred from thorn by Mr. Hague; *A. Rumicis* will eat anything, but I never saw its larvæ on its titular plant; *A. Ligustri* I have bred upon ash, &c.; and *A. Myrica* is a willow-feeder: thus, of all the plant-named species in this genera, except *A. Aceris* (which I know nothing about), we see they do not feed upon the plants they are named after; and of *A. megacephala*, a poplar-feeder (about which I see little to call in Greek on its head), and *A. auricoma* (not particularly yellow-haired, unless we take its name from its larva) finishes the genus, except *A. strigosa*, about which I know nothing whatever, except by hearsay. How our 'Gradus' friends are to get through this little dilemma remains to be seen, but it strikes me that to stumble upon many such rocks as these will spoil their "little game," because it is to be hoped they will not perpetuate errors by telling us that "*A. Alni* is called after its food-plant" (which it certainly is not), and so on of the others. In common with many other practical men, I am anxious to see a specimen of the 'Gradus' before we subscribe for it; if, as has been recently hinted, it is only to be "An Accentuated List," it will not be worth the paper it is printed upon to a scholar, and of no earthly use to those who are not scholars, and the mass of entomologists are not scholars; still they wish to know what certain names mean, but will for ever pronounce them in the dialect of their district, however it may jar upon Scotch or English ears. All the fine points of accentuation will go for nothing without a full explanation of how they apply, because, as I have said before, those who are not scholars, in the full acceptance of the term, cannot apply the points, and those who are scholars do not require it to be done for them. Of the two species in the genus *Semaphora* (*S. tridens* and *S. Psi*), and one in *Apatela* (*A. leporina*), the two first are general feeders, but prefer osier and long-coned or Winchester willow, whilst *A. leporina* is confined to birch, on which it is a canary-coloured larva, and to black or trembling poplar, on which its larva is white, with a slight, light green tinge, generally producing the variety *bradyporina*.—*C. S. Gregson; Fletcher Grove, Stanley, near Liverpool.*

Note on the Habits of Heliothis marginata.—As I last year took a hundred, or somewhat more, of the larvæ of *Heliothis marginata*, I can form a tolerably good idea

of its habits, and as it may interest some, especially young entomologists, I forward this account. The larvæ are subject to considerable variation: the typical larva, or variety, which is most plentiful, is pale or rather yellowish green, with a deep green dorsal line; subdorsal lines whitish yellow and generally narrow; spiracular lines yellow, bordered on the upper margin with white; the yellowish green ground-colour is freckled over with white, and is mingled with gray near the spiracular lines, above which, on each segment, there is a black dot.

Var. 1. Ground-colour reddish claret, with a dull black dorsal line; subdorsal lines yellowish and inconspicuous; spiracular lines yellow and conspicuous. Between the dorsal and each subdorsal line there are two rows of black dots; between the subdorsal and spiracular line the colour is blackish gray, with one row of black dots; between the spiracular lines and bases of legs there are two rows of black dots. In the colour of its back this variety somewhat resembles the larva of *Notodonta dictæoides*, and is not uncommon.

Var. 2. Deep greenish gray, freckled with white; dorsal line black, bordered with white; subdorsal lines yellow and conspicuous; spiracular lines broadly yellow, with a white upper margin. Between the dorsal and each subdorsal line are two rows of black dots; between the subdorsal and spiracular lines the ground-colour is deeper gray, with two rows of black dots; between the spiracular lines and bases of legs there are two rows of black dots. Less frequent than the last variety. The typical larvæ, as well as varieties 1 and 2, vary in depth of colour and distinctness of markings.

Var. 3. Ground-colour yellow, with an inconspicuous dull gray dorsal line; subdorsal lines yellow and narrow; spiracular lines broadly yellow, bordered on the upper margin with white, and above that with gray. A scarce variety. These larvæ feed on rest-harrow (*Ononis arvensis*), and are full-grown in the latter half of August: they live exposed, and many of them might, at first sight, be mistaken for larvæ of *Hadena eleracea*: they seem very subject to the attacks of ichneumon flies. The pupæ are subterranean, and are inclosed in earthy cocoons. The perfect insects, in a state of nature, fly from the middle of June to the middle of July, are lively, and come sparingly to syrup.—*J. F. Brockholes*; 16, *Cleveland Street, Birkenhead*.

Crymodes exulis a British species. Translated from the 'Stettiner Entomologische Zeitung,' by J. W. DOUGLAS, Esq.

[When Dr. Staudinger was here lately on a visit, he showed me about a dozen of the most striking of the varieties of this moth which he had collected in Iceland in 1856; and certainly they appeared so different from each other that almost every one might have been considered, *per se*, to be a distinct species, and it is no wonder that they have been so considered and have received so many names. He then told me that *Hadena assimilis*, *Doubleday*, which he had just seen in Mr. Stainton's collection, was no other than one of the dark varieties, and among his specimens there was one which so exactly represented our insect as to leave no doubt about the matter.

I have thought it might be interesting to our English entomologists to read the following remarks of Dr. Staudinger about the species, and have translated them from his paper "Reise nach Island zu entomologischen Zwecken unternommen" published in the 'Stettiner Entomologische Zeitung' for July, 1857, p. 238. The occurrence in the Isle of Arran of this species, hitherto found only in the Arctic Circle, is also a fact worthy of note, and it may happen that *Hadena Sommeri* and some of the other new *Lepidoptera* found by Dr. Staudinger in Iceland, and which he has enumerated in his very interesting paper, may also yet be found in the North and North Western Islands of Scotland, especially now that attention is directed to the subject.—*J. W. D.*]

HADENA (?) EXULIS.

Fusca seu *nigricans*, ferrugineo-mixta, alarum anticarum lineis maculisque dilutioribus, costis albicantibus, macula reniforme extus excavata. Magn. 32—45 mills. (38—40 mills.)—♂ ♀. *Lefebv., Annales de la Soc. Ent. de France*, v. p. 392, pl. x. fig. 2, ♂. *Dup. Suppl.* iii. p. 588, pl. 49, fig. 2. *Boisd. Ind. Méth.* p. 119.

Crymodes exulis, *Guenée, Noctuérites* i., p. 185.

Hadena gelata, *Lefebv.*, l. c. p. 393, fig. 3, ♀. *Dup.*, l. c. p. 590, fig. 3. *Boisd.*, l. c. p. 119 (Catalog. name).

Polia gelata, *Herr.-Schæff., Syst. Bearb. d. Schm. v. Eur.*, ii. p. 267, fig. 452, 453.

Crymodes gelata, *Guenée*, l. c. p. 186.

Hadena Grönlandica, *Dup.* l. c. p. 288, pl. 21. fig. 3, *a, b.* *Boisd.* - l. c. (Catalog. name), *Freyer, Neuere Beitr. Taf.* 411, fig. 3 ? *Zetterst., Ins. Lapp.*, p. 939.

Polia Grönlandica, *Herr.-Schæff.*, l. c. p. 274, fig. 151.

Crymodes Grönlandica, *Guenée*, l. c. p. 185.

Hadena borea, *Boisd.*, l. c. p. 119 (Catalog. name).

Polia borea, *Herr.-Schæff.*, l. c. vi., p. 55, fig. 566 ♂, 567 ♀.

Crymodes borea, *Guenée*, l. c. p. 186.

Mamestra cervina, *Germ., Faun. Ins., Eur. Fasc.* 12, No. 19.

Neuria cervina, *Herr.-Schæff.*, l. c. ii. p. 291, fig. 451. *Marmorata*, *Zett.*

Exarhis diffusa, *Hub., Geyer, Zutr. z. Samml. exot. Schm.* p. 9, fig. 411.

Noctua arctica, *Thunb. in litt. (Mus. Berol.).*

Crymodes gelida, *Guenée*, l. c. p. 186, pl. 4, fig. 7.

„ *Poli*, *Guenée*, l. c. p. 187.

? *Hadena marmorata*, *Zettlers.*, *Ins. Lapp.*, p. 937.

? *Noctua oleracea*, L. (*Kaupmans Fidirle*) *Mohr*, *Isl. Naturh.* p. 90.

Var. a. Alis anticis nigris, albido-marmoratis ♂ ♀.

Var. b. Alis anticis nigris, fascia media lata pallidiore ♂.

Var. c. Alis anticis nigro flavo albidoque variegatis ♂ ♀.

Var. d. Alis anticis flavescentibus, nigro-adspersis ♀.

Var. e. Alis anticis flavescentibus, albido-marmoratis.

Var. f. Alis anticis concoloribus griseis, nigro-lineolatis ♂ ♀.

Var. g. Alis anticis concoloribus fuliginosis ♂ ♀.

Var. h. Alis anticis concoloribus ochraceis ♂.

Var. i. Alis anticis fuscis, linea exteriori maculisque flavis ♂ ♀.

Var. k. Alis anticis nigris, maculisque flavis ♂ ♀.

Var. l. Alis anticis nigris, maculis albis ♀.

Var. m. Alis anticis concoloribus nigris ♂ ♀

No *Noctua* known to me varies more than the foregoing. To this cause in part is due that it is so surrounded with synonyms, and a further reason of the confusion is that authors mostly made their descriptions from very worn specimens. First, *Duponchel* says in the description of his *Grönlandica*, that he quite thinks it agrees with one of *Lefebvre's* species, but *Lefebvre's* original specimen is so bad that from it nothing can be decided. *Exulis*, *Lefebvre*, was already, by other authors, with the greatest propriety, placed as the male of *gelata*. *Duponchel* described this species very recognizably as *Grönlandica*, and indeed in the same year, 1836, in which it was published as *exulis* and *gelata*, of *Lefebvre*. But as *Duponchel* already, in his *Grönlandica*, mentions the *exulis* and *gelata* of *Lefebvre*, so must the latter name necessarily appear to be the earlier, and therefore the name *exulis*, given to the male, is chosen for the species. The mere Catalogue name *borea*, *Boisd.*, is of no value; but the original in *Boisduval's* collection proves to be perfectly identical with *exulis*. Dr. *Herrich-Schäffer* places this species under two genera, *Polia* and *Neuria*, as *gelata*, *Grönlandica*, *borea*, and *cervina*. These prove to be the best of the types of Messrs. *Kaden* and *Pogge* apportioned to the descriptions of *Herrich-Schäffer*. So also the *Mamestra cervina*, *Germer*, brought from Iceland by *Kaden*, is only *exulis*. *Eversmann* described in the "Bulletin de Moscou" for 1842, another *Noctua* as *cervina*, which

Herrich-Schäffer (fig. 163 and 164) figured, but it has nothing to do with *cervina*, *Germar*, and the name must therefore necessarily be changed. *Exarnis diffua*, *Hub.*—*Geyer*, received from Greenland by *Sommer*, belongs here, without the least doubt. A single undoubted specimen of this species stands in the Royal collection at Berlin under the name of "*arctica*, *Thunb.*" All the species erected by Guenée (l. c.) into his new genus *Crymodes* belong here, with the exception of *Sommeri*, of which, indeed, only one female is known, and it does not bear the characters of the genus. The description of his *gelida*, and still better the figure, prove that it also belongs here; yellow as this example is, I possess the species still more yellow. His *Poli* can also only belong here. To make a genus for itself out of this species has certainly much in its favour. *Grönlandica*, *Freyer*, is certainly *exulis*; *Grönlandica*, *Zett.* I place here only with a ?, because the description also applies to *Sommeri*. *Marmorata*, *Zett.*, referred here by others with the greatest certainty, I also place with a ? in the absence of certain proof. *Zetterstedt* found it in Southern Lapland, but I did not see the species in the Royal Museum in Stockholm. *Oleracea*, *Mohr*, can only be referred here, on account of its time of appearance; *confua* which also flies at the end of June, is put by *Mohr* as *Vaccinii*.

I have about four hundred examples of *exulis* from Iceland, and about twenty from Greenland before me, and scarcely one specimen is like the other in its variation. Also with respect to the variation the examples from Iceland are more important than those from Greenland, which are more uniform and like to each other. The smallest specimen (32 mills.) is a black female from North Iceland (*Myvatn*); the largest is a male from *Julianahaab*, in Greenland (45 mills.) Those from Greenland are large throughout, the smallest nearly reaches 37 mills. The largest of those from Iceland attains only the length of 43 mills., the average is 38—40 mills.

The variations in colour and marking in this species are truly incredible; only for the purpose of having the necessary forms of variation I am obliged to keep about one hundred specimens of *exulis* in my collection. The foregoing short diagnoses of the chief varieties give but a poor idea of the endless varieties themselves; even the best descriptions could here avail little; the differences could best be seen by a series of good figures. But the knowledge of the early state shows that not the least doubt of the specific identity of all the above-mentioned specimens can exist. About two hundred specimens were reared, and further, we often found the varieties of the species

in copula; in short our observations made on the spot leave not the least doubt about the matter.

The abdomen is the least variable in its colour, which is ash-gray, sometimes with a shade of yellow. The thorax is much more variable, frequently gray with two dark stripes on the shoulders. But it is nearly black in black varieties, whitish in the light-coloured ones, yellow or brown in others, and often it becomes of a variegated mixture of different colours. The head in its different parts varies like the thorax. The tongue always remains yellow-brown. The antennæ of the male are slightly serrated, and beset with a double row of short hairs. The hips, thighs and tibiæ are mostly gray; tarsi darker, the end of each joint annulated with brighter colour. The colour of the spurs on the tibiæ is very varied.

It is scarcely possible to determine the normal characters of the fore wings, but the ordinary ground-colour may be considered to be a gray black with a shade of brown or ferruginous, and the usual markings to be four transverse lines, one of them at the base, two enclosing the centre, and one on the outer margin; the colour of these lines is generally dingy yellow-brown. The round and reniform stigmata are filled in more or less white or yellow. The ribs are also white. The clariform stigma is rarely clear, but still more rarely is it particularly coloured. The outer transverse line (which is sometimes wanting) is either regularly toothed or bears two M-formed projecting teeth. Frequently the whole portion exterior to the third transverse line is of a uniform dark colour. The same thing sometimes occurs before the second line, in which case the middle of the wing is pale, making the *var. b.* The *var. a.*, in which the transverse lines are white and the ground-colour nearly black, is scarce. Sometimes the black, white and yellow colours proceed very clearly through each other, being the *var. c.* In one specimen the fore wings are dingy yellow, sprinkled all over with black atoms, and a dark transverse outward line, *var. d.*; where the ground-colour is also yellow, but the markings are very white, we have *var. e.*; in one example nearly the whole of the costa is white. The varieties with the fore wings entirely pale gray, and only the transverse lines and the circumference of the stigmata slightly dark, are particularly marked out as *var. f.* The same holds with those having the ground-colour rusty, *var. g.*, and intermediate gradations are not wanting here. In one male the fore wings are almost entirely of a uniform ochreous, *var. h.* In another they are almost copper-red, with dark lines, and only on the ribs white. Many specimens are dark rusty, and the outer margin and both stigmata

are yellow, *var. i.* Sometimes only both the stigmata are yellow. There are also varieties with the wings entirely black, the stigmata alone yellow, *var. k.*; or with quite white stigmata, *var. l.*: in the latter case there are some little spots in the vicinity of the stigmata also whitish. The fore wings are perfectly black only in a single specimen from the North, *var. m.*; in a female they bear a yellow toothed line on the outer margin. In one female from the North they are dark with a brassy gloss, but the stigmata and lines are pale. The form and size of the somewhat-rounded stigma vary greatly; it is seldom exactly circular, often elongated oval, often very small, and, in a single instance, it runs into the reniform stigma. Lastly, although it appears so different in form and size, its outer side is always evenly curved, and only in very small specimens is this difficult to recognise.

The hinder wings are gray, paler towards the base; frequently a distinct darker lunate spot is visible at the end of the median cell, and often a distinctly marked undulating line somewhat behind the middle of the wing; on the under side this is very distinct, as also is the lunate spot. In dark varieties the under side of the hind wings is either entirely dark or only rather dark on the outer margin, while the rest of the wing is entirely pale, with a black lunate spot. On the under side of the fore wings an undulating line like that on the hinder wings is generally distinctly placed, but it is at times entirely wanting; behind it and the outer margin the colour is sometimes much lighter. On the under side of all the wings before the cilia is a connected row of very rudimentary lunate spots. The cilia of the hinder wings are, with very little exception, light, mostly yellow or gray at the base. On the fore wings they vary much, and are gray, white, brown, black or mixed, but never regularly dappled with light or dark colour.

On the 16th of June I first found a newly-disclosed male sitting on the grass, but the end of the same month was the chief time for the appearance of this species. Their flight in the evening was very swift, but later in July, they also frequently flew in the day-time, often in the hottest sunshine, and settled on various flowers, giving preference to *Thymus Serpyllum*, *Silene maritima* and *Armeria maritima*. In August they still flew about singly; on the 15th of July the last female appeared from the pupæ collected by us.

The history of the early states of this moth is as interesting as instructive, because it shows that not only pupæ but also larvæ of one and the same species can remain as such for two or perhaps more

years. On the 15th of June we first found several pupæ of our exulis, of which one was apparently not quite fresh. By means of very zealous rakings in the high moss, we managed, by the beginning of July, to find about thirty pupæ of the species; and we obtained a good many in those places in particular where the moss grew sparingly among the grass. In these rakings (also early in May, near Reykjavik) we found besides some pupæ of *conflua*, together with larvæ and pupæ of *Graminis*, another dingy white species of larva, in all about thirty specimens of various sizes. Some appeared to be full-grown and measured about 40 mills., some were hardly half so large, and others still smaller. All were decidedly healthy, with the exception of some large ones infested with larvæ of *Ichneumons*. The best proof of their healthiness was that the smaller ones increased visibly in size and cast their skins. The largest would, nevertheless, not assume the pupa state, and at our departure on the fifteenth of August, they were no larger than when we found them at the end of June. When these larvæ ate for themselves ways and cavities in the moss, we at first thought they fed on moss; but here we were mistaken, for their proper food consisted of the lowest portion of the stems of grasses, or the roots. This was chiefly the reason why most of them died on board ship, where we had only moss to give them; some of them there also, in storms, came in contact with the sea water; nevertheless we brought some home in a healthy state.- These larvæ were those of our exulis.

We had found in the latter half of July a number of worn females of exulis, which laid eggs. They were put into a large, airy case with grass and flowers therein, but we could not find any eggs; indeed some were already dead. There we saw on the 26th of July, during the hottest mid-day sunshine, a female sitting on the thick lower part of a stem of *Poa alpina*. Kalisch wished to take it off, but to our amazement it sat fast on the stem. The last segments of the body were moving about in a nearly perpendicular position, and the ovipositor almost bored into the stem. By further observation we found several holes made by the ovipositor into the narrow sheath-leaves of the stem, between which and the stem were laid about one hundred eggs. I now examined the stems placed with the imprisoned moths, and found a quantity of eggs deposited in a very similar manner. The eggs are almost disk-shaped, which, except for their peculiar position, they would not be. They are smooth, yellowish brown, and small in proportion to others; for example, about half the size of those of *E. Graminis*. After two or three weeks the young larvæ appeared and as long as their size permitted they remained on the grass-stem and gnawed

it; then they loved to feed on that part of the stem which is just above the root, but they also ate down into the root itself, and appeared only exceptionally to feed on the leaves.

About the middle of September we took out the caterpillars produced on the grasses brought from Iceland; at that time they were all (about fifty) 5 to 8 mills. in length. At the end of November I again examined them, and found, to my great astonishment, that about five were already nearly as large as the largest specimens found in Iceland, the perfect identity of which with our exulis reared from the eggs was now as clear as day. About nine were half grown, and of the remaining six or eight still living ones, some were scarcely larger than they were in September. These facts, taken in connection with those observed in Iceland, are sufficient proof that our exulis sometimes passes one, two or even three winters in the larva state.

The young larva, when it comes out of the egg measures 2.5 to 3 mills. in length. With the exception of the darker head and lighter anterior feet, the colour, position of the spots and habit, are exactly like those of the full-grown larva. The first pair of prolegs are not very much shorter than the hinder ones. The position of the little hooks on the prolegs in the semicircle on the inner side of the lower plate is just the same in the adult larva, except that the number of the little hooks, now eight to ten, is then twelve to fourteen. The full-grown larva is 42 to 46 mills. long. It has no resemblance whatever to any larva of *Hadena* or *Polia* that I know. The hinder segments gradually but perceptibly diminish in breadth after the seventh or eighth. The colour is dirty white with a shade of gray, the head chestnut-brown, the plate of the thoracic and anal segments and the anterior feet yellowish. The labrum and eye-marks are rather dark, and just where the hemispheres join are two dark spot-like depressions. The head is scarcely half as broad as the following segment, which, on the upper side, is entirely overlaid by the exceedingly strong thoracic plate. The second and third segments bear on the upper side several very obscure dark spots, which are scarcely distinguishable from the ground-colour. The position of the spots appears to agree with other *Noctua* larvæ. The slightly raised spots always bear a rather long reddish hair springing from a dark speck. The thirteen segments of the larva, as shown in my "*Dissertatio de Sesiis agri Berol.*" are here very distinctly seen. The rudimentary stigmata are always very distinct on the twelfth segment, and mostly appear close under the fore part of the anal plate. The anal plate itself is very strong, in form a somewhat elongated semicircle, and bears as usual eight hairs.

The larvæ appear to assume the pupa-state at the end of May or beginning of June, within a cavity eaten into the moss or turf, not far from the surface. The pupa is chestnut-brown and very lively; it has a dark, often very conspicuous cremaster which is broadly obtuse at the end, bearing at each angle two strong, sharp bristles. The skin thrown off the larva very frequently remains attached to the cremaster. The moth appears in from four to eight weeks, and the empty pupa-cases are then very fragile and of a pale yellow colour. A large number of the larvæ were ichneumonised, and, from the 16th of July to the beginning of August, the pupæ furnished some fifty specimens of *Ichneumon luctatorius* var., *Wesmaël*, of which first the males and then the females appeared. In one full-grown larva I found a quantity of small white cocoons; at the end of July they produced *Pterilitus islandicus*, *Ruthe*, a species that also comes from *E. Graminis*.

Hadena exulis, according to the best authority, is as yet only found in Labrador, Greenland and Iceland. Duponchel and Boisduval give also the North Cape and Finland for *Grönlandica*, which is certainly this species; but both these authors err very often in giving the native countries of species. If *marmorata*, *Zett.*, belongs here, as is very probable, then the species is also found in South Lapland, but this matter requires confirmation.

Occurrence of Sopkria emortualis at Brighton.—A single specimen of this Deltoid, new to Britain, was taken in a garden at Brighton, on the 18th of June last, by Mr. Pocock. This locality seems more productive of novelties than any other part of Britain.—*Edward Newman*.

The Genus Oporabia.—In reply to Mr. Logan's question (Zool. 6285), I may say I formed my opinion of *Oporabia autumnaria* from specimens taken at Delamere Forest by Mr. Greening and myself, Mr. Greening having submitted his specimens to our friend Mr. Doubleday, who returned them as *Oporabia autumnaria*! I have a series in my cabinet under the name of *O. approximaria*, bred from birch; the females, to my eye, being distinct in form. I have also a specimen which I bred in August, from larvæ, taken on the 19th or 20th of June, feeding in catkins, on willows which grow on the centre ridge, in Wharnciffe Wood, Yorkshire: this insect has been submitted to Mr. Doubleday, who returned it as a variety of *O. dilutaria*: Mr. Bond has also seen it and decided it was *O. dilutaria*; it is exactly like *O. borearia* in the upper wings, but has a band across the elongated under wings, as in *O. approximaria*, not parallel with the cilia, as in *O. dilutaria*; I call it *O. precursaria*. I shall be glad to assist any one or more friends who will work out this question in a friendly spirit; to all others I am dumb. When Mr. Weaver brought his large specimens of *O. dilutaria* from Scotland as *O. autumnaria*, *Boisd.*, only one gentleman in

Lancashire bought a specimen, as it was considered not distinct from *O. dilutaria*: that gentleman wrote to me in these words, "I placed it in my cabinet as *O. autumnaria*, because I had heard there was such a species." I confess I feel little confidence in the opinion of one who lets an insect remain unexamined in his cabinet for so many years, when it was only placed there because he had heard there was such a species. I do hope that my friend Mr. Logan, who once promised to publish the Scottish Lepidoptera, will make a point of figuring this genus in particular, and shall be glad to render him any assistance in my power. I think it would be exceedingly interesting to the readers of the 'Zoologist' to know if the specimens bred by him from birch and the specimens bred by Mr. Wilson from heath resembled those taken by Mr. Cooper and Mr. Weaver in Perthshire. One word more and I have done: the habits of the October and November insects are so different that any one can tell which species he is about to take: *O. dilutaria* flies off the tree bole rapidly and generally upwards, *O. autumnaria* is one of the most sluggish flyers: an old friend once observed to me, "Nay, don't hurry; autumnaria won't go fast or far."—*C. S. Gregson, Stanley, Liverpool, November 14, 1858.*

[Will Mr. Gregson obligingly supply the cabinet of the Entomological Club with a series of each species? they will then be accessible to all inquirers.—*Ed.*]

Note on the Turnip Nigger (Athalia centifoliæ).—This year the turnip nigger has been very destructive in this district, and acres of turnips have been stripped of their leaves. I did not notice them in any number till the first week in August, when the weather was very hot and dry, so that they thrived and increased amazingly. On the evening of the 18th we had a severe thunderstorm with a heavy dashing rain; the two or three following days were showery, and I think a great many were killed; the turnips afterwards grew very fast, so that those niggers left did but little damage. I quite believe if the fine and hot weather had continued another fortnight the turnip crop would have been nearly destroyed. But what strikes me as very singular is that there is a second brood, which are, I think, even more numerous than the first, though of course they will not do so much damage, as there is more food for them. This time they have taken to the oldest turnips on the farm, which were not touched in August: hundreds of the caterpillars are upon them now, though they are not so numerous as they were a fortnight since; the severe frosts of last week did not seem to affect them in the least.—*Thomas Dix; West Harling, Norfolk, November 16, 1858.*

The Turnip Nigger.—May I ask "Rusticus" to be so good as assist me to the name of a black larva that is ravaging the turnips to such an extent, as to leave little else but the mid-ribs of the leaves. A whole field of many acres in extent is completely devoured by the little blackmoors. In Lincolnshire the little creature is known by the name of the "Black Jack;" but whether it changes to fly, ichneumon or beetle is a perfect mystery to the rustics in those parts. The larva is the thickest at the head and tapers slightly towards the tail. It is furnished with six legs in front, and with tentacles downwards to the tail; the exuvia is annulated, the annulations being concolorous.—*Peter Inchbald; Storthes Hall, near Huddersfield, October 21, 1858.*

[It is the *Athalia centifoliæ*, figured in 'Rusticus,' page 102.—*Ed.*]

Late Swarm of Bees.—The latest date that I have met with for a swarm of bees was the 13th of September, and I was much surprised to be called into my garden this day, at half-past one o'clock, to witness a swarm from my own hives; it was very

small and did not settle as usual, but took an easy flight and was lost after being followed a quarter of a mile.—*W. R. Morris; Kent Water Works, Mill Lane, Deptford, October 16, 1858.*

Occurrence of Thalassema Neptuni and a new species of Zoanthus in Torbay.—Amongst a rich variety of animal life procured by dredging near Torbay, on the 14th of October last, I was so fortunate as to obtain a specimen of Gaertner's spoonworm (*Thalassema Neptuni*), a species of Echinoderm that Professor Forbes was not lucky enough to see alive. In his work on the British members of that class he quotes Montagu's description of this species, which is given with that naturalist's usual minute accuracy. This curious animal appears to be confined to the western coasts of our island. A still greater prize, taken at the same time, was a small species of Zoanthus, which differs in so many essential characters from Zoanthus Couchii,—the only recorded British member of this tropical genus,—as to lead to the conclusion that it is undescribed. It was found in ten or twelve fathoms water, at about a mile from the eastern headland of Torbay, and, from the fact of three separate groups of them being obtained, the species will probably be met with again in the same neighbourhood. A full description of this interesting compound zoophyte will shortly be published.—*E. W. H. Holdsworth; 26, Osaburgh Street, November 9, 1858.*

Proceedings of Societies.

ENTOMOLOGICAL SOCIETY.

November 1, 1858.—Dr. GRAY, President, in the Chair.

Donations.

The following donations were announced, and thanks ordered to be presented to the donors:—‘*Annales de la Société Linnéenne de Lyon*,’ Tomes iii. and iv.; presented by the Société Linnéenne de Lyon. ‘*Annales des Sciences Physiques et naturelles, d’Agriculture et d’Industrie, publiées par la Société impériale d’Agriculture, &c. de Lyon*,’ 2ième Serie, Tome viii., 3ième Serie, Tome i.; by the Society. ‘*Mémoires de l’Académie impériale des Sciences, Belles-lettres et Arts de Lyon*,’ Classe des Lettres, Tomes v. and vi.; Classe des Sciences, Tomes vi. and vii.; by the Society. ‘*Verhandlungen des zoologisch-botanischen in Wien*,’ Vol. vii.; also ‘*Personen-Orts und Sach Register der fünf usten Jahrgänge der Sitzungsberichte und Abhandlungen*,’ by the Society. ‘*Proceedings of the Literary and Philosophical Society of Liverpool*,’ No. 12; by the Society. ‘*Exotic Butterflies*,’ Part 28; by W. W. Saunders, Esq. ‘*List of Specimens of Lepidopterous Insects in the Collection of the British Museum*,’ by Francis Walker, F.L.S., &c., Part xv. Noctuidæ; by the Author. The ‘*Zoologist*’ for November; by the Editor. The ‘*Literary Gazette*’ for October; by the Editor. The ‘*Journal of the Society of Arts*,’ by the Editor. A ‘*Manual of British Butterflies and Moths*,’ No. 22; The ‘*Entomologist’s Weekly Intelligencer*’ for October; by H. T. Stainton, Esq. Six specimens of *Agrotis saucia*, by F. Bond, Esq.

Election of a Member.

Robert Slade, Esq., of 36, Gillingham Street, Piccadilly, was balloted for and elected a member of the Society.

Exhibitions.

Mr. Stainton exhibited a specimen of a new British Noctua, *Micra parva*, taken at Torquay by Dr. Battersby: that gentleman had made a careful investigation of the cliffs at Torquay, in June last, in consequence of his daughter having met with a specimen of *Micra ostrina*, and the result was several more specimens of *M. ostrina*, and with them two *M. parva*, which he at first mistook for small females of *M. ostrina*: "they lay very close amongst the grass and brambles, and when disturbed did not fly more than a yard or two."

Mr. Gorham exhibited the living larvæ of *Coleophora Virgaureæ*, from Westerham, Kent.

Mr. Westwood exhibited beautiful examples of *Acherontia Atropos* and *Sphinx Convolvuli*, and remarked on the usefulness of setting out the legs of specimens of *Lepidoptera*, which has hitherto been much neglected by entomologists in this country.

Mr. Smith exhibited, on behalf of Mr. Plant, the following *Coleoptera*, viz:—*Tropiderus sepicola*, from Buddon Wood; *Zeugophora flavicollis*, from Martins Wood, Lincolnshire; and *Orsodacna humeralis*, captured in Birkland Forest, Nottinghamshire.

Mr. Stevens exhibited some fine *Coleoptera*, taken by Mr. A. R. Wallace in Celebes.

Mr. Westwood exhibited an ant, from South America, destitute of eyes; the specimen had been obtained by him on his recent visit to Denmark. Mr. Smith believed the insect pertained to the genus *Eciton*.

Mr. Bond exhibited, on behalf of Mr. A. F. Sealy, two specimens of *Luperina Dumerilii*, taken in the South of England during the past season.

Mr. Stevens read some extracts from a letter received from Mr. Diggles, of Moreton Bay, on the Entomology of that part of Australia, and stated that he had received a letter from M. Mouhot, who had undertaken a journey to Siam in quest of objects of Natural History, announcing his arrival at Singapore in September last.

Mr. Wilkins observed that he had lately had a female of *Acherontia Atropos* brought to him, which, on being placed under a tumbler, had deposited eggs; it was usually considered that the autumnal specimens of this and other allied species were invariably barren.

Mr. Dutton had lately obtained a female of *Acherontia Atropos* which contained no ova.

December 7, 1858.—Dr. GRAY, President, in the Chair.

Donations.

The following donations were announced, and thanks ordered to be presented to the donors:—'Bulletin de la Société Impériale des Naturalistes de Moscou,' Année

1857, Nos. 2—4; 1858, No. 1; presented by the Society. 'Journal of the Proceedings of the Linnean Society,' Vol. iii., No. 10; by the Society. The 'Natural History Review,' Vol. v., No. 4; by the Dublin University Zoological Association. The 'Zoologist' for December; by the Editor. The 'Athenæum' for November; by the Editor. The 'Literary Gazette' for November; by the Editor. The 'Journal of the Society of Arts' for November; by the Society. A 'Manual of British Butterflies and Moths,' No. 23; The 'Entomologist's Weekly Intelligencer,' Nos. 110—114; by H. T. Stainton, Esq. 'Description de diverses espèces nouvelles ou peu connues des Genre Scolia' par H. de Saussure; by the Author.

Exhibitions.

Mr. Stevens exhibited a box of minute Coleoptera, chiefly Staphylinidæ, sent by Mr. Wallace from Celebes, amongst which were several species of Philonthi and Steni. He observed that he was informed by Mr. Wallace that the Staphylinidæ were no doubt as numerous in the tropics as in more temperate regions, if assiduously searched for.

Mr. Stevens also exhibited two fine longicorn beetles, *Phosphorus angulator* and *Tragocephala pulchella*, from Sierra Leone.

Mr. Bond exhibited a specimen of *Acherontia Atropos*, having the markings of both the anterior and posterior wings on the right side much more suffused than usual.

Dr. Wallace exhibited a box of Lepidoptera taken in the Isle of Wight during the past summer: it contained a fine specimen of *Catephia alchymista*, a *Noctua* new to Britain, taken in September last; a specimen of *Laphygma exigua*, attracted by light, also in September; *Heliothis armigera*; *Leucania vitellina*; specimens of *Micra ostrina*, taken in June and August, and an example of *Nola centonalis*, attracted by light the first week in July.

Mr. Smith exhibited some beech leaves from Fontainebleau Forest, infested by galls formed by *Cecidomyia Fagi*: he observed that the species was mentioned by Mr. Walker in the third volume of the 'Insecta Britannica,' p. 131, as found on beech trees in Switzerland, &c.

Mr. Smith also exhibited specimens of *Ponera contracta*, found by Mr. Squire in a bakehouse near Burton Crescent.

Mr. Westwood observed that the first recorded British example of this species was found by him in St. James's Park.

Mr. Westwood exhibited a specimen of *Solpuga fatalis*, a large and very poisonous spider from India.

Mr. Westwood stated that the binding of the books in the library of a lady residing at Oxford had lately been found to be much injured by a Lepidopterous larva, apparently that of *Endrosis fenestrella*.

The Secretary read the following, from a letter addressed by Mr. H. W. Bates to Mr. Stevens:—

"Ega, September 29th, 1858.

"The two species of *Cymindis* you mention as interesting things contained in my last collection were taken under extraordinary circumstances, which I think are worth relating, although there is nothing of scientific importance connected with the subject. One only is a *Cymindis*, the largest of eight or ten species: I have found all but this one about roots of herbage in sandy, partly sheltered places; the other

metallic species, so similar to the *Cymindis* in its rufous square humeral patch, is really a *Coptodera* or new genus allied thereto,—all the allied species of which, at least twenty taken here, are found coursing over the bark of decaying trees. These two species, however, were not taken in their proper habitats, but cast ashore on the sandy beach near the town after a stormy night on the lake. I found them together with vast multitudes of other insects; in fact, there was a ridge of sediment along the beach, a mile in length, composed almost entirely of insects. It is remarkable that a great number of the species I have never been able to obtain in any other manner. The causes of the phenomenon I suppose to be these,—premising that it occurs only once annually, at the end of August, during stormy, changeable weather, which follows the first heats of the fine season:—a sultry night attracts vast numbers of nocturnal insects from the forest to fly about over the lake; a squall of cool wind arrives suddenly from the opposite shores, and the wind and chilled temperature cast the myriads of gambolling insects into the water, the swell afterwards casting them on the beach. It is a proof of the vast number of the nocturnal insects in the tropics. The greater proportion consists of *Coleoptera*; there are also many *Hemiptera* and moths; even small birds, *Cerabæ* and others.

“The *Coleoptera* consist chiefly of vast numbers of *Scaritidæ*, from minute species less than the *Dyschirius gibbus* of Europe to large *Scarites*, $1\frac{1}{2}$ inch long; some of them of very singular forms, such as *Oxystomus*, *Stratiotes*, and some, I think, new genera; the most remarkable of which Mr. Westwood has recently described as *Solenogenys fœda*. There are also many *Truncatipennes*, chiefly of genera *Polystichus*, *Zuphium*, *Diaphorus*, *Galerita*, *Casnonia* and *Brachinus*. Other *Geodephaga* are in less variety, but some species, as a species of *Dercylus*, are in vast multitudes. Next in numbers to the *Scaritides* are the *Heteromera*, chiefly small species allied to *Helops*. After them come the *Lamellicornes*; grand *Dynastes*—the *Megalosomæ*, *Mars* and *Actæon*, *Enema infundibulum*, species of *Stratægus*, *Cælosis*, *Ligyris*, *Stenocrates*, *Chalepus* and *Cyclocephala*. Some black species of *Chalepus* and *Stenocrates* especially occur always by thousands. There are also a few *Melolonthidæ*, of the genus *Microcranium* (*Burm.*). Amongst the sediment I found also one or two large handsome *Buprestidæ*. *Staphylini* occur in less abundance, although there are great numbers of minute species clinging to portions of wood, and a few very large species, as *Pinophilus torosus*, *Er.*, a very large *Staphylinidi*. The *Pselaphidæ* are also in vast numbers, clustering within the crevices of pieces of wood and rubbish cast up by the waters. I could only find time to select a few of the more curious species; one was a minute *Artiocerus*, some others belonged evidently to genera at present unknown. There were many other large *Coleoptera*, of which only single specimens occurred, such as two very fine *Prionidæ*, one, I think, a *Mecosarthron*. Numbers of a *Macraspis* also occurred,—a genus which I thought were exclusively day-flyers, and it was a species which I had not yet taken in its place in the forest. There were also many *Coccinellæ*; two *Cantharides* which I have never been able to meet with elsewhere; several *Anthici*, *Curculionides*, *Cassidæ* and other families of *Coleoptera*.

“There are a few *Hymenoptera*, ants and one or two bees and wasps.

“The *Hemiptera* were chiefly two or three species of *Pachycoridæ*, very handsome insects, especially one, an *Angocoris*, but these were rare, whilst a species of *Canthcona* was in great abundance.

“The greater part of the insects thus cast up by the waters of the lake were quite dead, others nearly so, whilst many clinging to portions of wood and weeds were alive:

two or three hours of an equatorial sun soon dispersed the latter: of the former, the large-bodied Lamellicornes became a prey to flocks of insectivorous birds, especially bands of little sandpipers; they ate only the abdomen: the Carabides and Hemiptera they would not touch; many of them remained entire for many days, others fell to fragments after being exposed to the sun. The waters of the rivers at this season were retreating, but the fragments of insects were covered by a stratum of blown sand, and this may serve to explain the method by which masses of the bodies and mutilated remains of insects become imbedded in fossiliferous strata.

"This wholesale destruction of insect life does not occur frequently; in fact, I have witnessed it on a large scale only once a year. On many sultry evenings, in the fine season, numbers of insects are to be seen flying abroad, but the various conditions required for the grand immolation do not combine frequently. I have found many interesting Coleopterous insects by standing in a favorable place on the banks of the river, and observing them as they pass; it is necessary to have the clear western sky in the background. The insects are very uncertain in their appearance; it is not even every sultry night that proves favorable; they appear to be acted upon by atmospheric conditions which we cannot ourselves appreciate or calculate. Many of the insects taken flying in this way are the same as those found drowned on the beach, as related above, especially the Scaritidæ, the Polystichi, Heteromera, &c.; but many others are different,—for instance, many small Longicornes, especially Chrysoprasis, are eminently day-insects.

"One evening on the banks of the Amazons at St. Paulo I witnessed an extraordinary flight of Coleoptera, almost all Scaritidæ; there was literally a shower of them, nearly all the same species—some twenty or thirty—which I had previously found at Ega, on the beach. These insects are extremely difficult to find in their proper habitats; of the thirty or more species of Scaritidæ found flying in the evening, I have not taken more than five or six *in situ*, and those at roots of herbage in shady places. Sometimes these nocturnal insects may be attracted by a lamp at night, placed in a favorable place, but a prolific night rarely occurs; in this way I have taken a great variety of Peleophidæ, Scaritidæ, including the *Solenogenys fœda*; Staphylinidæ, including some extraordinary forms allied to Ophites; also Palpicornes, Calleidæ, even Cicindelæ; numbers of Harpalidæ, genus *Selenophorus*, but no Longicornes, for many night-flying insects appear not to be attracted by light."

Mr. Stevens stated that Mr. Bates proposed to return to England in the spring of next year, having spent the last eleven years in the investigation of the Entomology of the region of the Amazons.

Mr. Westwood trusted he would receive a hearty welcome from the entomologists of this country, whose collections he had enriched with South-American insects to a far greater extent than had been done by any other individual.

Mr. Stainton read descriptions of twenty-five new species of Indian Micro-Lepidoptera received from Mr. Atkinson, of Calcutta.

Mr. Waterhouse read a paper intituled "Notes on the Species of Elateridæ in the Stephensian Cabinet."—*E. S.*

NORTHERN ENTOMOLOGICAL SOCIETY.

December 18, 1858.—B. COOKE, Esq., in the chair.

This being the Anniversary Meeting, the Secretary read a report of progress during the year, which was most satisfactory.

Exhibitions.

The President exhibited a box full of beautifully-set Hemiptera, principally taken last season.

Mr. Langcake exhibited a box of recent captures for identification, containing many interesting species; amongst them was one *Depressaria* unknown to the members present, and an extraordinary variety of *Phibalapteryx gemmaria*.

Mr. Marrot exhibited the box of the evening, an undoubted case of parthenogenesis in *Lasiocampa Quercus*, and said he took only one larva during the season; it was left in the box it was collected in, spun up at once, came out, and was pinned alive into a pocket box, which box was never opened afterwards until the moth had laid its eggs, died, the eggs hatched, and the young larvæ perished for want of food! There were about twenty-eight egg-shells and twenty-five dead larvæ in the box.

Mr. Gregson exhibited a box recently received from Mr. Dale: in it were many interesting species, especially *Phloxopteryx upupana* and some *Peroneæ*, of which hereafter. He then exhibited a box from Mr. Allis; in it were *Gelechia nigra*, G. Hubneri, *Coleophora troglodytella*, *Anesychia langrella*, &c., and an apple-feeding *Yponomeuta*; it is expected this will one day be proved a good species. He then exhibited a very long series of *Tephrosia crepuscularia*, from Kent, London district, Black Park, Shropshire, Cheshire, Lancashire, Westmoreland, Cumberland and Scotland; the latter supplied by Mr. Chapman, of Glasgow; one specimen from Delamere Forest, as near white as possible, and another from the same place, very nearly black, with every gradation of colour between them; the southern specimens, perhaps, a little yellower in the ground-colour than the generality of others, yet not to be separated from some of the northern specimens, proving to the satisfaction of the Meeting that *Tephrosia crepuscularia* and *T. laticaria* are one and the same species, the first name standing. He then exhibited some beautiful specimens of *Botys decrepitilis*, kindly sent by Mr. Chapman, and a number of *Cheimatobia autumnaria*? taken by Mr. Mawson, of Cockermouth, at the foot of Basenthwaite Water, during the last week in October: this year they are like *Oporabia filigrammaria*, but as that species would pass away in September, at the very latest, they confirm what has been advanced at these Meetings before, namely, that there is a good species allied to *O. filigrammaria*. A discussion ensued which led to some amusing remarks, it being conceded that no man could confound the specimen before the Meeting with *O. dilutaria*. He then exhibited a *Geometra* variety, which he thought *Melanippe propugnaria*, from Cumberland, and the new *Tinea*, lately bred, which was brought before the last Meeting, as likely to become British, having been imported in skins from Honduras, observing that it had reproduced itself in a cold room.

Mr. Brockholes observed he had not yet bred it, but expected to do so shortly, when it was asked by a Member, Would the ladies of England thank a bachelor for

introducing another destructive insect into their houses, in order to enrich our cabinets? In the box were specimens of *Scopelosoma satellitia*, from Kendal, nearly black, and a perfectly black *Acronycta Rumicis*? the variety *Salicis* of most cabinets, but not of Curtis.

Mr. Johnson exhibited a box of Coleoptera, containing a *Lesteva* new to the district.

The Secretary then exhibited a box to illustrate "*Lepidoptera and their Parasites*," a paper which it is hoped will be read before a Meeting shortly,—the perfect insect and pupa-case, cocoon and two species of perfect parasites which attack the insect. He then, after the discussion, called attention to a very long series of *Leptogramma parisiana*? (*Boscana*?) and made the following observations thereon:—

Leptogramma parisiana? (*Boscana*?)

In placing this magnificent series of *Leptogramma parisiana*? (*Boscana*?) before you, I may observe I have spent much time and trouble in getting them together, in the hope that, from the various forms, we might judge whether they constituted one variable species, or were really distinct and well-defined species. We have to thank those kind friends who have assisted me, but we are especially indebted to Mr. Parfitt, of Exeter, and to the Rev. E. Horton, of Wick, whose kindness in presenting me with specimens and in forwarding specimens for exhibition here, from their own cabinets, at great risk, deserve the best thanks of this Meeting. One of my friends writes me from Yorkshire: "You are not singular in supposing *L. parisiana* and *L. Boscana* one species." My attention was first called to this species by reading the Rev. Mr. Horton's remarks in the 'Intelligencer,' and I determined to work out this question, at the same time I worked out the early states of the allied species in this group, and as this is decidedly the most interesting question to us in the family, I have determined to bring it before you first. You will observe that from the top of the series the specimens become gradually lighter and lighter until we see the eighth specimen, which is the lightest autumn specimen yet seen (this belongs to the Rev. E. Horton), and carries us into the true *L. Boscana*, or summer brood, in regular successive gradations; after which, the remainder lead us gradually down to the darkest or old *L. scabrana* form again. I take my ideas of the true *L. Boscana* form from the specimen given to me by my friend Mr. Allis, from Haworth's collection. We now come to the shape of the insects: here again the sexes are permanent in form in both the summer and autumn brood; hence from the personal appearance of the perfect insects, we can only conclude they are one and the same species; size, shape and markings, to the eye of the closest observer, are the same, colour only varying in intensity. We now come to the early state of the species, without which, I grant all I have done and said might eventually be confuted, and about which some who pride themselves on the possession of large collections of *Leptogramma* care little, preferring either to give all that is known about this species at present, and leaving the further illustration of the history of this insect before you to be worked out as opportunity offers. First, both forms are elm-feeders; this is acknowledged on all hands, but perhaps I cannot do better than read an extract from a letter I received from the Rev. E. Horton, who seems to have paid more attention to the early states of this insect than any other person: he says,—“I could not discover any difference in the larvæ. I extract the following from my journal as a description of the larva: Head brownish black, shining on

the first segment; a bilobed patch of the same colour, darkest externally, and shaded lighter to the middle; the rest of the body pale bluish green, of a semitransparent appearance, flattened; skin rather loose, with a few pale hairs; the green becomes more glossy as it approaches the pupa state; the young larva is pale reddish green; legs shining black." I think we may leave the name of these insects an open question; it is probable it will revert to Fabricius's name *scabrana*.

After the discussion (all being agreed that the specimen constituted one variable species), the Secretary exhibited a long series of *Peronea potentillana*, *Cooke*, a long series of *Peronea Schalleriana*, *H. D. Cat.*, and some *Peronea comparana*, *H. D. Cat.*, and read a paper "On *Peronea potentillana*, *Cooke*," by C. S. Gregson. The Meeting decided the species a good one.

The President then read the following paper from Edwin Brown, Esq.:—

On Breeding Acherontia Atropos.

"As I esteem it the duty of any one who discovers a new and successful method of arriving at a scientific object to impart that discovery, however little it may add to the general stock of knowledge, I beg to occupy your attention for a few minutes, whilst I mention a plan of developing *Acherontia Atropos*, which I found to answer exceedingly well during the past autumn.

"At short intervals five caterpillars of this species were brought to me, some found on the potato, the others on *Lycium barbarum*. One or more of these larvæ had been sorely pinched by the rustics, who held them in great dread, and indeed talked of cutting down "the tree that had bred such venomous animals;" the consequence was one of them soon cast off the larva-skin, and in a short time died. The four pupæ I placed in a flower-pot, well shaded and partly filled with light soil, upon which half an inch of powdered peat was spread. The pupæ were placed upon the peat and covered with a thickish layer of moistened moss (*Hypnum squarrosum*), a short and thick stick being planted in the midst. The pot was then sunk in a hot-bed frame, underneath a wall facing the south, and a hand-glass, perforated at the top, placed over the pot. Here, I argued, I possessed all the elements necessary for success. My friends, however, shook their heads and looked incredulous, whilst I expatiated upon the pupæ being thus moist, without risk of injury from tearing, or the growth of fungus matter—upon the exclusion of all excess of light, their enjoyment of a regular temperature—on the absence of all external pressure, and on the convenience furnished for 'stretching.' It was of no avail, my friends said the plan was 'against nature, and not likely to succeed.' To this I replied, 'It was owing to an imperfection in nature that so few moths exist, as compared with the number of caterpillars, and my plan was offered by way of an improvement on nature.' The result justified my calculations. I obtained a moth from each pupa, and all in fine condition, excepting one, which was somewhat crippled, owing, as I imagine, to a hurt it had received in the larva state."

After a vote of thanks to various contributors the Meeting broke up.—C. S. G.

On the Tendency of Species to form Varieties.

By THOMAS BOYD, Esq.

I HAVE read the papers on the variation of species in the 'Zoologist' (Zool. 6292—6308) with much interest; and yet they have left an unsatisfactory feeling in my mind: on asking myself, "What does all this prove?" the only answer I could make was, "A possibility." They seem, in common with very much of the argument and discussion on allied subjects in the present day, like a return to the old philosophy, "the anticipation of Nature," as Bacon calls it, and the only result attained, or likely to be attained by it, is that we lose ourselves in doubt, like the ancient philosophers,

"And find no end, in wandering mazes lost."

The argument, it seems to me, starts upon the smallest possible basis of facts, the known variation in species, and then goes on, without any additional fact, to the possibility or probability of an indefinite extension of this variation. Is this wise! Is it in accordance with the spirit of modern Science?

But the last of the three papers referred to goes much further than the others; it is much more definite in its aim, it claims something of the character of a proof, and it carries the argument into ground scarcely touched before. After ably sketching out the effects of external circumstances on the numbers and variation of animals, the author lays down two points,—*first*, "that the animal population of a country is generally stationary, being kept down by a periodical deficiency of food and other checks," and *secondly*, "that the comparative abundance or scarcity of the individuals of the several species is *entirely* due to their organization and resulting habits, which, rendering it more difficult to procure a regular supply of food and to provide for their personal safety in some cases than in others, can only be balanced by a difference in the population, which have to exist in a given area." This, it seems to me, is far more general and comprehensive than is warranted by the facts of the case; all that is proved is that the want of food and the inability of self-preservation do exercise an influence over the number of species, and that it is probable that these are two main causes of numerical variation; but to go beyond this is to ground conclusions upon our ignorance, for there may be many causes, of which we know nothing, which exercise powerful influence over these phenomena.

In the next paragraph allusion is made to the probability that some

varieties of a species might have a better chance of escaping or protecting themselves against certain adverse circumstances than the parent species; as, for instance, unusual length of limb might give an antelope greater facility to escape from the feline Carnivora; and it is argued that, after such a variety had become numerous, any subsequent circumstances which would throw an additional strain on the vitality of such species would result in the annihilation of the parent, leaving only this variety, which is assumed to be a *superior* variety.

Now have we any right to assume that an antelope with longer legs than its parent is superior to that parent? It seems evident that we cannot, in any way, do so, unless we are certain that it has every other power and faculty in the same perfection as its parent, and is exposed to no other disadvantage on account of this partial superiority, and I cannot think there is sufficient ground for such an assumption; the additional speed which would enable it to escape from some enemies might be accompanied with dulness of sight or hearing, which would leave it more exposed to the attacks of others, and in all probability it would be accompanied by a thinner coat, which would render it more susceptible to changes of temperature, and by a necessity for more food, which would throw an additional strain on its other powers, and these and other circumstances of a similar nature would counterbalance the partial superiority supposed; and even if not,—even if any variety thus specially characterized should, under certain circumstances, acquire a numerical superiority over the parent species,—is there any reason to suppose that a subsequent change of circumstances would throw an additional weight into the scale in favour of the variety? I think not. The perfection of any organized being consists in its unity as a whole—in its adaptation to all the phases of its being; and a special modification in one direction, to meet certain circumstances, so far from rendering it more suited for different circumstances, would in all probability produce an opposite result.

But it will probably be objected that this is all very inconclusive; and so it is, and so must all our opinions on this subject be till we are far wiser than we are now. The fact seems to be that there is, among organized beings, a tendency to vary; but a tendency is not a law of indefinite progress; a tendency to increase is not a law of indefinite increase, neither is a tendency to vary a law of indefinite variation. Tendencies can be seen in their true light only when viewed in connexion with other tendencies which modify and set limits to them; and if, as in the present case, we know something more of one tendency than of the opposing ones, we have not, on that

account, any right to assume that those of which we know so little are in reality as weak as our knowledge of them is small: the only circumstance that can give us a right to conclude this is the fact that they do exert that modifying effect which they would if they were in existence and in active exercise; and of this fact, in the present instance, we have no proof; indeed the facts of the case seem to me to point, with no unmeaning finger, in the opposite direction—the specific distinctness of species, closely allied and following each other immediately in the course of time, seems now considered almost a geological axiom; nor, so far as I am aware, is there in the whole range of natural science, a single instance of indefinite progress, except in the case of man himself; and here it seems closely connected with, if not entirely dependent upon, his power of abstract conception; that is, upon that power which forms the grand distinctive mark which separates man from all other organized beings.

What we want on this subject is the record and collation of facts, experiments and observations; and if this be done I feel assured that we shall find here, as Kepler did with the irregularities in the orbits of the planets, that the variations return into themselves in constantly recurring cycles.

With regard to the last paragraph, I am quite at a loss to know what meaning to attach to it. Mr. Wallace says, "This progression by minute steps in different directions, but always checked and balanced by the necessary conditions, subject to which alone existence can be preserved, may, it is believed, be followed out so as to agree with all the phenomena presented by organized beings, their extinction and succession in past ages, and all the extraordinary modifications of form, instinct and habits which they exhibit." Does he mean that by the tendency to vary we may explain all the differences that obtain between different varieties of the same species, or between different species of the same genus, or between different genera of the same order; or, further still, that we may trace back all organic life, as we see it now, to some unknown root in the far-off geologic ages, some sponge, or polype, or vitalized cell, from which everything has since sprung. The words I have quoted will bear this construction, and if the tendency to vary were a law of indefinite variation, it might carry out this idea; but, being what it is, simply a tendency, it seems to me that painting such an ideal picture on the subject is like Science sitting down at the feet of Imagination.

THOMAS BOYD.

Notice of the Various Species of Bovine Animals. By the Editor of the 'Indian Field.' *

I will commence with the musk ox (*Ovibos moschatus*) of the "barren-grounds" of Arctic America. The present distribution of this remarkable animal is, indeed, confined to that peculiar region, similar however to the "Tundras" of Arctic Siberia; but there is evidence of its having formerly inhabited a far more extensive range, and its fossil remains have been discovered even in Devonshire, in England!—one of many evidences of a former glacial epoch in Europe, long anterior to the existence of human beings in all probability. Remains of the rein-deer have likewise been found in England, with shells of now arctic or sub-arctic species, and correlative signs of glacier action in the valleys of the mountains, huge boulder-stones of which the present position has only hitherto been explained, intelligibly, by the transporting power of icebergs, &c. The musk ox seems to stand quite alone in its tribe; though Professor Owen classes it with its very opposites, the buffalos! Its horns, indeed, bear a certain resemblance to those of the Cape buffalo, but are much less spread out in their curvature; the naked muzzle is reduced to its extreme minimum; and the tail is short, like that of *Ovis Ammon*: the animal is densely covered with wool and long hair, which last falls over the sides so as to conceal its short limbs to near the ground. Most of our readers will have seen the fine stuffed specimen in the British Museum; but a much better idea of the living animal will be gathered from a figure in one of the narratives of Arctic expedition, we forget which (probably Ross or Back), and have not the work to refer to. Most assuredly there is nothing in that figure to betoken a near affinity to the buffalos. The head is carried very low in running; whereas in the ordinary carriage of a buffalo the nose is held out straight in a line with the back. The musk cattle clamber rocks and traverse broken ground with extraordinary facility (assuredly not a Bubaline trait), and their hoofs—unlike those of the buffalos—are adapted to their climbing propensities.† There is even considerable superficial resemblance between the Arctic musk ox and that very

* Communicated by Charles Darwin, Esq.

† According to Colonel C. H. Smith, "the under parts of the hoof and frog show a singular softish transversely ribbed surface, of a brown-red colour, seemingly intended to secure the foot on slippery snow and ice: the outer (?) toe is round, and the other crooked and pointed."

remarkable beast, the *Budorcas taxicolor* of Mr. Hodgson ('Journal of the Asiatic Society,' vol. ix. p. 65), which inhabits the Mishmee mountains at the head of the valley of Asám. But this latter we take rather to be a massive goat or goral; just as the nilgai is akin to our little four-horned chikara, and the bubalis or "Harte-beest" group to the gazelles. It has been stated (with what truth we know not) that the musk cow has only two developed teats,—as in the sheep,—all other bovines having four. The dung of musk cattle resembles that of sheep and goats.

The Siberian fossil skull figured by Cuvier (Oss. Foss. pl. 172, figs. 6, 7,) has the descending portion of the horns still more closely appressed to the sides of the head than in the existing musk ox.—(*Id.* pl. 17, figs. 15, 16, 17); this fossil animal being referred to the *Ovibos Pallantis* of the late Professor de Blainville.

The rest of the bovines fall primarily into bisontines, taurines and bubalines, which respectively inhabit, for the most part, or typically, cold, temperate and hot climates; the indigenous taurines of tropical regions obtaining a cooler temperature upon the mountains. The humped cattle, however, form one exception, and seem proper to the hottest regions of the anciently-known hemisphere.

The bisontines sub-divide into the bisons proper, and the yak. All have cylindrical horns, very slight naked muzzle, (most developed in the European zebra), and are clad with long shaggy hair, especially on the head, chin and fore-quarters. The tail is short, not reaching below the hocks.

The true bisons have a very broad convex forehead, and stout horns curving in a semicircle. The head and fore quarters are particularly large and heavy, and the hind quarters reduced, an appearance which is exaggerated by the copious mane and beard in front. They carry the head very low, and commonly stand with their fore and hind feet near together. The orbits of the skull are remarkably prolonged and tubular. These animals inhabit swampy forests and prairies, such as was much of Central Europe in the days of the Cæsars.

The American bison (*Bos Bison—americanus*, L.; *Bos Bison* of many authors, as distinguished from the next, erroneously designated by them *B. Urus*). With fifteen pairs of ribs, and consequently but four lumbar vertebræ. The well-known so-called "buffalo" of the western prairies.* We have seen many alive, and have remarked that

* Whence the thriving town or city of Buffalo, on the shore of Lake Erie, and a certain familiar ditty appealing to the Terpsichorean propensities of its young ladies by moonlight.

the tail is not tufted merely at the end, but resembles that of the yak, only with the hair much less developed.

The European bison, visent, wisent or wisund, zubr or (improperly) aurochs, *i. e.* ure-ox (*Bison europæus*, Owen; also *B. priscus* of Bojanus, apud Owen; *Bos Bison*, L., apud Nilsson, as distinguished from the gigantic taurine urus of former days). With fourteen pairs of ribs, and therefore five lumbar vertebræ.* Now confined to the great marshy forest of Bialowikza, in Lithuania (believed to be the only remnant of genuine primæval or purely natural forest still in Europe), but formerly much more extensively diffused, and considered by Owen to be identical with the *Bos priscus* of palæontologists, which co-existed with the *Elephas priscus* of what is now the temperate region of Europe—the remains of which last have been erroneously assigned (according to Dr. Falconer) to *E. primogenius*, which is the mammoth or Arctic elephant of Siberia. In the European, as compared with the American bison, the peculiar bisonine characters are in every way reduced, or more or less softened down in intensity. For an admirable description of this animal and of its habits, *vide* Weissenborn in the 'Ann. Mag. Nat. Hist.' vol. ii. p. 305 *et seq.*, also Nilsson, *id.* 2nd series, vol. iv. p. 419 *et seq.* The bulls emit a powerful musky odour, the chief seat of which is that part of the skin and hair which covers the convexity of the forehead. This is strongest in the rutting season, and is much weaker in the cows. The zubr has an invincible repugnance to the domestic *Bos Taurus*, which is not the case with the bison of North America; which latter will readily breed with domestic cattle, but the European bison never. (The mixed progeny are said to be infertile). The American is also far more tameable. Each has been known to attain about a ton in weight; but the European bison has greatly degenerated within historic times, and more so if truly identical with the fossil *Bison priscus*, the horn-cores of which are much longer and straighter, *vide* Owen's figure of a British fossil skull of *B. priscus* (Brit. Foss. Mam. and Birds, p. 490), as compared with Nilsson's Scanian sub-fossil skull of the modern type (in Ann. Mag. Nat. Hist. 2nd series, vol. iv. p. 415). The existing zubr of Lithu-

* This character is not so absolutely constant as is generally supposed; for a cow zubr, examined by Bojanus, had only 13 pairs of ribs; and we have the authority of B. H. Hodgson, Esq., for asserting that the Indian humped cattle have occasionally fourteen pairs. That gentleman being detained in the course of a journey through the Tarai, and seeing a number of skeletons of domestic cattle lying about counted the ribs of several of them, and to his surprise observed the occasional variation referred to.

ania does not attain to half the weight mentioned ; though so late as 1752 one is stated to have weighed 1,450 lbs.

The Caucasian bison (*B. caucasicus* ?). This animal is little known. It is supposed to be distinct from the Lithuanian zubr ; has a black dorsal stripe, which is not seen in the latter, and differently-shaped hoofs. There is also a slight difference in the horns. According to Professor Nordman, who was employed in 1836 on a scientific mission in the Caucasus, (where he was often obliged to make his excursions under the protection of a strong military escort, and a few field-pieces), "this animal, though no longer occurring near the high road from Tamar to Teflis, &c., is not very scarce in the interior of Caucasia. Herds are still found in a few districts by the river Kuban ; and the animal is met with on Mount Caucasus from the Kuban to the sources of the Psib, a distance of about 115 English geographical miles. Near the Kaban it is met with, in swampy places, all the year round. In the country of the Abazechians (Abchasians ?) it repairs to the mountains in summer, and is then frequently killed by the Psoehs and other Caucasian tribes. Late in autumn it descends from the mountains to visit the pastures in valleys never yet trodden by the feet of any European, except prisoners of war. It is particularly numerous in the district of Zaadan. Lieut. Lissowski, who studied at Wilna, and possesses a thorough knowledge of the zubr of Lithuania, assured me at Bambori, that the latter animal was *not very different* from that of Caucasia."—(*Vide* Weissenborn, in *Ann. Mag. Nat. Hist.* vol. ii. pp. 254 and 291). It is very desirable that this Caucasian bison should be properly compared with that of Lithuania. Professor Nilsson assumes their identity, as a matter of course, from known facts connected with their former extensive distribution of the European bison ; but until positive and careful comparison, we cannot regard the question as settled, however may lie the probability.

A kind of bison or zubr (more probably than the great taurine "urus," or some animal akin to it), is mentioned in the 'Travels in Tartary' of the old traveller Bell, as existing in his time in the country of the Tzulimm Tartars.—*Vide* 'Journey from Tomskey to Elimskey,' vol. i. ch. iii. p. 224). "On the hills and in the woods near this place," he remarks, "are many sorts of wild beasts, particularly the urus, or uhr-ox, one of the fiercest animals the world produces. Their force is such, that neither the wolf, bear nor tiger dares to engage with them. In the same woods is found another species of oxen called "bubul" by the Tartars. It is not so large as the urus ; its body and limbs are very handsome ; it has a high shoulder and flowing tail, with long

hair growing from the rump to its extremity, like that of a horse. Those which I saw were tame, and as tractable as other cattle." Here we have a distinct notice of the yak, both wild and tame, in a part of Asia where it would appear to be now quite unknown! The name "bubul" applied to it has probably its connexion with *Bubalus*. Remains of extinct bisons have been found in Siberia, and of three or four species in North America, as figured by Cuvier and by Harlan and others; and we really feel some difficulty to imagine that our modern European bison could, under any circumstances, have developed horns, the *bony cores* of which measure $2\frac{1}{2}$ feet "from base to point upon the outer curve, 17 inches in vertical diameter [circumference?—surely not bow-string diameter, which gives an amount of curvature quite unintelligible in the particular race or species] and 4 inches from front to back at their base;" as in a specimen of *Bison priscus* from Clacton, in Essex, noticed in the 'Annals and Magazine of Natural History,' second series, vol. xx. p. 393. The largest horns of the existing Lithuanian *zubr* do not exceed 18 inches round the outer curvature, and this with their investing corneous sheath! The only known indigenous bovines of America are its peculiar living bison, the musk ox of the Arctic "barren grounds," and the fossil bisontine species referred to. Of one of the latter we possess drawings of a most peculiar frontlet, with narrow yet bisontine forehead and thick horn-cores, stated to be from the celebrated deposit of "Big-bone Lick," in Kentucky, of a dwarf species, which seems to be undescribed to this day.

We have not seen the skull of a yak of pure blood, but suspect that it has not the protrusile tubular orbits of the true bisons.* The general form appears to be a step nearer to the taurines, and there is less inequality of the fore and hind quarters; still fourteen pairs of ribs: long hair on the fore quarters and pendant from the flanks; but the most striking peculiarity is the "chowry" tail. The horns are longer than in the modern typical bisons, and their tips curve considerably backwards—instead of the rigid semi-circular flexure in at least the bulls of the bisons proper. All appear to have the same grunting voice. The general aspect of the yak, it may be added, is distinctly bisontine, and it carries its head low, like the rest of the subgroup.

* Mr. Hodgson figures a yak skull, in vol. x. of the 'Asiatic Society's Journal,' in his "Illustrations of the Genera of Bovinæ;" from which the orbits would seem to be a little protrusile; but the bisontine peculiarities are exceedingly reduced. 

The yak (*Bos poephagus* or *B. grunniens*, or *Boeophagus grunniens*) is indigenous to High Tibet, and especially to Eastern Tibet, where still tolerably numerous in the wild state, though the species (as every one knows) is extensively domesticated, and the ordinary tame cattle of that elevated portion of the globe. The wild animal is known as the dong, or ban chour, and an interesting notice of it will be found in the 'Friend of India' for September 30th last.

We now come to the taurines, and among them may be recognised three principal groups:—1, that of the humped cattle; 2, that of which the European bull is characteristic; and 3, the mostly tropical group with flattened horns. All are more or less smooth-coated, our British Highland cattle displaying about the extreme of shagginess among the taurines.

The humped ox (*Bos indicus* vel *gibbosus*) is unknown in an aboriginally wild state; but large herds, the descendants of domestic cattle, still roam about the northern parts of Oudh and Rohilkund, and thus show that the species can maintain its existence, unaided by man, in a region infested by tigers.* It does not appear that it has hitherto been met with in a fossil state, nor can we venture to assert in what country it is truly indigenous; for the domestic races are spread over

* These feral "zebus" are noticed by Captain (now Colonel Sir T. Proby) Cautley, in the 'Asiatic Society's Journal' for 1840, p. 623. He remarks that, "In the districts of Akharpur and Dostpur, in the province of Oudh, large herds of black oxen are, or were, to be found in the wild uncultivated tracts, a fact to which I can bear testimony from my own personal observation, having, in 1820, come in contact with a very large herd of these beasts, of which we were only fortunate enough to kill one, their excessive shyness and wildness preventing us from a near approach at any second opportunity." Another writer notices herds of these wild humped cattle as occurring on the road from Agra to Bareilly. Again, in Dr. Butter's 'Outlines of the Topography and Statistics of the Southern Districts of Oudh, and of the Cantonment of Sultanpore—Oudh,' we are informed that "Bengali bulls and cows are found near Harpu,"—i.e. living wild. Their numbers would even seem to have increased of late years, to judge from a notice of them which we saw not long ago in one of the newspapers, in which attention was directed to their hides and horns as objects of commerce. As Dr. Butter distinctly calls them "Bengali bulls and cows," it follows that they are of the small race common in the country, as distinguished from the large cattle so numerous in the Upper Provinces; and Cautley's designation of them as "herds of black oxen" would seem to imply uniformity of colouring, as in aboriginally wild species. We should like, too, to know if their horns assume constantly the typical size and flexure; for these are matters of considerable interest to a naturalist. The animals are understood to have gone wild at one or more epochs, when whole districts were devastated in the grand old style, and in the fine old times of wholesale rapine and slaughter, the remembrance of which is still so fondly cherished by very many.

India, Arabia, great part of Africa, even Madagascar, and would appear to be found so far eastward as Japan; at least old Kœmpfer tells us that the Japanese "have a sort of large buffles, of monstrous size, with bunches on the back, like camels, which serve for carriage and transport of goods only in large cities." The name "buffalo," we may here remark, is currently bestowed on the humped cattle by English graziers; and thus we commonly hear of "buffalo's hump," whereas a buffalo does not happen to have a hump! The extensive herds of the Foulahs, Fellahs or Felâtahs, pre-eminently a race of herdsmen, who spread quite across Africa northward of the equator, consist exclusively of these humped cattle. According to Denham's 'Appendix,' "two kinds exist in Central Africa, one with a hump before and very small horns; the other altogether of a larger size, also with a hump, and immense horns." The latter (of which we have seen a pair sent by Denham to the British Museum) are enormously thick at base, but exhibit the true and peculiar flexure of the species; and again the Galla cattle, mentioned by Bruce and Salt, with immensely long and proportionately thick horns, are humped, and not unlike some big-horned cattle we remember noticing at Madras.* In Madagascar there is a wild humpless race or species, long ago indicated by Flacourt, and since noticed by the missionary Ellis, but the domestic cattle of the island are stated to be all humped, and such are commonly imported thence for the markets of Mauritius and Bourbon. These humped cattle are particularly suited to a dry and torrid climate, are indifferent to the fiercest rays of the sun, seldom seek shade, and never go into the water and there stand knee- or belly-deep for hours, like the humpless cattle of Europe. Being unknown in a primitive wild state, most naturalists still regard them as a mere climatal variety of the *Bos Taurus*, especially as the two interbreed freely, and the hybrids in every proportion; but there are other instances of species thus commingling. The presence of the hump is but one difference of very many; and it and other distinctions are well shown even in the small fœtus. The one is born with teeth through the gums, the other not so! The whole form is indeed remarkably different. In *B. gibbosus* the body is shorter and rounder, and the hind-quarters slope abruptly, instead of being continued straight to form nearly a right angle; the limbs are longer and more neatly formed; the ears lanceolate and somewhat pointed, instead of being broad and rounded; the dewlap begins at the chin, instead of before

* *Vide* also the figures of cattle in some of Barth's plates.

the breast; the eyes are larger, considerably more full and lustrous—indeed worthy of the famous comparison of Homer, his “ox-eyed” Juno! Again, the voice is utterly different, a mere grunt; and the typical flexure of the horns is not the same. The ordinary varieties of colouring are different, especially the Nil-gai markings of the feet not unfrequently seen in the humped cattle; the quality of the coat also is different, and the forehead is smooth or not shaggy.* At rest the humped bull carries his head low as any bison, the neck sloping down in a line with the fore part of the hump. But enough! We shall believe that the humped ox or zebu is a climatal variety of *Bos Taurus*, when we are persuaded that the knobbed goose (*Anser cygnoides*) is a mere variety of the European tame goose (*A. cinereus*), and not till then; the said geese interbreeding freely as the taurines in question, and producing mutually prolific hybrids! The yak also produces a prolific hybrid with the humped cow; and if *they* are not distinct species there is no meaning in the term. Both species of smooth-coated domestic cattle are well and characteristically represented in the ancient Egyptian paintings. †

Occurrence of Whales at Lynn.—A fine specimen of *Hyperoodon bonfloriensis* was found on the 22nd of September last, stranded upon a sand-bank in the Wash, near the mouth of the river Ouse, called the “Ferrier Sand.” It measured 24 ft. 8 in. long; the gape of the mouth 2 ft. 3 in.; nose or beak 1 ft. 8 in. to the rising of the crest of the head, which rose nearly at a right angle to a height equal to the length of the beak; the pectoral fin was 3 ft. long; from the tip of the beak to the

* The hair of the crown and forehead is slightly elongated in all taurines, as especially seen in the calves; but it mostly requires to be looked for to be observed. The proper curly front is peculiar to the European type.

† The humped cattle are remarkable for most extraordinary variation of size, from the huge bullocks of Western India (the ordnance cattle) down to the pygmy gyna; but the latter is not a distinct race—merely casual dwarfs, which, when they propagate, usually produce offspring of the ordinary size. For some notice of the Indian breeds of humped cattle, *vide* Hamilton’s ‘Journey to Mysore,’ vol. ii. p. 8 and plates; also ‘Transactions of the Agri-Horticultural Society of Calcutta,’ vol. vii. p. 112. As in the next group, we think it probable that more than one aboriginal wild race have contributed to produce our domestic races of humped cattle. The books tell us that there is a race or breed in Surat, with a second hump! We should be glad of any information concerning it. We also find that it is currently stated that “the hump is almost wholly composed of fat!” In India, where salt hump is so commonly seen and much relished at table, we happen to know rather better.

front edge of the dorsal fin 14 ft. 5 in.; from the hind edge of the fin to the posterior edge of the tail 8 ft. 7 in.; base of the fin 1 ft. 8 in.; the length or height of dorsal fin 1 ft. 10 in.; tail across 6 ft. 11 in. The horns of the crescent-shaped spiracle were turned forwards. No teeth were visible in the mouth until the flesh was cleaned off, when two were found in the lower jaw, at the end, measuring about an inch long. The colour of the animal was a dark bluish slate on the back, inclining to brownish on the sides. On the belly and a little distance up the side, in the region beneath the dorsal fin, it was mottled with white. On Wednesday night, the 3rd inst., whilst Smith, a Trinity pilot, was entering the Wash with his smack, he saw a fine young specimen of the great northern Rorqual (*Rorqualis borealis*) stranded upon the "Wainfleet Sand." He went on shore and dispatched the creature with a boat-hook. When it floated the next tide he brought it to Lynn. I was only enabled to make, satisfactorily, the following admeasurements: length 32 ft. 4 in.; pectoral fin 4 ft.; across the tail 8 ft.—*Edward L. King; King's Lynn, Norfolk, November 17, 1858.*

Notes on the Birds of Jamaica. By W. OSBURN, Esq.

(Communicated by P. H. Gosse, Esq.)

Sandhurst, Torquay,
January 3, 1859.

My dear Sir,

The following letter, which I have just received, contains such graphic pictures of Jamaican Ornithology, that I have thought the readers of the 'Zoologist' would be scarcely less interested than myself in its perusal.

I am, my dear Sir,

Yours very truly,
P. H. GOSSE.

To Edward Newman, Esq.,
F.L.S., &c., &c.

"Mahogany Hall, Jamaica,
December 4, 1858.

"Dear Sir,

"The only reason I can offer for the liberty I take in addressing you, as a perfect stranger, is your delightful book on the Ornithology of Jamaica, which has afforded me so much instruction and valuable information since my residence here, for the last twelve months. I have during that time been forming a collection of bird-skins, and given much of my time to the investigation of their habits. My list still falls very considerably short of yours; but, as I have collected, and am still collecting, in some localities which I gather you did not visit, you may perhaps like to have some of the results of my observa-

tions, where they appear not to have been anticipated by the large mass of information you collected on the subject during your own visit.

"My first residence was for three months at Grand Vale, in Westmoreland; afterwards at Camp Savanna, near Morgan's Bridge; then at Savanna-la-Mar; and finally here, on the borders of St. Anne's and Trelawny, about ten miles inwards.

"As Westmoreland had already been especially investigated by yourself, it was not likely to yield much new; I have, however, a *Caprimulgus* not in your list. I know nothing of its habits, it having been brought to me by a negro, in August, shot close to Savanna-la-Mar: the wings reach only half way down the tail; it struck me as very much like our English nightjar in its general aspect, but it has a broad white streak across the breast, rising to a point in the centre, like a circumflex, and festooning on each side broader to the shoulders. The following are the dimensions, taken from the recent bird:—Length $10\frac{1}{2}$ inches; expanse 17 inches; tall $5\frac{1}{4}$ inches; flexure 6 inches. The wings are rounded; the first quill shorter than the second; the third longest.

"I have had frequent opportunities of observing the curious bird you name, provisionally, in your work, as *Acanthylis collaris*: I first saw them on the 6th of March last, careering over the dark wood that covers the hill opposite Grand Vale House: it was about five in the evening; the 'Norths' had blown up some heavy clouds, though we had had no rain. From the door-steps I fired at one and brought it down: on going to pick it up, as it lay on the grass, its long wings extended, to my great mortification it gave me ample proof of its powers to rise from a flat surface, by rising at once and flying languidly over the valley beneath, where it disappeared. A large number (perhaps fifty) soon appeared; they darted down the wind with extraordinary swiftness, coming up against it more slowly; then, in a short time, the whole flock wheeled round once or twice in a kind of gyrating column (I have seen rooks in England perform a manœuvre very like it), when the whole disappeared. A week after they appeared again, repeating exactly the same manœuvres: this time I loaded with heavier shot, and procured a specimen. It proved a male, on dissection, and its plumage was in very fine condition. The dimensions agreed very nearly with those you give: I could not, however, make the wings, expanded to their utmost, more than $19\frac{3}{4}$ inches, nor, when closed, reach beyond the tips of the forked tail more than $1\frac{1}{2}$ inch. I paid particular attention to the eyes, which are indeed singularly

large and lustrous: the only explanation I am able to offer of your correspondent's assertion that the 'irides are blacker than the pupil,' is that these last are of that deep blue so observable in some of the Strigidæ, as, for instance, your *Ephialtes grammicus*, whereas the irides being dark hazel and opaque, in some sense, do seem darker. The claws were so fully curved as to make it impossible to force the point back to the same plane as that of the sole, and there was a worn patch beneath the first joint of the toes, corresponding to that beneath the tarsus-joint, as if only that portion of the foot habitually touched the surface to which the bird clung. I made a note that, the day after, half-a-dozen again appeared at about 11 A.M., the north blowing, a brilliant day, and no rain, though there was a slight shower the day before. I had no further opportunity of observation until I came to this side (Trelawny), about a couple of months ago. We have lately had such a downfall of rain as rarely occurs, laying large portions of the country under water, and doing considerable damage by torrents. Being out with my negro servant during a little interval in the bad weather, my attention was attracted by a loud cry I did not know: the boy pointed to the 'rain-birds' overhead, which, though at such a height as not to be otherwise recognizable, I knew to be this swift from the revolving column they stopped in their course to form. After the rains I saw them, in much reduced numbers, steadily feeding at a great height. I omitted to mention that the stomach of the one I dissected contained a black mass, fragments of insects, among which small Coleoptera seemed to predominate, many of them of a scarlet colour. On the 21st of last month, a brilliant day, they appeared again, when I made careful notes, at the time, of their habits. It was about 11 A.M. when I noticed their loud cry: I should imitate it by a 'wee—wee—wee,' the last much prolonged. It is very harsh, and I thought at the time in tone it bore some resemblance to that of our common loggerheads: it is audible at a great distance, and appeared kept up by the whole flock. They were then in no great numbers, evidently busy feeding at an immense height, wheeling over a circumscribed space. Every now and then a small party of five or six would set off at a prodigious rate very close together, come down lower, shoot round a cotton tree or steep hill-side, uttering the same cry with peculiar vehemence: they then exactly reminded me of our English swift. From these observations I will venture to add that my impression is that these birds cannot be considered, in any sense, crepuscular, more so than our other hirundines.

"Another very remarkable hirundine attracted my attention almost

Immediately after my arrival here, which proved your beautiful *Hirundo euchrysea*. I first saw it in the middle of October: it was a dull overcast day, with drizzling rain; but the beautiful iridescence of the back and head, as it dipped and wheeled over the canes, made it at once conspicuous. I did not see it again till a month after (November 16th), during rainy weather, and on the same day *Acanthylis* appeared: they were then in great numbers over the common attached to this 'pen.' I made the following note in my journal:—'Their flight is much more like that of the English swallow (*Hirundo rustica*) than any of the island hirundines I am acquainted with. It darts, with arrowy swiftness low over the ground, its pearl-white belly and lustrous green back showing by turns: or another part of the flock will skim over a clump of bamboos, or whirl in rapid circles with poised wings round the thick foliage of the bread-nuts. The whole flock of perhaps two or three hundred constantly moved, so that where there were numbers would be presently quite deserted for another part of the valley. They seemed much more alarmed at the discharge of my gun than is usual with swallows, the whole flock rising and darting about in great alarm. The bird shot at generally descended with a swiftness too great for the eye to follow, then suddenly checked its course near the ground, and joined the rest, with the peculiar chattering of swallows.'

"November 19. A brilliant day, after eight days' almost uninterrupted rain. On going out, soon after sunrise, two or three of the great swifts were wheeling over the valley, and the little golden swallows were very numerous, flocks skimming over every meadow and sheltered corn-piece. The gleam of their heads and backs, as the bright morning sun flashed from them, now ruddy, now green, now bright golden, was one of the most lovely of the many beautiful sights of the tropics. The play of light as they shot along in their rapid skimming flight reminded me of the glancing lustre of flying fish as they leap shining from the water. At a greater height they 'sailed' more, as is usual with the *Hirundinidæ*; and, rarely, one would spread its tail and wings to the utmost, the latter rather deflexed, and wheel very slowly over a small space, as if toying, or perhaps it was a manifestation of that consciousness of their own gay attire, which is so constantly observable in brilliantly coloured animals. It was at this moment I tried to get a shot; but my attempts were quite unavailing, and they wheeled and skimmed in the most provoking security, within a few feet of the muzzle of my gun: they appeared very constantly, whatever the state of the weather, up at any rate to the 30th ultimo,

when I succeeded in bringing one down as it came up against the sea-breeze rather more slowly. I have never yet seen them alight anywhere. The splendour of the plumage, examined closely, exceeded even my expectations. As my measurements, taken from the recent specimen, differ in some important particulars from yours, taken, I presume, from the skin, I will venture to send them;—

“*HIRUNDO EUCHRYSEA*, Gosse.

“Irides hazel. Beak black. Legs brownish black (like that of some Indian ink. I could see no purplish tinge).

“Length $5\frac{3}{4}$ inches. Expanse 12 inches. Flexure $4\frac{1}{2}$ inches. Tail $2\frac{1}{4}$ inches. Wings longer than the tail $\frac{1}{8}$ inch. Rictus $\frac{1}{2}$ inch.

“Intestine $5\frac{1}{2}$ inches. Two minute cæca $\frac{3}{4}$ inch from cloaca. Stomach contained a black mass, fragments of small insects, among which coloured elytra of Coleoptera were conspicuous.

“The rest of your description I found very accurate; but you do not notice that the middle and external lateral toes are syndactyle as far as the first joint of middle toes. This struck me as peculiar: Swainson does not mention it as a general characteristic of the class; and in the little *Hirundo pœciloma*, the only one I had at hand (the rest of my collection being despatched to England), though the toes are unequally cleft, there is not the marked disproportion as in *Hirundo euchrysea*. The tertials too are much more deeply emarginate, characteristics which, with their brilliant colouring, reminded me of the *Meropidæ* of Africa. As far as my observations go, there seems, in one or two points, a similarity between the habits of this swallow and the great swift: neither are constant inhabitants of the limestone valleys midway between the coast and the central ridge; both appear during wet weather in large flocks, not so intent on feeding as apparently going over their hunting-grounds, and afterwards, for some days after the bad weather, hawking in flocks of much reduced numbers, as usual with the family. I mention this, however, with much diffidence, as it requires much more extended observation than mine to place the fact beyond doubt.

“I have never been able to hear anything that seems worth any credit regarding the nidification of either species. I am meditating a residence close to the Black Grounds, on the central ridge itself, and my arrangements are already completed, so soon as the weather permits travelling. I am in hopes of obtaining some particulars while there.

"*Columba caribbæa* is, I hear on all sides, very numerous in the neighbourhood, but I have never been able to catch sight of them, or procure more than two specimens, both females. There are, I think, some very interesting particulars about them. Robinson, whom you quote, I can quite confirm as to the unusual length of the tibiae. The tarsus is feathered, but only in front; the posterior surface is bare, covered with very small circular scales, flattened, broad and soft. Now, if its habits of alighting on the large limbs towards the centre of trees be taken into consideration, together with its plump, heavy make, loaded with fat (beyond anything I ever witnessed in wild animals), and its short wings, it must be a bird of far from active habits, not given to long fatiguing flights: and will not this, the lengthened tibiae, be accounted for by their enabling the bird to use its tarsi on the broad branches which it frequents, to support its weight while reposing, exactly like a plantigrade animal?

"The spacious caves of the neighbourhood have yielded me several most interesting species of Cheiroptera; one with an extensible tongue, pencilled at the tip, has much interested me.

"Trusting that these few observations may be of sufficient interest to warrant the liberty I have taken,

"Believe me,

"Faithfully yours,

"W. OSBURN.

"P. H. Gosse, Esq."

Scraps from the Far West. By Capt. T. W. BLAKISTON, R.A.

Fort Carlton, Saskatchewan River.

Dear J——,

Since my last letter to B——, I have made the following short note on the ornithology of this neighbourhood during the winter months that have passed since my arrival. The "winter visitors" are not separated from the "resident natives," because of course at present I cannot separate them with certainty.

To begin at the top of the list: both eagles and hawks* go to the southward, the last of the former being seen on the 10th of November, and the river closed with the ice on the night of the 11th, so that they did not leave as long as there remained open water. From this we may

* A small hawk was, however, seen on three occasions during the winter.

date the commencement of winter. The species of eagle was supposed to be *Falco leucocephalus*, the white head, neck and tail, being distinctly seen.

Hawk Owl (*Strix funerea*). Specimen shot on the 8th of November, and in middle of winter.

Snowy Owl (*Strix nyctea*?). Seen on two or three occasions during winter; one appeared to be of rather small size.

Great-horned Owl (*Strix virginiana*). Specimen obtained in February.

Great American Shrike (*Lanius borealis*). I suppose, but am not certain, that this is the same bird that winters far to the south. There is also the same doubt in my mind as to *Strix virginiana*, which is said to be resident in the Southern States; however, I have specimens of each.

Neither species of *Regulus* nor *Parus hudsonicus* have I observed here this winter. I do not think that they go south of this on account of the climate, but am more inclined to think that their absence is to be accounted for either in consequence of there being no pine woods here, or, that their range is not so far west; if so, the latter has well been named Hudson's-Bay tit, as I found it between Lake Winnipeg and that bay, and it is common enough on the eastern peninsula, namely, Nova Scotia, during winter.

Black-cap Tit (*Parus atricapillus*?). Common. I have placed a mark of doubt because there is one described by Cassin as *P. septentrionalis*, which is said to differ but slightly, the habitat given being, "Missouri, Utah and Rocky Mountains." I have preserved several specimens for comparison, and if it turns out that my specimens are *P. atricapillus*, and I cannot discern any difference between them and those I obtained in Nova Scotia, then I shall think that the other species is wrongly named "northern," for surely a bird that winters here may be called more northern than an inhabitant of Utah. It may perhaps be *P. occidentalis*.

Fringilla linaria,—or whatever it may be called, for there seems much confusion concerning the different species of this genus,—at any rate the American lesser redpole, is here during winter, but not numerous. I have several specimens of this also for comparison.

Snow Bunting (*Emberiza nivalis*). In large flocks till the end of October, after which date but few were observed until the 3rd of December, since which I have seen none.

Pine Grosbeak (*Corythus Enucleator*). In considerable numbers from the 7th of November, and another species supposed to be the

Evening grosbeak (*Coccothraustes vespertina* ?), was first observed a week later, but it never was so numerous as the other. Both were generally to be found about maple trees (*Acer fraxinifolium*), the seeds of which they eat.

No crossbills have been seen, which I account for by the absence of pine woods.

Raven (*Corvus corax*). Always to be seen, and so far from being a solitary bird, as it is called in Europe, I made a discovery in its habits, of which I had no idea before. At the beginning of winter I observed that the ravens, which I saw about sunset, no matter where I was, were always flying towards the same point, and I concluded there must be some large trees somewhere in that direction, where a few pairs perhaps roosted. One day, therefore, after having been out with my gun, I made a point of returning to the Fort in the evening, by that quarter; judge my surprise! when among some clumps of young aspen trees, none of which were above twenty-five feet high, or thicker than my arm, on finding one of these clumps literally filled with ravens, which, on my near approach, took wing and commenced flying about in all directions. I judged, by counting a portion, that there were upwards of fifty in that one place, and that no one should hereafter say, "Oh! they were only a lot of crows," I shot one, which I keep as a specimen. I have been to the same spot on other occasions during the winter, and always found my black friends. It is wonderful with what regularity of time they repair to their roosting-place in the evening, and leave again in the morning, by pairs, for their day's hunt; one pair flies directly over the Fort each morning, and as I sit on watch for the minute-hand of the chronometer to come round to each hour of observation,* they give a croak as they fly over, as a morning salutation I suppose, at any rate I give them the credit for such civility, and looking to see the time, I find it the same within two or three minutes, but gradually earlier and earlier, for the sun, which is their clock, is each day lengthening his course above our horizon. The raven is only known by the name "crow" here.

Magpie (*Corvus Pica*). Seen about the whole winter. I have specimens for comparison with the European bird.

Canada Jay (*Garrulus canadensis*). Common.

No species of *Sitta* seen; probably on account of the absence of pine woods.

* Capt. Blakiston holds the post of Magnetic Observer to the Government Exploring Expedition in British North America.

Picus canadensis was observed on a few occasions ; sometimes in company with the downy woodpecker (*P. pubescens*). The former appears to take the place of *P. villosus*. It would be interesting to know where this species ceases to range.

Tetrao umbellus and *T. canadensis* I have not seen west of the forks of this river, which you will see by the map is a little east of this. Certainly there are no woods suited to the latter.

Sharp-tailed Grouse (*Tetrao phasianellus*), is a general inhabitant of the semi-wooded portions of these northern plains. It is usually in packs of large or small size in the fall and winter, but I cannot yet speak as to the other seasons of the year. If it is not the "prairie hen" of the southern plains, it certainly takes the place of that bird in the north. I was always under the impression that the prairie hen was *T. Cupido*, but you will be able to settle this point. The food during the winter appears to be usually the seeds of *Rosa blanda*, the ordinary briar of the plains or snow-berry (*Symphoricarpus racemosus*), also the buds of a species of willow (*Salix*), but in the fall their food was different. I have opened the crops of many, and Mr. Bourgeau, our indefatigable botanist, kindly furnishes me with the names of the seeds, &c. I find within them.

Willow Grouse (*Lagopus Saliceti*). Although I have hunted diligently for this bird, I have not found one during this winter, and have only heard of a single specimen which was shot to the west of this, in about the same latitude. It was sent to me, and I have preserved it.

I have written to two or three gentlemen connected with the fur trade, to procure me specimens of each kind of ptarmigan known in the north, because Mr. Gould thinks there is one yet undescribed closely allied to *L. Saliceti*.

As to water birds, none are to be seen here in winter, as there is not an inch of open water anywhere.

THOMAS BLAKISTON.

Notes on the occurrences of rare Birds in Devon and Cornwall in 1857 and 1858.—Purple Heron (*Ardea purpurea*). On the 30th of October, 1857, I bought an immature bird of this species at the shop of a poulterer in Stonehouse.

Gray Lag Goose (*Anser ferus*). On January 18th I bought a fine old male in the Plymouth Market, shot in Cornwall, and on the 26th of November I obtained a female in the market at Devonport, which was killed on the river Tamar. This species is very uncommon with us, the above being the only two I ever observed in our markets, although I have been for many years on the look-out for them.

Great Snipe (*Scolopax major*). In November, 1858, I saw a fine example of this bird, in the flesh, killed by a gentleman residing near Plymouth.

Alpine Accentor (*Accentor alpinus*). On December 20th, 1858, I observed a pair of these rare birds on the cliffs near Plymouth, but unfortunately had no gun with me. They were very tame, and allowed a near approach, but although I was at the spot in less than an hour afterwards, with my gun, they were not to be found. I have since searched the coast daily, but without the least success. The day before they appeared we had a most tremendous thunder-storm (a very rare thing in December), and I fear the constant severe gales we have since experienced must have driven them inland. Their actions, when hopping about on the grass on the top of the cliff, were very like those of the common hedgesparrow, but on being disturbed they immediately flew to the rocks below. Their note resembled the syllables, "tree, tree, tree," as described by the Rev. F. O. Morris in his 'British Birds.' On Monday, January 10, I had the good fortune to shoot them after a search of three weeks: I examined the stomach of one, which I found to be very muscular, and contained gravel, fine sand and seeds, but no insects. The only other Devonshire specimen of this bird I ever saw was sent from Teignmouth to Plymouth to be stuffed, together with a fine old male black redstart (*Phœnicura Titlès*). It appears that these birds frequent the same localities, for the place where I saw the alpine accentors was an excellent one for the black redstart.

Spoonbill (*Platalea leucorodia*). On December 24th, 1858, I saw a fine white spoonbill that was killed about a fortnight before, on the St. Germain's River, by Mr. H. Spencer, of St. Germain's. It was stuffed by Mr. Percy, of Plymouth, for the Earl of St. Germain's.

Little Gull (*Larus minutus*). A few days since Mr. Bolitho, bird-stuffer, of Plymouth, had a beautiful specimen of the little gull to stuff for a gentleman living near Plymouth: it was killed in the neighbourhood.

Gray Phalarope (*Phalaropus lobatus*). Some of these birds have been killed at Plymouth during the past autumn; they are generally considered rare, but a few may be seen every autumn in Plymouth Sound during the equinoctial gales: their actions at such times are very elegant; they alight just outside the breakers, where the froth and sea-weed have accumulated, swim with extraordinary activity and lightness, constantly whirling their bodies round, and incessantly nodding their heads and dipping their bills in the water, in search of food. So tame and fearless are they at these times that I have actually seen them give a little spring and flutter only when fired at and missed, and immediately go on feeding as if nothing had happened. The stomachs of those I have examined contained the remains of insects and what appeared like small particles of coal. I have never seen these birds on the land, but a friend of mine tells me that he once saw two, during a heavy gale, come in from the sea and alight on the mud banks of the river, and run about just like sandpipers. In 1846 an extraordinary flight of gray phalaropes visited Plymouth and the neighbouring coasts: they remained about three weeks, and in such numbers were they that I saw a sailor with an old rusty musket literally filling his pockets with them: on my asking what he intended to do with so many, he coolly told me that they made capital pies. It seems strange that the red-necked phalarope (*Phalaropus hyperboreus*) should be comparatively so rare, considering it breeds in Scotland; for, among the great number of phalaropes I examined when they were so plentiful, and at other times, not one of the rednecked

species could I find ; indeed I only know one instance of its having been obtained in Plymouth.—*John Gatcombe ; Wyndham Place, Plymouth, January 15, 1859.*

Occurrence of Rare Birds near Carlisle.—The following birds, now in the possession of birdstuffers in Carlisle, have been shot in the neighbourhood during the months of October and November, 1858.

Black Tern (*Sterna nigra*). A pair of these birds were shot on Rockcliffe marsh, in October, in their autumnal moult ; the back and wings are of a deep slate-colour ; the other parts, except around the head, are white.

Stock Dove (*Columba ænas*). A bird was shot on Duncan lime-kiln, near Ecclefechan, in November, which has proved to be this species.

Whimbrel (*Numenius phaeopus*). This bird leaves the north in autumn for the southern districts, where they pass the winter ; the bird before us, which was making towards our shores, was shot at Lilloth, in October.

Bohemian Chatterer (*Bombycilla garrula*). An individual bird of this species was shot from a large flock, in November, at Newby Cross ; no others have been observed up to this time : it is only during severe weather that they approach near towns and villages.

Great Gray Shrike (*Lanius æcubitor*). One bird of this species was shot at Rough-tonhead, on the 7th, and another at Blackwall on the 10th of November : they are often met with in the North in the winter season ; they are constant attendants upon the fieldfare and redwing, and when want is exhibited by the enfeebled bodies of the latter, the shrike, which is ever ready to attack, terminates their existence.

Crossbill (*Loxia curvirostra*). A small flock of this species was observed between Coathill and Armthwaite, where there is abundant food at High Stand and the adjoining neighbourhood of Eden Brows : large numbers of them settled here in the winter of 1856 : their food is the seed of Scotch fir cones.

Will any reader of the 'Zoologist' kindly inform the writer to what bird the nest belongs which was found by him on a spruce fir, near the top, containing four white eggs ; the nest was composed of twitch-grass, such as may have been ploughed up and laid for some time ; the eggs, which are white, resemble the wryneck's in shape and colour, but are scarcely as large as the redstart's.—*Thomas Armstrong ; 12, Barwise Court, English Street, Carlisle.*

Occurrence of Rock Doves at Beachy Head.—On the 6th of January I purchased two rock pigeons (*Columba livia*) of a boy, whose father had shot four out of a large flock of some hundreds, at Beachy Head, a day or two before. A friend also told me that he had seen and shot at a flock of about forty, at the same place, on Saturday last.—*John Dutton ; South Street, Eastbourne.*

Occurrence of the Pomarine Skua (Lestris pomarina) at Birting Gap.—A coast-guard man brought me a good specimen of this rather rare visitant on the 5th of January, which he had shot at Birting Gap, near Eastbourne, a few days before : it is in exactly the same state of plumage, in fact a *fac simile* of Yarrell's fine plate. Weight, 13½ oz. ; length, 17¼ inches ; breadth, 3 feet, 7¼ inches. I did not ascertain the sex. It was rather lean. The stomach contained a little green matter, also a few small worms. Two middle tail-feathers about half-an-inch longer than the next feather on each side ; back, scapulars, tertials and upper tail-coverts number-brown, margined with wood-brown ; great wing-coverts uniform amber-brown ; wing-primaries blackish brown ; tail upper-brown ; under tail-coverts, broadly barred across with umber-brown and wood-brown ; legs pale blue ; the whole of the feet black. Birting

Gap is about five miles east of Seaford, at which place the Rev. R. N. Dennis, Rector of East Blatchington, procured a specimen on the 7th of October, 1858. Doubtless we shall hear of more captures this winter.—*Id.*

Occurrence of the Black Swan (Cygnus atratus) in Somersetshire.—In the spring of last year, five of these birds were shot in North Moor, near Bridgwater, Somersetshire. I did not at the time ascertain the species, but I have lately had the opportunity of seeing one of the five at Taunton, when it clearly appeared to be the *C. atratus* of Keill (*Anas atrata*, *Latham*), the whole plumage being black, or very nearly so, and the bill red, with white marks near the point. It measured from the tip of the bill to the end of the tail, 3 feet 10 inches. I could not measure the expansion of the wings, as the bird was prepared for being stuffed. The birds, when first seen, were far from wild, allowing a near approach before they attempted to fly off. This may have been from excessive fatigue. Were they foreign immigrants, or is it more probable that they escaped from some preserve? If immigrants, where did they come from?—*Thomas Clark; Halesleigh, January 5, 1859.*

Remarks on the Southern Petrels.—A very common and well-known bird is the Pentado petrel (*Procellaria capensis*), commonly known as the "Cape pigeon," from July to December; it is by far the most numerous bird between the latitudes of 30° S. and 40° S.; during the rest of the year it is seldom seen. I have not been able to ascertain where it breeds, as it is never seen in the islands of the Southern seas; and at the time of the year when the other birds are nesting it is found plentifully out at sea. It is very remarkable the preponderance of marine birds in cold climates over those in tropical seas, being exactly the reverse of that which usually obtains on land, but perhaps they are not quite so numerous as people imagine, as we must remember that a ship at sea draws all birds towards it for a circle of at least 20 miles in diameter. When caught, these birds, as indeed most of the petrels, vomit a quantity of strong-smelling oil, not as a means of offence, but out of fright; their cry is like a piece of iron drawn along a very large-toothed comb. It is useless to describe these pretty birds,—they are too well known: their proper habitat is from 27° S. to 41° S., but they often follow a ship as far as 24° S., and once one followed the ship I was in as far as 17° S., but the thermometer was only 70° in the shade; that day I saw Tropic birds, flying fish and a Cape pigeon all together. There are a great many species of petrels in those seas: I made out ten different species; the names of some I do not know, and I am certain that many more would be made out if one only had more facilities for getting them. The sooty petrel (*Puffinus major*), called by the Australians "the mut-ton bird," is common in July and August, but retires to breed in September; it makes a burrow in the ground horizontally from two feet to as much as six yards, and lays one cream-coloured egg at the end of it. The bird is brown above and white below, feet yellow, beak blue; its feathers fit very close and have a glossy appearance; it is very fond of diving, poising itself in the air at a height of 20 or 25 feet, it shuts its wings and takes a header straight into the water, sometimes it stops under several minutes, and when it comes up shakes the water off like a dog: they open their wings under water, and use them very rapidly; like all the other petrels they fly with their legs stretched out behind them. Several of the petrels are very local: the whitecheeked petrel (*Procellaria equinoctialis*), for instance, is never found east of the Cape, but goes generally farther north as far as 26° S., whilst several others are never seen to the west of it: one of them is the longnosed petrel,—I do not know its name but there is an unnamed specimen in the museum at Calcutta; it is blackish brown, with black feet and a

bright yellow beak ; its nostrils, which are very large, run all down its beak as far as the bend. There are several others, as the necklace petrel and the beautiful little mow petrel, with which I am not sufficiently acquainted. The stormy petrel is also seen, but is not very common. Many people suppose that these petrels follow the ship all night, and certainly you often see a bird or two flying about at all hours of the night. Once about 1 A.M. a Cape pigeon, as it was flying over the ship, hit against a rope and fell on the deck. You also sometimes see the same bird for two or three days together ; and a naval officer told me that once a Cape pigeon, with a red ribbon round its neck, followed the ship he was in for 1500 miles into 20° S. They say that if the birds were to sleep on the water the ship might be 100 miles off before morning, and as they do not fly high it is not likely that they would find it again ; but it seems to me that this is as absurd as the poet's idea of their sleeping in the air,—

That oft the sleeping albatross
Struck the wild ruins with her wings,
And from her cloud-rocked slumberings
Started—to find man's dwelling there
In her own silent fields of air :

for although you do see birds at night they are not common : also if you mark twenty or thirty you will seldom see one again ; but sometimes one will appear after two or three days. It seems to me that they sleep on the water, and in the morning, knowing that their best chance of breakfast is in the wake of some ship, they fly high to look for one ; some find the ship they were with before, others another : this seems rendered more probable by the fact that at sunrise very few birds are about the ship, but soon afterwards they begin to arrive in great quantities.—*F. Wollaston Hutton ; Lieut. 23rd R. W. Fusiliers.*

Colouring of the Eggs of Birds.—I have long been desirous to ascertain some particulars respecting the minute anatomy of the mucous membrane of the oviducts of birds, during the laying season, but the opportunity of making the needful observations has not occurred to myself, and year after year I have suffered the proper period to pass without taking adequate steps to obtain the co-operation of those who unite the ability with the opportunity to aid me in the inquiry. It is well known that the eggs of birds differ not only in form but also in colour and texture, and that in many instances the colour and markings of the egg-shell are almost as characteristic as the plumage of the full-grown bird. In the egg-shell of the emu we have a green colour which seems to be analogous to the very remarkable green pigment in the maternal portion of the placenta of the puppy. In that of some other birds, as the Guinea fowl, we see a reddish brown, affording one of many illustrations of the cognate character of the complementary colours green and red. Again the egg-shells of many birds present various shades of deep brown and olive up to perfect black. As an example of the black I would invite especial notice to those of a breed of black ducks. The black colour of these shells is applied in the most irregular manner as regards both the quantity and the distribution. Sometimes the shell is almost universally of a deep black ; sometimes a shell, remarkably white for that of a duck, is partially smeared with black as if daubed with a shoe-brush. The eggs of many birds are spotted in such a manner as to form a characteristic pattern. It seems perfectly reasonable to suppose that there must be some special anatomical arrangement destined to produce

the varieties of colour just alluded to, and my conjecture is that for some of the modifications the provision may consist in the proportion and distribution of the minute veins. For example, retardation of the circulation and detension of the blood in the veins seems to favour the production of black, as in the case of the black pigment of the choroid coat of the eye and the co-existence of the *venæ vorticosæ* of that structure. This capillary arrangement may be such as to produce a pattern, and this inscribed on the egg before its expulsion would give it the peculiarities belonging to its particular species. The case may not be quite so simple as here supposed. Besides the capillary vessels, the follicles and the epithelial element of the mucous membrane of the duck are very probably concerned in producing some of the phenomena. The deposit of earthy matter, forming the shell of the egg, may itself be brought about by something like the conditions which determine the deposit of bony or earthy matter beneath the attached surface of serous membranes. I shall be greatly obliged if some of the readers of the 'Zoologist,' who may be skilled in making fine injections and microscopic researches, would take advantage of the coming spring to make some of the inquiries here suggested.—*Thomas Hodgkin* ; 35, Bedford Square, January 24, 1859.

A Word on Otolithes.—It may perhaps interest your ichthyological correspondents to hear the results of my examination of the otolithes or ear-bones of fish. I have examined upwards of one hundred species, and can now positively state that they possess generic characters, and I believe I can as positively state specific ones also. Such is unquestionably the case with the Gadoids; of course the specific characters are less marked than the generic, but with care can be made out. I have also discovered that the Gadoids were in great numbers during the deposition of the crag, having obtained otolithes of cod, whiting, whiting pout, pollack, &c, and, from the Lower Marive of Hampshire, the whiting pout and some closely-allied species. The greater part of my series is at present in the hands of Professor Agassiz, to whom they were forwarded after my return from the States last autumn: as soon as I again receive them, I shall be most happy to show them to any of your correspondents who may feel an interest in the subject. As I purpose still continuing my investigations, I will inform you of any further results.—*Edmund Thomas Higgins* ; 2, Tamworth Place, Redland Road, Bristol, January 17, 1859.

Food-plant of Lycæna Agestis.—When I took the 'Zoologist' in hand, and saw Mr. Morris's paper (Zool. 6336), I expected he had been so fortunate as to have found the larva of *Lycæna Agestis* feeding on the *Helianthemum*; but I find, on reading it, that he has only confirmed my experience that it is the *Erodium*, and the *Erodium* only, on which the larva feeds. Mr. Morris says, "L. Agestis is often found very abundantly on the downs in this neighbourhood, where the *Helianthemum* is also plentiful." I hope Mr. Morris will make himself better acquainted with the Botany of Surrey. Again, he says, "I have also taken L. Agestis at different times in localities so far from the chalk or sand that I am certain there was neither *Erodium* nor *Helianthemum* within miles:" here, again, what he shows is simply want of

botanical knowledge; for the *Erodium* is found in plenty on the banks of the canal at Norwood, but no *Helianthemum*: thus Mr. Morris proves that *L. Agestis* is found where its food-plant grows in abundance. *Helianthemum*, as I have stated before, will only grow on chalk or limestone, while the *Erodium* grows in open places, where there are grassy slopes, such as run all through the Surrey hills; on the high mountain ridges the *Erodium* is rare, but in those places the *Helianthemum* grows in abundance; in such localities *L. Agestis* is rare. I am much obliged to Mr. Morris for calling my attention to the Surrey hills, and more particularly to the canal at Norwood, as it proves all that I wish. If Mr. Morris can spare a few days next summer I hope he will search well the *Helianthemum* for the larva of *L. Agestis*, for I can assure him it will be a discovery when he finds one; it does not follow that because Mr. Morris finds *L. Agestis* where the *Helianthemum* is found that it must be its food-plant.—*H. J. Harding*; 1, York Street, Church Street, Shoreditch, January 5, 1859.

[This discussion must now terminate for the present, to be renewed at some future time, when Mr. Doubleday, Mr. Logan, Mr. Harpur Crewe, or some other close observer of larvæ, shall actually breed *Lycæna Agestis* from the larva.—*Edward Newman*.]

Food-plant of Sphinx Convolvuli.—I was extremely glad to read Mr. Douglas's paper on *Sphinx Convolvuli* (Zool. 6337). I believe the larva rarely or ever feeds upon anything but the greater or lesser bindweed (*Convolvulus Sepium* and *C. arvensis*, L.), and the perfect insect is thence most properly named *Sphinx Convolvuli*. I know an entomologist in Kent who has several times bred the perfect insect in April and May, from larvæ taken the previous autumn upon *C. Sepium*. A cousin of mine has now in his possession a very lively pupa, the larva of which was taken last September, at Eastbourne. — *H. Harpur Crewe*; Drinkstone, Woolpit, Suffolk, January 14, 1859.

[I wish that any gentleman who finds either the larva or pupa of this insect would oblige us all by transmitting a minute description of them to the 'Zoologist.'—*Edward Newman*.]

Food-plant of the Genus Acronycta.—I have read with much interest Mr. Gregson's remarks (Zool. 6338), under the above heading. I am able to add three more food-plants to those he enumerates for *Acronycta Alni*, viz. beech, saw and black Italian poplar. I have three times had the larva, and respectively from the above-mentioned trees. My brother, a few years since, brought me a fine pupa, the larva of which he found and fed up upon alder, and my friend Mr. Herbert Bree beat a full-fed specimen from oak the year before last. Mr. Gregson remarks that he never saw *A. Rumicis* on its titular plant: this is certainly not the case in Derbyshire, where I have seen the larvæ feeding upon all the common species of *Rumex*, and in profusion upon the common sorrel (*Rumex acetosa*): this species, at any rate, is not, I think, misnamed. I am, however, entirely at a loss to conceive how *A. Ligustri* came by its title; I have taken the larvæ in some plenty on ash, but never, except in one instance, upon anything else; this exception was at Malvern, where I once beat two small larvæ from hazel, fed one of them up upon that tree, and bred the moth; I do not believe it ever feeds, or did feed, upon privet, but I may be mistaken. The favourite food-plant of *A. Aceris* is certainly sycamore; upon this tree the larvæ used to occur in some plenty, when I was at Trinity, in the environs of Cambridge: during my residence in Suffolk, however, I have myself beaten it from maple and oak, and seen

it beaten from birch. *A. auricoma* certainly does not take its name from the larva, the hairs of which are sooty black. *A. leporina* is not confined to birch and black poplar; I have taken a score or more of the larvæ upon alder, and have several times seen it upon the Ontario poplar: the pale green larva with white hairs is not confined to poplar; I have frequently beaten it from alder, and still oftener from birch, both in Kent and Derbyshire: I never met with more than three specimens of the canary-coloured variety (if variety it be); one of them was feeding upon aspen, the other upon birch. At Cambridge the larva of *S. tridens* used to be rather common in October on the whitethorn hedges at the back of the colleges.—*H. Harpur Crewe; Drinkstone, Woolpit, Suffolk, January 14, 1859.*

Larva of Heliothis marginata.—It may be interesting to Mr. Brockholes (Zool. 6338) to know that the larva of *Heliothis marginata* is common in some parts of Suffolk. All the varieties he mentions occur, and in the same ratio as to rarity, *var.* No. 3 being far the most scarce. I have taken this larva in various parts of England for some years past, but never upon anything except the thorny rest-harrow (*Ononis campestris*, Koch); it eats the seeds and flowers, seldom, if ever, the leaves; I never saw it upon *O. arvensis*; I have been told that it feeds upon various species of crane's-bill, but with what truth I know not. That it does feed upon other plants than *Ononis campestris* I am almost sure, for I have taken the perfect insect at sugar in a locality where little or no *Ononis* of either species occurred. I was once travelling about with a number of these larvæ, and located for a time in a village where no *Ononis* grew; after trying various experiments I found that they fed freely upon the unripe seeds of the sweet pea. The perfect insect, when bred, is almost always dwarfed.—*Id.*

Larva of Taniocampa cruda.—The caterpillar fastens two leaves together, lying curled up between them during the day-time. I thought it must be, at least, a good *Ceropacha*, and went on collecting them till I had "amassed" about two hundred. I shall not soon forget my disappointment, as day after day my friend *T. cruda* emerged. My suspicions had already been grievously excited, by observing that the larva entered the earth to effect its transformation; the whole of the genus *Ceropacha*, if I mistake not, spinning up between leaves, or in moss, &c. The larva is extremely variable, and though preferring oak, will readily feed on hazel and willow. The pupa may be found from the beginning of July to March.—*Joseph Greene in the 'Naturalist.'*

Larva of Taniocampa cruda.—This larva appears more than any other to delude and annoy the collector. The protean variety of its colours beats all description. I found a variety this year and last, which was pale green with a very pretty orange and red spiracular stripe. In addition to its other troublesome qualities the wretched larva is a cannibal.—*H. Harpur Crewe; Id.*

Larva of Orthosia Upsilon.—I have taken the larva of this insect in some numbers near Stowmarket, when sugaring just after dark, crawling up the pollard willows, and occasionally upon the stem of the black Italian poplar. It conceals itself during the day amongst the grass and roots at the foot of the tree, or under a piece of loose bark, and as soon as it gets dark, climbs up to feed on the leaves. It is a dark dingy blackish larva, and is full-fed about the 7th of June. It feeds most voraciously, and attains its full size with marvellous rapidity. It remains a very short time in the pupa state, sometimes barely three weeks. In confinement all my larvæ buried, and spun a cocoon under the surface of the soil.—*Id.*

Larva of Orthosia lota.—The egg would appear to be laid on the bud, as the larva

is almost invariably found among the young tender leaves, spinning four or five of them together when young. It afterwards conceals itself, eating only at night. It is a most voracious feeder. As a rule, I should say it prefers willow to poplar; I have not met with it on poplar.—*Joseph Greene ; Id.*

Larva of Anchoscetia pistacina.—I took the larva of this insect in some plenty last year, at the end of May and beginning of June, by sweeping the mowing grass in the meadows round Stowmarket. It closely resembles the larva of *Hadena oleracea*, and is sometimes bright yellowish green, and at others reddish brown with black spots. It feeds voraciously upon the leaves of the three species of meadow crowfoot, *Ranunculus bulbosus*, *R. acris* and *R. repens*. It spins a very tight, neat earthen cocoon, in which it remains some weeks before assuming the pupa state. This cocoon when kept dry becomes exceedingly brittle. The eggs which I have had were laid in the autumn, and hatched in the spring.—*H. Harpur Crewe ; Id.*

Larva of Scopelosoma satellitia.—The larva of this species is very singular in its habits. I do not allude to its carnivorous 'propensities.' In this respect unfortunately it is not singular. Sometimes, when young, it feeds on trees, and afterwards on low-growing plants; at other times it appears to invert this order of things. I found a number of them last spring about half an inch long, feeding on the common primrose, but when placed in a box, containing leaves of the wych elm, they immediately forsook the former and devoted their energies to the latter. Conceals itself during the day.—*Joseph Greene ; Id.*

Larvæ of the Genus Xanthia.—This highly interesting genus is well represented in Suffolk, as I have myself taken the whole six species; and this appears to be a suitable place to make a few remarks on the habits of the larvæ of this genus. The general opinion seems to be, that when young they feed on the seeds of various trees, and afterwards leave them for various low-growing plants. That this is by no means necessarily the case, I have had abundant opportunities of proving. For instance, *X. citrigo* was nearly full-fed when beaten from lime, and in confinement they not only preferred that tree as food, but would not touch any other. At Playford I heat the larva of *X. ferruginea* in the greatest profusion from the wych elm of all sizes, from a week old to their full growth. Again, the five pupæ of *X. gilvago*, which I dug up this year in Derbyshire, were all at the roots of elm, there being no plants at all near. The same remark applies to *X. xerampelina*. Indeed, with regard to this latter insect, I entertain little doubt that leaving the tree is the exception and not the rule. I must at the same time acknowledge that I have not succeeded in finding the larva. I am very anxious to know farther, whether the eggs of the different species in this genus hatch in the autumn or not? I believe the general idea is that they do not. My own impression is that they *do* hatch and hybernate. My only reason for thinking so is, that in October I found, in beating some loose grass, weeds, &c., in a very small plantation, two larvæ of this genus, about half an inch long. I cannot state the species, as there were both ash and elm in the plantation, and the larvæ (when young especially) are so much alike that it is difficult to discriminate them. My notion, therefore, from this circumstance is, that the eggs are hatched in the autumn on the trees, and that just before the leaves fall the larvæ descend to hybernate among the weeds, &c., and in the following spring ascend them for the purpose of feeding again. This idea is much strengthened by the fact that *X. ferruginea* (the only species, unfortunately, I can speak of from experience) may be found nearly three-quarters of an inch in length, when the buds of the elm have scarcely burst. These remarks are only intended to

provoke inquiry, and I shall feel grateful for any information on the subject.—*Joseph Greene ; Id.*

Occurrence of Sophronia emortualis near Brighton.—A specimen of this insect was captured in this town, on the 18th of June, 1858, by Mr. Pocock. Unfortunately the specimen is not in good condition, and it would therefore be difficult to describe it, but a few characters may be given by which it may be readily distinguished from any of our other Deltoides. In size it approaches *Herminia tarsipennalis*, and when perfect the colour may perhaps agree with that species, but in the specimen recently captured there is a distinct yellowish tinge; the first line arises on the costa, and descends almost perpendicularly to the inner margin, in this nearly approaching *H. grisealis*; this line is but slight and indistinctly represented on the under wing; the second line rises on the costa beyond the middle, and by a slight but uniform curve passes across the wing to the inner margin, and is continued quite through to the inner margin of the under wing: this line does not arise on the costa and then extend to the outer margin, as in *H. derivalis*, but the point which actually crosses the costal nerve is the most distant from the base of the wing: both these lines are well defined, and appear of a pale yellowish or cream-colour, margined with darker on the inner side; the character of the second line would be best understood by a reference to *Ephyra punctaria*, but it is much more boldly defined than in that species. The posterior margin of the reniform stigma is faintly outlined with pale yellow or cream-colour. The state of the specimen precludes further remarks.—*H. Cooke ; 8, Pelham Terrace, Brighton, January 4, 1859.—From the 'Intelligencer.'*

Discovery of a New Nepticula.—Mr. Edleston lately sent for determination a number of insects, and amongst them two specimens of a *Nepticula* taken amongst Spanish chestnuts, and for which Mr. Edleston proposed the name *N. castanella*: this appears to be a distinct species, something allied to *N. tityrella*, but the fascia straighter and placed nearer the hind margin. We regret to learn that Mr. Edleston was unsuccessful in finding any *Nepticula* larvæ in the leaves of the *Fagus castanea* last autumn, having apparently demolished the whole tribe the previous year.—*H. T. Stainton ; January 10, 1858.—From the 'Intelligencer.'*

Is Micra parva double-brooded ?—I should like to propound the following query to the readers of the 'Zoologist,'—viz., is *Micra parva* double-brooded? M. Boisduval gives this species as occurring in July, and its congener *M. ostrina* in spring and summer. Now I take *M. parva* on the 12th of June, in good condition, in a place I had hunted over day after day last year, swarming with *Satyrus Semele*, *Lycæna Agestis*, &c. Can any of the readers of the 'Zoologist' tell me in what state these species are now, and where?—*G. R. Crotch ; Uphill House, Weston-super-Mare, December 26, 1858.*

On the Propriety of Including Imported Species in the List of British Insects. By FREDERICK SMITH, Esq.

It is a fact, well known to entomologists generally, that a large number of insects included in our Fauna are of foreign origin, and I think a few words on this subject may elicit from others opinions as

to the time when, and under what circumstances, we are justified in including imported species in the British list. For some time past I have paid considerable attention to the Formicidæ, particularly our native ants, and I find two or three, undoubtedly imported species, not only existing in numbers in gardens, green-houses, hot-houses and dwelling-houses, but I find them continuing their kind, increasing in numbers and spreading themselves over various localities, in short becoming naturalized; once naturalized I conclude they become British insects, and should be unhesitatingly included in our Fauna.

Some of these imported species are occasionally found at large, but in all probability, only the individuals which our ships have conveyed in merchandise, ballast, &c.; to these we may, I think, refer *Carabus cancellatus* and *C. auratus*: neither of these increase and multiply, and may, along with *Calosoma Sycophanta*, be properly expunged from our lists. It is not amongst the Geodephaga, however, that any large importations are to be looked for; we must expect the greatest number to consist of such species as subsist upon the various articles which our commerce with other countries is the means of bringing to our shores.

Of the latter kind, those which feed upon the various sorts of corn, pulse, rice, fruits, skins and furs, may be expected to be most numerous. It is not my object here to furnish a list of these imported insects, but I would, as stated above, invite others to give their opinions upon the point in question. There are, doubtless, several other cosmopolitan insects, the native country of which it would be difficult to ascertain: what country, for instance, claims *Dermestes vulpinus*,—it comes in merchandise from all parts of the globe: the same may be said of *Trogosita mauritanica*, and of what country is *Sitophilus granarius* or *S. Oryzæ* a native? The latter species is omitted by Mr. Walton in his list of native Curculionidæ, but it has equal claims, in my opinion, to being included as British, with *S. granarius*; I found it very plentiful last summer along the Suffolk coast, near Kessingland and Pakefield: here it apparently has become acclimatized, for I not only found it on the shore, but in sandy spots at some distance inland; I have met with *S. granarius* in similar situations, but, doubtless, both species are most numerous and most frequently found in granaries and warehouses. Although rice may be the usual nutriment of *S. Oryzæ*, it must subsist upon other food on the Suffolk coast: the greater number of individuals were found in a sandy ravine or chasm, bordered by fields of barley.

Carpophilus flexuosus, an insect belonging to the family Nitidulidæ, is constantly found in drums of figs, &c.: this species appears to have spread over most parts of the world; specimens have been received from North and South Europe, North and South America, India and the Fedjee Islands: this insect I have taken at large in this country, at Colney Hatch and in Plumstead Wood; I also found it in a fir plantation on the border of Hawley Flat, Hants. Those well-known and universally distributed species, *Necrobia ruficollis* and *rufipes*, *Ptinus hololeucus*, *Anobium paniceum*, *Stene ferruginea* and *Alphitobius picipes*, with, no doubt, a host of other species, which a Coleopterist would be able to catalogue, are now by pretty general consent enrolled in the ranks of British beetles.

I now come to the more immediate purport of this communication; supposing a species to be undoubtedly imported, but which, uninfluenced prejudicially by change of climate, continues to multiply its kind, until by degrees it spreads itself in all directions, and becomes generally known, and its extermination impossible,—at what precise point of time are we justified in naturalizing the insect? I remember at a meeting of the Entomological Society, some twenty years ago, the *Ptinus hololeucus* being exhibited as a novelty; this species is now, I believe, generally incorporated with the British *Ptinidæ*. About the same time, 1838, a notice on a minute species of ant which had become so numerous in dwelling-houses that it proved an intolerable nuisance, so much so, that houses were deserted in consequence. I may be allowed here to quote a few observations from my Catalogue of *Formicidæ*. The ant in question, named *Myrmica domestica*, by Mr. Shuckard, “has been admitted into the lists of British ants, but is undoubtedly an importation. The Rev. Hamlet Clark brought a number of specimens of this ant from Constantia, in Brazil; these have been carefully examined, and proved to be identical with Shuckard’s species. The *Myrmica molesta* of Say, I consider identical with our insect, specimens from the United States having been carefully compared: it is described as being equally abundant and annoying in houses in that country, and is probably now of almost universal occurrence, like other insects which attach themselves to the habitations of man; South America is, in all probability, its native country.”

Myrmica lævigata: I described this species with a suspicion of its being identical with the *M. pallidula* of Nylander, and, on a comparison of specimens of the small workers only, I did not detect differences which presented themselves when a series of all the sexes

were obtained for comparison: through the kindness of Mr. Parfitt I have received examples of the female, and of the workers, major and minor; on a comparison of these with specimens of *Myrmica pallidula* of Nylander and with those of the *Cecophthara pusilla* of Heer, I find them identical with the latter insect, the house-ant of Madeira: this ant will, I have no doubt, in the course of a few years, become generally distributed, not only in hothouses, but also in dwelling-houses, and will, in that case, prove a much more troublesome insect than the *M. molesta*; it is a larger species than the latter, and belongs to the family Attidæ, the species of which have two distinct forms of the working-ants, one, the soldier, or worker-major, being distinguished by a monstrously enlarged head, and strong sharp cutting-jaws: the *M. molesta* only possesses one form of worker, and is a true *Myrmica*, according to my view of that division of ants.

Both these house-ants have been introduced, and regularly reproduce their kind, and will, doubtless, continue to do so, and become permanently located in this country; I have, therefore, included both in my forthcoming work on the ants, and I conclude these rambling observations with a repetition of the question, at what time, and under what circumstances are we justified in including such imported species in the list of British insects?

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27, Richmond Crescent,
Islington.

A Late Swarm of Bees: Artificial Swarm. Are the Combs hexagonal or not?— In the 'Zoologist' for January (Zool. 6348) Mr. W. R. Morris, of Deptford, gives an account of a swarm of bees as late as September 13th (a very hot day here, ther. 78°). As I have frequently found very late and very early swarms turn out to be desertions,—the latter also occurring on calm, hot days,—I wish Mr. Morris would let me know the result of the examination of the parent-hive in a future number. I have kept bees for more than fifty years, and nearly as long ago as the time named, on the 4th of April, on a fine calm hot day, I had the "appearance" of a swarm about mid-day: I found it was a total desertion, which I attributed to having carried deprivation of the combs too far in the autumn; the bees went directly to a chimney some hundred yards distance and were lost. I never saw a regular swarm come off any of my hives without settling first, but on a hot day, with a scorching sun, unless shaded, they, the bees, will not remain clustered above a few minutes. On two or three occasions early swarms were announced (on the 30th of March) in a newspaper and periodical, and, on enquiring respecting two, one, the owner informed me, was a desertion from the combs, having been entirely riddled by the Death's Head Hawk-Moth (*Acherontia Atropos*), and the other swarm the wet got into the combs, from the covering being deficient and the combs becoming mildewed. Newly-hived swarms will often desert

a hive if it be musty or dirty, and I have known many desert if there is any tarred twine carelessly used (too often the case) inside in binding straw-hives; this is always fatal, they will never stop. As I am on the subject of bees, I regret to see a most intelligent writer, in other respects, endeavouring to establish a new theory as to the formation of the cells of the workers. All the best authorities for the last hundred years have clearly proved that these cells are hexagonal; there is no other form which affords such economy of space, and nothing, in my humble opinion, displays more of that "*Partem Divinæ mentis*" (*Virgil*) in these wonderful insects, the bees, than in the hexagonal formation of their cells. There is also too much inclination now-a-days to try apiarian experiments,—the almost total prevention of swarming is carried too far,—for if there be one thing more wonderful than another, it is that particular and extraordinary mode the Great Artificer of the world has ordained to be the manner of increasing their species in throwing off their natural swarms, &c.—*H. W. Newman; Cheltenham, January 7, 1859.*

[I do not understand Colonel Newman's allusion to the Death's Head: does he not mean the honey moths, the larvæ of which do riddle the combs?—*Edward Newman*].

Capture of Notiophilus substriatus in the North of Scotland and in Cumberland.—When at Tain, Ross-shire, in September, 1867, I took all the Notiophilids that came in my way, and on examining them to-day I find that five of the specimens are, without any doubt, substriatus. They were all taken at the base of the sand-hills, on the sea-shore, down which they appeared to have fallen, in company with hundreds of common Amara. The wagtails, which were very numerous, seemed quite aware of this natural trap, and if late in making my round I found that they had been earlier risers than myself, and had eaten up the whole catch, leaving their foot-prints as a memorial of their doings, and as a hint to me to get up sooner to-morrow morning. I have a specimen of the same insect taken on the hills in Cumberland, which is of a fine steel-blue colour. The species thus appears to be widely dispersed.—*Thomas John Bold; Long Benton, Newcastle-on-Tyne, December 28, 1858.*

English Habitat for Quedius auricomus.—Amongst my Cumberland captures of the past season is a very beautiful little Quedius, agreeing fully with the description of *Q. auricomus*, *Kiesew.*, in '*Faune Française*,' vol. i. 540. I took it beneath debris, on banks of the river Irthing, in May, 1858. This species has not, to my knowledge, been previously found on this side the border. Mr. Hardy records it as occurring in Berwickshire, and has described it with great accuracy under the name of scintillans, in the '*History of the Berwickshire Naturalists' Club*,' vol. ii. 258. Mr. A. Murray, in his '*Catalogue of the Coleoptera of Scotland*,' p. 123, indicates *Q. auricomus* as "Rare; Berwickshire; near Hamilton." It is also recorded in the '*Entomological Annual*' for 1855, p. 123, on the authority of the foregoing Scottish localities.—*Id.*

Note on Zoanthus.—The Zoanthus lately noticed in the '*Zoologist*' (Zool. 6349) proves to be identical with *Dysidea papillosa*, *Johnston*,—an animal formerly believed to be a sponge; it is, however, a true compound polype, and a detailed description of it in its proper character has just been laid before the Zoological

Society. The only question now is whether or not *D. papillosa* and *Zoanthus Couchii* are the same; both have been found on the Cornish coast, and, as Mr. R. Q. Couch speaks of the *Zoanthus* being common there, he, or some other naturalist, may have had an opportunity of comparing them, and will perhaps kindly help me out of my present difficulty.—*E. W. H. Holdsworth*; 26, *Osnaburgh Street*, January 4, 1856.

Proceedings of Societies.

ENTOMOLOGICAL SOCIETY.

January 3, 1859.—*Dr. J. E. Gray*, President, in the chair.

Donations.

The following donations were announced, and thanks ordered to be presented to the donors:—‘*Transactions of the Zoological Society of London*,’ Vol. iv., Part 5; presented by the Society. ‘*On the Arrangement of the Cutaneous Muscles of the Larva of Pygæra bucephala*,’ by John Lubbock, Esq., F.R.S., L.S., G.S., &c.; by the Author. ‘*Exotic Butterflies*,’ Part 29; by W. W. Saunders, Esq. ‘*Mono-graphie des Gomphines*,’ par Edm. De Selys Longchamps, Membre de l’Académie Royale des Sciences de Belgique et de plusieurs autres Académies et Sociétés Savantes; avec la collaboration de M. le Docteur Hagen, de Koenigsberg; by the Author. ‘*The Journal of the Royal Dublin Society*,’ Vol. i.; by the Society. ‘*Proceedings of the Zoological Society*,’ Nos. 363—369; by the Society. The ‘*Zoologist*’ for January; by the Editor. The ‘*Athenæum*’ for December; by the Editor. The ‘*Literary Gazette*’ for December; by the Editor. The ‘*Journal of the Society of Arts*’ for December; by the Society. The ‘*Entomologists’ Annual*’ for 1859; ‘*A Manual of British Butterflies and Moths*,’ No. 24; The ‘*Entomologists’ Weekly Intelligencer*,’ Nos. 115—118; by H. T. Stainton, Esq.

Election of a Member.

George S. Mosse, Esq., of Eldon Road, Kensington, was balloted for and elected a Member of the Society.

Exhibitions.

Mr. Waterhouse exhibited a specimen of *Tachyusa concolor* of Kraatz = *Homalota concolor*, *Erichs.* The insect was found at the uppermost of the Highgate Ponds, on the 25th of May, 1855. Latterly, Dr. Power has taken the same species at Barnes Common and at the Hammersmith Marshes.

Mr. Waterhouse also exhibited a specimen of *Symbiotes latus* of Redtenbacher, which he found in sweeping the herbage in a wood near Ryde, in the Isle of Wight, in the summer of 1854: Mr. Waterhouse believed this was the first occurrence of the genus *Symbiotes* in England.

Mr. Janson observed that he believed the discovery in Britain of *Tachyasa concolor* was due to Dr. Power, from whom he had received the species some months back; he had likewise seen it in the collection of Mr. H. Adams; Mr. Squire had also met with it at Hammersmith, and had long since placed it in his cabinet with its legitimate specific appellation.

With respect to *Symbiotes latus*, *Redt.*, Mr. Janson remarked that he had been for some time past perfectly familiar with it as a British insect. He had first taken it beneath the loose bark of a dead tree, in which a formidable colony of *Formica flava* had established itself for some years; the beetles were moving about amongst the ants. Redtenbacher says (Faun. Austr. 2nd Ed. 371) that "the species" of this genus, of which he describes two, "live among ants." That *Symbiotes latus* is not, however, a myrmecophilon, in the strict sense of the term, Mr. Janson stated he had subsequently satisfied himself, as he had found several individuals subsisting on a species of mould growing on a rotten elm stump, more than a mile distant from the spot in which he had first discovered it, and certainly unaccompanied by any ant. Mr. Janson added that *Microchondrus* (*Guérin*), Wollaston, Ins. Mad, 196 (1854) was coincident with *Symbiotes*, *Redt.*, and that he should probably have occasion to return to this subject at a future Meeting.

Mr. Stevens exhibited some Coleoptera from the interior of Peru, amongst which were a fine new species of *Psalidognathus* allied to *P. Friendii*, and an *Agaocephala* very distinct from all known species of that genus.

Mr. A. F. Sheppard exhibited some Coleoptera taken at Geelong, Victoria.

Mr. Janson exhibited a specimen of *Oxypoda spectabilis*, *Maerkel*, Germar, Zeitschr. f. d. Entom. v. 217, 47 (1844); Kraatz, Naturgesch. d. Ins. Deutschl. ii. 162, 2 (1856), taken by Mr. R. Hislop, near Falkirk, during the past season, transmitted him by that gentleman for identification. He remarked that the insect had been first found in Saxony associated with *Formica fuliginosa*, and was hence considered and described by Herr Maerkel as myrmecophilous, but it was subsequently taken near Berlin, among damp fallen leaves, unaccompanied by ants: the individual exhibited occurred "amongst grass." Dr. Kraatz, *l. c.*, gives it as a distinct species, stating, however, that it appears to him not improbable that it will ultimately prove to be a dark form of *O. ruficornis*, *Gyll.*, but that a long series of examples was requisite, in order definitely to determine this question. Mr. Janson had carefully compared the present specimen with four individuals of *O. ruficornis*, *Gyll.*, *Kraatz*, and had been unable to detect any structural distinctions, the only point of disparity being in colour: thus, *O. spectabilis* has pitchy black antennæ, the three basal joints alone red, the thorax and elytra likewise pitchy black, the humeral angles of the latter rufous. *O. ruficornis* has the antennæ and lateral margins of the thorax rufous, the elytra rufo-testaceous, with the region of the scutellum dusky.

Mr. Edwin Shepherd exhibited a specimen of *Stenus palustris*, *Erich.*, a species hitherto unrecorded as British, taken by Mr. F. Bond, in the fens near Cambridge.

Mr. Adam White exhibited a sketch of a curious Isopodous Crustacean, recently sent home by F. M. Rayner, Esq., Surgeon of H.M.S. Herald, and taken by him on Flinders and Hummock Island; it belongs to the family Sphæromidæ, but is distinguished from every isopod hitherto described or seen by Mr. White, in having a long horny projection from the epistome; the faceted eyes are conspicuous on each

side of the same segment ; with them is a projecting horn shorter than the middle one. He named it *Cephaloniscus Grayanus*, in compliment to the keeper of the zoological collections at the British Museum. Mr. White also made some remarks on the order Isopoda.

Mr. Stainton exhibited, on behalf of the Rev. H. A. Pickard, a specimen of *Plutella Annulatella*, remarkable as having been taken in a new locality, the Isle of Portland, and as being much whiter than ordinary specimens. The only previous localities in this country recorded for this insect, were the North of England (near Newcastle-on-Tyne), the North of Ireland and Scotland ; from the greater contrast of colour in this Portland specimen, it was far prettier than the northern form of the species.

Dr. Allchin exhibited a large *Noctua* allied to *Catocala*, said to have been taken near Bolton, Lancashire ; he had been unable to identify it with any species contained in the extensive general collection of *Noctua* in the British Museum.

Mr. Walker made the following remarks :—"At a former Meeting, on the occasion of the exhibition of a horn-shaped gall inhabited by a *Thrips*, discovered by Mr. Foxcroft, at Sierra Leone, I observed that it resembled the horn-shaped gall of the lime-leaf, and that I had not discovered the insect which is the cause of the latter excrescence ; but I have since found that its history has been investigated long ago by the botanist under-mentioned :—"Observations Physiologiques sur le developement des gales corniculées de la feuille de tilleul de Hollande, et sur la cause qui les produit. Par P. J. F. Turpin." (*Mém. Acad. Roy. Sci. Institut. Fr. vi. 1835*). He noticed that it was inhabited by a mite, which he named *Sarcoptes Gallarum Tiliæ*, and of which he traced the development from the egg to the perfect insect. He observes that it is not certain whether the mite is the cause of the formation of the gall, in which it does not occur before the middle of May nor after the middle of August, and, therefore, its mode of life during nine months of the year is still unknown. Another horn-shaped gall appears on the leaves of the beech, and is quite distinct from the pyramidal gall lately mentioned here as the habitation of *Ocidomyia Fagi*.

Mr. Smith communicated a paper intitled "A Contribution to the History of *Stylops*, with an enumeration of such species of Exotic Hymenoptera as have been found to be attacked by these parasites."

Mr. Waterhouse read the following papers :—"A List of the British Species of *Latridius*." "A Revision of the British Species of *Corticaria*."

Part ix. of the current volume of the Society's 'Transactions,' published in December, was on the table.—*E. S.*

York Entomological Society.—At the Anniversary Meeting of this Society, held on the 3rd of January, 1859, the Rev. F. O. Morris was elected President ; Mr. J. Birks, Treasurer ; and Mr. R. Anderson, Secretary, to whom all communications may be addressed at his residence, Coney Street, York.

*Extracts from the Letters of the late WILLIAM ARNOLD
BROMFIELD, M.D., to his Sister.*

RATHER more than six years have passed away since the universally lamented death of Dr. Bromfield. His wanderings in pursuit of Natural-History knowledge either in his own country,—more particularly his native Island, the Isle of Wight,—or in the wider field of the West Indies, the United States, Egypt and Palestine, occupied almost the whole of his life after he had arrived at manhood. He entered Egypt on the 18th of October, 1850, ascended the Nile, reached Cairo on his return on the 11th of June, 1851; passed onward to the Holy Land, reached Beyrout on the 22nd of September and left that place on the 28th, “sleeping that night at Zahleh and arriving the next day at Baalbec ill through long fasting, his servant having omitted to take the requisite provision for the journey. The following night he was seized with diarrhœa, from which he suffered without intermission until he reached, on the 1st of October, the house of the Rev. J. L. Porter at Bludan, the summer station of the Mission, where he was assiduously attended by Dr. Paulding.

“Efforts were made to dissuade one so unfit to travel from proceeding to Damascus; but the combined illness of Mr. and Mrs. Porter, and probably the restlessness induced by fever, determined him to press on to that city. The journey seems to have greatly increased the malady, and his recovery became, humanly speaking, hopeless.

“On reaching the Hotel de Palmire, his symptoms were rapidly aggravated, and assumed the form of malignant typhus; while the sufferer was watched during the brief remainder of his life, with the kindest Christian care, by the Rev. James Barnett, and by Mr. George Moore, an English traveller, who, under most trying circumstances, volunteered his help to a fellow countryman.”

He died at Damascus on the 9th of October, 1851. No man ever lived who attracted more entirely the affections of all who knew him; he was of the most affectionate disposition, mild in his manners, sincere, kind and considerate to all, of unwearying assiduity, of the most invincible industry and the most ardent lover of truth: this latter quality led him, during his voyage on the Nile, very frequently to deprecate the high-flown terms with which previous travellers had uniformly spoken of the antiquities of Egypt; and so great was the confidence placed in the veracity and judgment of Dr. Bromfield, that, among his friends, this modified estimation of Egyptian antiquities

became prevalent, and lasted until the photographs of Francis Frith told silently, but with a power not to be questioned, a very different tale, and Egypt is again restored to that estimation as a land of wonders which she had previously held. Dr. Bromfield's erroneous estimation of these wonders has been held by some as a want of candour, but those who know him best well know the utter fallacy of such a conclusion; he was annoyed and disgusted by the bombastic phrases of conceited travellers, and his extreme love of truth revolted at the inflated descriptions he had read. His truth-seeking mind required a greater degree of exactitude than is to be found in any record published up to the time of his visit: had he only seen the photographs of Frith, unaccompanied by description, how different would have been his feelings. There is not a greater proof of the estimation in which Dr. Bromfield's intense love of truth was held than the effect produced by his criticisms on the antiquities of Egypt. I confess myself to have been an unhesitating convert to his views, and that I greatly under-estimated these antiquities until I beheld their portraits painted by themselves: that evidence who shall dispute?

A truly affectionate sister received these letters during her brother's last journey, and has printed them for private circulation only, distributing the copies among the writer's friends. From one of them, with which the editor of the '*Zoologist*' has been favoured, the following interesting passages are extracted.—*Edward Newman*.

Animal possessions of the Egyptians.—Camels, dromedaries, donkeys and huge buffaloes, with a few dark brown sheep, are their chief possessions; the buffaloes may be seen continually lying in mid river, with their noses alone out of the river, or swimming across to the opposite bank, quiet inoffensive animals, used both for draught and burden. We remarked many persons ploughing with a camel and a buffalo yoked together in most ill-assorted fellowship. Dove-cotes, swarming with myriads of pigeons, rose high above the houses in some of the larger towns, of a conical shape, like immense hay-stacks, and pierced with innumerable holes for the birds to enter in and come out. Pigeons are a great article of consumption in Egypt, where poultry takes the place of butchers' meat in a great measure.—p. 31.

Crocodiles in the Nile.—Nearly coequal with the limits of the Doum palm is the line that bounds the distribution of the crocodile

northwards at the present day, for in ancient times it would appear to have ranged much lower in the Nile, and it is said to have even inhabited the Delta, and Lower Egypt properly so called. In our day the crocodile is said first to make its appearance at or near Osiout, but we saw none of them during our stay at that city; but on Sunday morning (December 14) on arriving about a quarter of a mile from a sand-bank, which we learned from our boatmen was a favourite resort of these reptiles, and which is a little beyond Girgeh, between that town and Farshoot, we had the gratification of seeing a whole herd, if I may use the term, of these river monsters emerge one by one from the stream as the sun gained power, and assemble on the sand-bank, where we soon counted no less than sixteen of various sizes, huddled together, and evidently enjoying the warmth of the bright and unclouded morning ray. The smallest of those we saw, as we watched them through our telescopes, seemed to be at least eight or nine feet in length, and several were absolute leviathan monsters, as hideous and terrific as can well be imagined, not less certainly than sixteen and eighteen feet long, with bodies as thick as that of a horse; the huge jaws of some gaping wide apart as they lay listless and motionless on the sand, or occasionally dragged themselves forth from the water to lie along like huge logs or trunks of palm trees, to which they have no inconsiderable general resemblance in the rough and scaly covering of their unwieldy forms, knotted with crested protuberances. We were so near them, that by the aid of our telescopes we could perfectly watch their motions, and discover their minutest characters, longing all the time to be amongst them with our guns, and planning an attack we intend making on their stronghold when we return down the river. We propose to throw up a masked battery of sand the day previous to our attack, and landing on the beach before day-break the following morning, to open fire on them from behind our temporary fort as they come up out of the river to bask in the sun. We have furnished ourselves with balls of hardened lead expressly for the purpose, and trust to be able to achieve the feat of shooting a crocodile, and carrying off his jaws and scull as trophies of our campaign against the ancient monster deities of Egypt's river. The young specimens of the crocodile of the Nile that are occasionally brought alive to England give no idea whatever of the hideous deformity and ferocious aspect of the full-grown animal. A more revolting creature does not exist; yet, I believe, that to man they are seldom, if ever, dangerous, being extremely watchful and timid, waddling slowly down to and sliding into the water, on the too near approach of any person; and we

observed the sand-banks occupied by numbers of aquatic birds, geese, cranes, pelicans, &c., walking about the outstretched monsters as if possessed with a feeling that they were in no peril of their lives in the society of these ugly reptiles. A boat, in rounding the bank, fired a gun at the crocodiles, but not within range, which had the effect of sending them all pell-mell into the water, but in a few minutes afterwards the noses of one or two might be seen emerging, and soon the sand-bank became re-peopled with the fugitives. We little expected at this season to find crocodiles half so numerous, seeing how cold the mornings are now, and how low the temperature of the Nile is, compared with that which it obtains a few months later or earlier than the present.—p. 86.

Critique on Popular Views of the Zoology and Vegetation of the Nile.—The ornithology of the Nile is, as to its subject, less susceptible of exaggeration than its zoology, for the multitudes of water-fowl that haunt its stream may justify the use of the word “swarming.” The same expression might be applied with almost as much correctness to the various birds of prey that hover over its banks, far exceeding in variety of species and number of individuals any amount of the same tribes in other countries and, indeed, constituting one of the most singular features of this strange and interesting land. Vast are the flocks of geese, pelicans, storks, cranes, spoonbills, flamingoes, shags and other aquatic birds that overspread the river.—p. 105.

Cultivation of the Valley of the Nile.—The valley of the Nile is one vast uninterrupted kitchen garden, from the shores of the Mediterranean to the second cataract, a distance of a thousand miles; and, I believe, it continues to be such a garden of herbs far beyond that point into Abyssinia.—p. 108.

Birds mostly akin to English.—Very few of the birds have much beauty of colouring, and those commonly seen are either identical with or are related to the species with which we are familiar in England, such as the common sparrow, the gray wagtail, the Royston crow, the sky lark, which abounds in every field in Lower and Central Egypt, the Nile plover, very like our common peewit (also a native), turtle doves, blue rock-pigeons, besides the kestrel, hen-harrier and various other hawks identical with or closely resembling British species, as are the owl, kingfisher and many of the water fowl, some of which latter, as the flamingo, egrets, &c., are common to this country and southern Europe. Of course there are many birds exclusively African, as pelicans, paddy-birds, &c., but these are seldom distinguished by any elegance or gaiety of plumage; although, of

course, there are certain exceptions to this general sobriety of colouring. As regards insects, I will only mention, that of the few butterflies that flit about the fields of this land of unclouded sunshine and high temperature, that which is by far the most frequently seen is our English painted lady (*Cynthia Cardui*), a species common with us in certain years during the latter part of summer and autumn : I have noticed as yet but a single insect of this order at all superior in size to the largest of our English Lepidoptera : the rest, few in number as regards the species, and not greatly abounding individually, do not exceed our native butterflies either in point of size or beauty of colouring ; which is another proof of the position before alluded to.—P. 112.

Effects of a Scorpion Sting.—On the 21st of February our progress was delayed for some hours by an accident to our servant Ameen, who was stung in the hand by one of the great yellow African scorpions, that had been brought to me by one of the camel drivers. Ameen, foolishly relying on a supposed immunity from the venomous effect of these and other noxious animals, which he believed had been communicated to him by a serpent-charmer at Cairo, for a consideration of eleven piastres, actually grasped the scorpion with his bare hand, and it instantly struck him at the root of the second finger of the left hand. He suffered intense pain for a few hours, with a feeling of great coldness all over, numbness on the left side of the body, indistinct vision, sickness, and other constitutional symptoms of rather an alarming nature. I had none of the proper remedies with me for scorpion stings, such as ammonia and ipecacuanha, but applied laudanum to the wound, and brandy internally ; the next day the symptoms had quite subsided, and Ameen felt well able to continue the journey. The scorpion was one of the largest I had ever seen, and was about five inches in length to the end of the tail.—P. 117.

Sketch of the Birds of Soudan.—When you write to H—— tell him that he would find abundant amusement in Soudan (Ethiopia Proper) amongst the innumerable multitude of birds that inhabit this region and the whole valley of the Nile ; the number of individuals is perfectly astonishing, and the species themselves numerous. Birds of prey abound as in Egypt ; hawks, kites, eagles, vultures, are ever seen in the air ; the multitude of aquatic fowl is incredible ; geese, herons, storks, cranes, spoonbills, ibises, pelicans, actually swarm, and fill the air with their myriads. Every grove resounds with the cooing of doves, of which we have killed five or six different species between Cairo and Khartoun, the species changing with the latitude. Many European genera are amongst the commonest of those inhabiting this country.

Wagtails, whitethroats, larks, plovers and sparrows are seen everywhere ; in many cases apparently identical with our English species ; as for instance the sky lark, common plover or lapwing, and perhaps the ordinary sparrow of the country, which comes exceedingly close to our common house sparrow, if it be not the very same bird,—being equally domestic and familiar, and even more plentiful than in Europe. In the thickets and groves along the Nile, and which here and there adorn even the desert, various richly decorated tropical birds are met with, but the ornithology of this part of Africa, like its botany, has a plain unadorned character, partaking throughout of that found to prevail in the temperate zone.—p. 126.

Hippopotami seen above Berber.—Talking of the hippopotami, we saw several when in the upper country above Berber, and in the White River, and could sometimes hear them blowing in the water at night : we never saw them on land, and could only see their broad truncated snouts, and part of their huge heads occasionally raised above the surface : they are not at the present day to be found below Berber.—p. 131

The Crocodile more fearful than formidable.—As to crocodiles, Mr. Lake, an excellent shot with his rifle, killed at least three of these monsters, on the sand-banks, but never could secure their bodies, as, on being mortally wounded, they always contrive to flounder into the water, where they either sink dead, the body not rising till after at least twenty-four hours when decomposition has begun, or they come on shore after some time to die. The crocodile is a very timid animal, and I firmly believe rarely, *if ever*, ventures to attack an adult, and then only in the water, *never* on land ; but there is no doubt that they will seize children who venture into shallow water where they abound : an instance of a little girl having met with such a fate occurred at a village on our southern route, the very day before our arrival. The Arabs along the Nile never evince the least fear of crocodiles ; the boatmen are constantly paddling about in the water to shove their boats off the innumerable sand-banks that obstruct the navigation in all parts of this immensely long river ; and I have seen large birds strutting about almost within a foot or two of their huge jaws, as they lie basking on the banks, a dozen or more together, and have even seen them perch on the top of the crocodiles' heads. The real danger to a man, should he be able to approach so wary an animal near enough to receive injury (which could happen only in case of one disabled by a wound), would be from a stroke of his powerful tail. Their mode of gliding into the water when disturbed

is by a slow motion like that of some gigantic serpent or fish; they then look very slippery, and as if all joints and suppleness.—p. 132.

The Scorpion Spider or Galleode.—At the sugar-works at Ernout, I saw one living and several dead specimens of the terrific scorpion spider or galleode of Egypt and the adjacent countries; the latter were found drowned in a large tank for supplying the engines; the former was captured in the house by Mr. Fox. The outstretched legs of the largest specimen measured about eight inches in the span. The general aspect of this hideous animal is that of a gigantic spider, which it resembles in the great length of its hairy legs the oblong livid body, jointed like that of the scorpion, is destitute of any sting, instead of which the head is furnished with a formidable pair of sharp and very prominent pincers, capable of inflicting an extremely painful though, I believe, not very venomous bite. It is a nocturnal animal, frequenting out-houses and deserted apartments, running with incredible speed, and fearlessly attacking any object that is opposed to it. Mr. Fox's Arab servant, hearing a mouse squeaking in the room one night as if in distress, was induced to ascertain the cause, when he found one of these galleodes had fastened upon it, but whether with the intention of making the mouse its prey, or from accidental offence given by the latter, Mr. Fox could not say. The natives regard its bite as not dangerous, but rather encourage it, as a noted destroyer of its first cousins, the scorpions. I have several of the above specimens (including the largest) in spirits, which I hope to send home with my plants, &c. from Alexandria.—p. 155.

Cattle of Nubia—The Water Buffalo.—In the upper countries the cattle are of a peculiar, probably distinct species of ox, very much like our own, but with a hump on the back, and the females are, as milch cows, good for nothing, being always nearly dry; so that we could scarcely ever procure cows' milk, even when meeting with large herds of them, much as we should have preferred it to that of goats. Our common breed or species is also seen in Nubia, &c., but more rarely. In most parts of Egypt, but especially in the lower provinces, the common and hump-backed cattle are in a great degree supplanted by the water buffalo (*Bos Bubalus*) a huge grotesque, ungainly, but apparently harmless and stupid animal, to which we were indebted for some of the milk obtained in Egypt, and all the abominable mass of indigestible fibres sold for beef. The water buffalo has not made its way very far beyond the second cataract, or into Nubia; but it is well known, I am told, in India. Its name is derived from its habit of laying a great part of its time immersed in the water of pools and rivers, and it is an

excellent swimmer. Thousands may be seen on the banks and shallows of the Nile, during the heat of the day, luxuriously reposing, with only their heads, or even the tips of their hippopotamus-like noses visible above water: the stream that is continually passing over them brings renewed coolness with it: at times one envies them their position.— p. 176.

Serpent Charms witnessed and vindicated.—Just before quitting Cairo, on the 10th of July, I had an opportunity of witnessing the performance of the serpent-charmers who profess to clear the houses of the city of the reptiles of that order, with which they are all more or less infested. Dr. Abbot kindly allowed me to bring the men to his house, in which they captured six snakes of a harmless description in less than half-an-hour, which number included no less than three different species. These snake-charmers belong in general to a particular tribe of Arabs, who boast of having possessed their mysterious faculty for an indefinitely long period. The chief actor in this case was a fine-looking man, with a handsome and intelligent, but peculiar cast of countenance. He carried a stick in his hand, with which, on entering each apartment, he struck the walls several times, uttering, in a low measured tone, a form of exorcism in Arabic; adjuring and commanding the serpent—which he declared, immediately on the door being thrown open, was lurking in the walls or ceiling—to come forth. Presently, the reptile would be seen emerging from some hole or corner, with which every room, even in the better class of Egyptian houses, abounds; on which the enchanter would draw the unwilling serpent towards him with the point of the stick, and when within reach put it in the bag he carried about with him for that purpose. It is said that the charmer conceals one or more serpents in his ample sleeves and these he contrives to let loose in the apartment during his evolutions with the stick; such may very possibly be the case, seeing that in ordinary juggling tricks the quickest eye may be deceived by the dexterity and rapidity of the performer's movements. I can only declare that I was myself utterly unable to detect such a manœuvre as that on which the operation of charming these reptiles is said to be founded; for although the charmer did not allow the spectator to be actually in the room during the exorcism, he permitted persons to stand close behind him, whilst at the same time the door of the apartment was thrown wide open. Besides I have been assured by persons of the highest credit, that they have witnessed the feats of the serpent-charmers after their garments had been thoroughly searched for concealed serpents; that they have been made to change their clothes for

others provided by the owner of the house, and, what is yet more convincing, have frequently been compelled to divest themselves of all covering before entering the room they engaged to clear. It is usual to object that, in these extreme trials, the serpents were introduced upon the premises the night previous to the experiment, by persons who usually accompany the chief performers; but it is not easy to conceive how, without some secret mode of enticing them from their lurking-places, serpents so introduced could be found and captured at the precise moment when it was desired to do so, as the nature of this class of reptiles is to ramble about in holes and obscure retreats, and to withdraw from the eye of man, rather than, like the lizard tribe, to frequent open, sunny situations where they are much exposed to view. Supposing the serpents to be introduced at the time of exorcising by the performers' attendants (which could not be done in the room in which the charmer himself exhibits, as he always enters alone, and under such rigid examination, when every precaution is taken to prevent deception, he would not be allowed to have a companion), how, I say, could the reptiles be prevented from making their escape amongst the rafters or in the holes about the apartment, which instinct would assuredly teach them to do, rather than come and present themselves to view, unless impelled to show themselves by some influence like that by which they are apparently induced to come forth from their retreats at the word of the enchanter? Were the art of serpent-charming a mere juggling deception, how could it for so many ages have been exercised as a profitable employment by a particular tribe? it being, in fact, customary in Cairo to send to the serpent-charmer when a house is much infested with serpents, just as we should require the services of a rat-catcher to rid our premises of those destructive animals. The extreme antiquity of serpent-charming is much in favour of its honesty as an art, and, were it once ascertained that conveying serpents to the premises to be cleared was a general or even frequent practice, the poor and generally covetous and parsimonious Cairenes would not give a para to have their houses stocked with noxious reptiles under the pretence of being rid of them. I certainly did not witness the exhibition under any of the above-mentioned circumstances of rigid scrutiny, but the men were taken from the street to Dr. Abott's house, without a moment's previous intimation as to whither they were about to be conducted. One or two circumstances respecting the kind of serpent brought forth, and the weak, torpid condition of the whole six, throw a shadow of suspicion on the matter, but I am not prepared to object too strongly against either of these points:

the torpidity of the reptiles might be the effect of the incantation, whatever that singular process may consist in; and although one kind was a species of slow-worm, it does not follow that, because our own indigenous reptile of that name never is found in houses, no other species of the genus can inhabit the haunts of man, as the same may be said of *all* our English serpents, which shun the abodes of mankind, whereas, in warmer climates, snakes of various and totally different genera haunt houses even in the most crowded purlieus of a great city, as at Cairo, where perhaps not a house is free from them. The serpent-charmers pretended to secure me from the accidental effect of the bite of these reptiles, by the not very pleasant process of blowing into the mouth and afterwards pressing the lobe of my left ear between the jaws of one of the snakes, so as to draw a little blood. My late experience in the case of poor Ameen's scorpion's sting in the desert did not strengthen my confidence in the charm, with which, at far less cost of money and suffering, I was fortified by the Cairene exorcist.—p. 218.

Vermin Annoyances.—There being no bedstead in the room, the mattress was spread on the floor, which I speedily discovered to be peopled by innumerable hosts of fleas, bugs, ants and cockroaches, whilst, from the time the sun went down, there was neither peace nor quiet to be had, when sitting up, and endeavouring to read or write, from the incessant attacks of mosquitoes, which sang their shrill, small war-notes in my ears without a moment's respite, inflicting punctures on the back of my hands the instant I relaxed in my efforts to drive them away; from these to me far the most annoying of all insect-tormentors I could defend myself during the night by retiring into my fortress of muslin, as Saad and myself contrived to suspend mosquito-curtains very cleverly over the bedding beneath, by means of strings made fast to nails driven into the walls of the room, and tied to the window-bars; but this was no barrier to the other insect-annoyances, with the exception of the cockroaches, which it effectually kept out, as also a gigantic species of mouse, which replaces in Egypt the common European kind: it is almost the size of a small rat, the body very long and the ears extremely large and round.—p. 227.

Swimming Snake.—I witnessed to-day a singular attempt of a large snake to make his way against the current of the Nile: after persevering for about a quarter of an hour to stem the stream, he, with the wisdom of his race, yielded to the force of circumstances, and turning his head in the contrary direction, was carried, without effort on his part, towards the Mediterranean, in which quarter, it is probable, what-

ever affairs had called him abroad would be as well transacted.—
P. 225.

*Extracts from the Correspondence of HENRY BIRCHALL, Esq., while
in South America.**

Santa Marta, New Grenada, July 9, 1856.—All around the north-east side of the town a cactus-swamp extends, and then a sort of waste plantation, through which paths run, goes round to the southern side: the cactus trees are from twenty to thirty feet high, and their prickles are fearful, making nothing of a boot-leather. In this plantation I have had some excellent entomologizing: butterflies were in prodigious numbers, but so extremely active that they were hard to catch beyond belief; I, however, succeeded in capturing thirty species, besides some Coleoptera and dragonflies. There is no grass anywhere; the ground is covered with a sort of shrubby, bilberry-like plant, under which myriads of blue, green and yellow lizards find shelter. The profusion of butterflies is something quite astonishing, but they fly so fiercely that they are soon injured, and perfect specimens are the exception. It is only possible to collect for about two hours, from 7 to 9 A. M., the heat is so great. I knocked down with my towel yesterday a beautiful swallow-tail (*Papilio Epidaus*). Almost all the shrubs and trees are garnished with most villanous thorns, so one has to be on one's guard in rushing through the bushes after game, and many a fine insect has escaped from my net becoming caught in the thorns. The butterflies seem to me to take five times as much killing as our English ones; no amount of nip appears to floor the larger species, and I have no chemicals at hand for them. In the bush there are lots of our familiar green-house plants,—Mimosas, Daturas, Bigonias; the mango trees are something like walnuts, with a touch of yew about them, and the fruit in great abundance, but I dare not touch it.

Barranquilla, July 13.—On my road here the butterflies fairly drove me distracted, for I could not catch them with my spurs on: this afternoon I have taken a walk, and persecuted them a little, but with only middling success; in fact, I found two could play at that game, and I got the worst of it, and had to procure some hartshorn as a remedy for my persecutors' bites. On my return I found the saloon in a commotion, on the discovery of a large scorpion; I immediately got out my bottle, and, after some manœuvring, persuaded him into it by

* Communicated by Edwin Birchall, Esq.

means of a paper-knife: they are horrid-looking wretches, and worse than they look, by all accounts; their sting is said to be fever to a certainty: this fellow is nearly six inches long. The natives say scorpions are always in pairs, and as soon as one is found look about for his companion, but we could not find the second this time.

July 22.—On board the "General Mosquera" steamer on the Magdalena: getting up at 5 A. M. saw the magnificent range of the Sierra Nevada of Santa Marta under the eastern sky: this range is from sixty to seventy miles distant, and yet looked quite near; but the clouds of the horizon ran along between us and their base, showing their enormous altitude,—17,000 to 18,000 feet is about the highest; during the day they are quite invisible from Barranquilla. The Magdalena here is perhaps three-quarters of a mile wide, and the current runs three miles an hour; the waters are as yellow and muddy as those of Father Tiber, and so continue upwards. Enormous quantities of a weed called "batate" encumber the waters; in appearance it is like the Lotus, and the lagoons are almost choked with it: it floats down chiefly from the Cauca river. This evening, the ship being heated by the sun, and kept hot by the great boilers, felt like a baker's oven: I went aft to a cooler corner, though it was very damp, and watched the brilliant sparkle of the myriads of fireflies in the forest; they are most charming in their brightness. I know not how to describe the beauty and novelty of the scene through which I have been passing: trailing plants, in long festoons, hang in all directions; sometimes a score of trees are grown into one tangled mass of creepers, with hollows underneath, like wilfully contrived pleached alleys and secret arbours; birds in orange and blue, gold and crimson, green and purple, and every other possible combination, flit in and out as we go by, hugging the bank; now and then a great alligator, stimulated by a rifle-bullet, splashes from the bank into the muddy water, and disappears below; here a brace of white herons are watching for fish; gaudy kingfishers dash into the water and out again; huge macaws, in blue and yellow, sail clumsily and scream as they go; over the tree-tops great hawks wheel round and round; everywhere the hum of insects and the fluttering of butterflies,—all speak of the universality of life, and say to man that he is not the sole object of the world's existence and its Maker's care. The scenery is more like Windermere or the lower Lake of Killarney than anything else I can think of; islands without number, but so large as only to look like corners where another river comes in; we don't see them as islands, but are constantly branching off right or left to go past them. At 9 A. M. arrived at Pinto, a wood station,

where, as three hours stoppage was necessary, I went ashore to persecute my old friends : the abundance of one beautiful crimson and black butterfly (*Vanessa Amalthæa*) was quite embarrassing. It was pretty hot, but not oppressively so.

July 23. Mompos. — Arrived at 3.30 P. M., and found the heat tremendous. Mompos is built along the river, by which runs a terrace shaded by enormous trees, but shade is hot here as well as sunshine : a fine church, half built and wholly overgrown with creepers, shows the decadence of the place since the days of the Spanish *régime*, but large fairs are held here, and much business for the interior transacted. After being bored till near sunset I escaped from my Yankee friends to have a look after my game ; however, I went along the river-bank among the thick growth of plantains (*Musa*), and was rewarded by the capture of several magnificent fellows, six inches across the wings (*Pavonia Ajax*) ; I saw one in the cathedral at Santa Marta, but could not catch it, having only my hat. In the evening swarms of moths came on board, and I captured many ; one in particular, a huge purple-brown fellow, with eyes in the under wings, is a capital-looking subject, but being fat-bodied he is not for dying.

July 23. 12.45.—Arrived at Banco, another wood station ; went ashore of course with net, and straight into the forest, 100 yards from the vessel, and had pleasant doings with my friends the butterflies, who were numerous, but desperately lively ; nevertheless I overcame many, and added fifteen species to my stock in the course of an hour. I find that having a pursuit is essentially serviceable ; nothing can be more wearisome than life in a steamer like this, where every action is in public, from getting out of bed to getting into the same : no bathing to be had, which makes very uncomfortable mornings ; dare not try the river, the alligators lying in every sand-bank—the ugly villains.

July 26.—My perseverance has infected my American friend Mr. F——, who has got me to rig a net for him : he says his sisters will go crazy, he “guesses,” when he brings them a lot of these butterflies ; he also “guesses” that whoever I am collecting for will “go crazy” on seeing my “assortment.”

July 30.—Saw troops of big brown monkeys jumping one after the other along the tree-tops, swinging by their tails for an impetus when the leap was rather a stiff one : I heard them roaring in the forest to-day, where we wooded, just like tigers, but being aware of their practices I did not look out for “fur and claws.” This evening the chain of mountains beyond, and among which Bogotá lies, came into

view towards the south-west ; they look very magnificent, but no snowy peaks in sight. I saw the "Southern Cross" last night for the first time : why anybody took the trouble to give it so foolish a name I cannot imagine ; the "Southern Rhomboid" would be nearer the mark, besides it is not conspicuous : take the four stars of the square of the Great Bear and diminish their brightness considerably, and you have the constellation so much talked of : the great beauty of the southern heavens lies in the region of the Milky Way, which is a perfect blaze of stars.

Honda, August 5.—The town is beautifully situated, surrounded by mountains of moderate elevation, with a loud, brawling stream of pure water rushing through it and joining the Magdalena close to the town ; the river is called the Gualí, and much resembles the Wharfe ; Ilkley gives a fair idea of Honda in general position, and the architecture has also a certain resemblance, many houses being thatched and others covered with badly-made red tiles.

August 6.—Rode to the mines of Santa Ana in about five hours ; most of the road lies across a grassy plain, bordered by walls of mountains in extraordinary forms, and presenting many splendid views : the heat on these plateaus is very oppressive, but we descended now and then into the "quibrada" or ravine of a torrent, where trees shaded us, and we were refreshed. For the last two hours we were ascending the side of a steep mountain, but our fatigue was repaid by glorious views of the valley below ; the sun set in the valley long before we reached our journey's end, and we thus obtained a very beautiful effect of light and shade, such as I never saw before : rising on the other side of the valley was a cliff some 400 feet high, which, however, from our elevation, and backed by the immense mass of the "Paramo," or range of Bogotá, seemed inconsiderable, and only like a great castle commanding the valley ; when darkness had set in below, a ray of sunshine through the clouds struck on this castellated cliff, lighting it up with red and gold, whilst perpendicularly from its summit rose a broad stripe of rainbow, being the lower arc of a very large one, the rest of which was invisible ; the piece of rainbow appeared nearly straight, and looked like a pillar of coloured fire rising above the illumined castle : even our American was enraptured with the spectacle. The Andes look magnificent from this point : the eastern range, on which is Bogotá, stretches, like a mighty wall, beyond the valley, and we can see with a glass the trees and a house where the plateau of Bogotá begins, and past which I have to travel ; the height looks prodigious, and the confused mass of mountains between that point and this tells

what a road we have to take. On the opposite horizon the sun-covered central range ought to be visible, but clouds concealed it during my stay.

August 12.—My luggage arrived yesterday; the ants have made sad havoc amongst the butterflies, eating their heads and bodies lamentably, although shut up in a writing-case in my carpet-bag; the bulk are, however, safe, having been placed in a light box impregnated with petroline.

Bogotá, August 28.—The first few miles out of Honda are really awful for one unaccustomed to these roads; the slopes we had to ascend and descend looked almost perpendicular; some of them were just like going down the outside of the dome of St. Paul's, where a slip of the animal could send you further than was amusing, whilst the ascents were done by fair scrambling up of the mules, during which it was hard to avoid slipping off over the tail; nevertheless an hour or two makes you regard all this with perfect indifference, so steady are the mules. As we rode along, gradually ascending, we obtained magnificent views of the valley of the Magdalena, with the broad river winding through perpendicular cliffs, beyond the range of the Andes, and far away over them, towering at a height inconceivable, the snowy peak of Tolima, one of the central range, conical and massive, far above the clouds that floated along the sides of the lower mountains. Higher and higher as we wound through the mountain-passes, amid woods and torrent-beds, the views of the lower country became more and more splendid; mountains, which from Honda looked important, sank down to a mere portion of the wild confusion of hills below us: if the bottom of the Wharfe, from Bardentown to Bolton Abbey, were dry, and you had to ride from the latter to the former along the river-bed, you would be doing what there is any quantity of between here and Honda; you have to clamber up places jump by jump, which is bad enough, but more agreeable than going down smooth places like the outside of a monstrous stone loaf, and this, you will please to observe, is the high road between the capital of New Grenada and its principal sea-port. The plain of Bogotá, situated 10,000 feet above the level of the sea, seems of enormous extent, and is bounded on every side by ranges of mountains of moderate height; westward, over the nearer hills, Tolima, with his snowy head and a long range near him are visible in the morning. The plain is rather swampy; I noticed the beautiful little *Colias Dimera* flying in great numbers, and settling in damp spots in the road. In dry weather you have as good a road to canter on as there is in England, but in wet—I won't say—it must

be fearful, judging by a place or two where rain had fallen in the night. I am most fortunate to come up in the dry season, for the road from Honda is quite another business after a fortnight's rain; man and beast get bogged up to the neck, and every place is disgustingly shaky and slippery. I forgot to say, when at the mines of Santa Ana, I captured some magnificent and monstrous butterflies, six inches from tip to tip (*Morpho Adonis* and *M. Cytheris*); I do not know which to admire the most, the brilliant metallic blue of the former or the perfect resemblance of the latter to the glittering, flickering flashes of the opal: here they are much in request for drawing-room ornaments. One thing we have here, the infinite beauty and glory of which never satiates nor repeats itself—the wondrous sunsets, which lately have been of singular splendour: a few evenings ago we had one I never saw equalled; the cool, deep blue of the East was set off with fine white clouds tinted with pink, and then to the zenith gradually changing to a deep gray; descending westward this formed a mighty arch from south to north, perhaps thirty degrees high at the centre, fringed with delicate red and flecked with patches of the same colour; the open arch itself was like the very portal of paradise, all clear, pure white silver, of dazzling brilliancy, whence came light, which, thrown on the warm reddish yellow of the cathedral, combined so as to give it the most intense pure lemon-colour, standing in magic contrast against the deep blue and purple-brown mountains behind. The silver archway was groined with delicate lines of crimson, looking like the tracings of the mason-work; right and left were golden clouds as door-posts; below, all the buildings and the hills which bound the plain were in darkness, with only here and there a turret sharply defined against the silver brightness; watching awhile its beauty from the “Altozano,” or terrace in front of the cathedral, gradually the colours changed, less bright perhaps, but, from the increasing darkness below, this was not sensible; the silver gradually changed to gold, the gray to greenish brown, whilst an intensely bright flame-colour marked the place of the sun's disappearance; so the changes went on without visible alteration of form, through all the combinations of the rainbow, until all was gone. Perhaps the sunset here is not so very much more beautiful than in Europe; it may be, as I always walk on the Altozano or to the suburbs about that time, that I take more notice, but it seems to me that the colours are more vivid than they are in England. The most striking thing, perhaps, about these glorious sunsets is that it is absolutely dark on the ground whilst all this wondrous play of light and colour goes on in the west; you can see

nothing of the details of the houses between you and the western sky, nor could you recognize any one a few paces distant.

(To be continued.)

Extracts from a Letter of Mr. A. R. WALLACE to Mr. S. STEVENS.

Ternate, September 2, 1858.—When I arrived here from New Guinea, about a fortnight ago, I found your two letters of January and March, noting the safe arrival of the Aru collections and the advantageous disposal of the birds: they gave me the greatest pleasure and satisfaction, and the interest the collections appear to have excited was a great encouragement to me; and I assure you I stood in need of some encouragement, for never have I made a voyage so disagreeable, expensive and unsatisfactory as the one now completed. I suffered greatly from illness and bad or insufficient food, and am only now just sufficiently recovered to work hard at cleaning and packing my collections: my servants suffered as much as myself; two or three were always sick, and one of my hunters died of dysentery. My collections will greatly disappoint you and my other friends,—more than they do myself,—because you will be expecting something superior to Aru, whereas they are very inferior in fine things. First and foremost, all my hopes of getting the rare paradise birds have vanished, for not only could I get none myself, but could not even purchase a single native skin! and that in Dorey, where Lesson purchased abundance of almost all the species: he must have been there at a lucky time, when there was an accumulated stock, and I at a most unpropitious one. It is certain, however, that all but the two common yellow species are very rare, even in the places where the natives get them, for you may see hundreds of the common species to perhaps *one* of either of the rarer sorts. There are some eight or ten places where most of the birds are got, and from each I doubt if there is more on the average than one specimen per annum of any other than the *Paradisaea papuana*; so that a person might be several years in the country, and yet not get half the species even from the natives: yet they are all common in Europe! I sent two of my servants with seven natives a voyage of one hundred miles to the most celebrated place for birds (Amberbaki, mentioned by Lesson), and after twenty days they brought me back nothing but two specimens of *P. papuana* and one of *P. regia*:

they went two days' journey into the interior without reaching the place where the birds are actually obtained; this was reported to be much further, over two more ranges of mountains. The skins pass from village to village till they reach the coast, where the Dorey men buy them and sell to any trading vessels. Not one of the birds Lesson bought at Dorey was killed there; they came from a circuit of two hundred or three hundred miles. My only hope lies now in Waigiou, where I shall probably go next year, and try for *P. rubra* and *P. superba*. Even of *P. papuana* I have not got many, as my boys had to shoot them all themselves; I got nothing from the natives at Dorey. You will ask why I did not try somewhere else when I found Dorey so bad: the simple answer is, that on the whole mainland of New Guinea there is no other place where my life would be safe a week: it is a horribly wild country; you have no idea of the difficulties in the way of a single person doing anything in it. There are a few good birds at Dorey, but full half the species are the same as at Aru, and there is much less variety! My best things are some new and rare lories.

In insects, again, you will be astonished at the mingled poverty and riches: butterflies are very scarce; scarcely any *Lycenidæ* or *Pieridæ*, and most of the larger things the same as at Aru. Of the *Ornithoptera* I could not get a single male at Dorey, and only two or three females; I got two from Amberbaki and two from the south coast of New Guinea, from the Dutch exploring ship. Of *Coleoptera* I have taken twice as many species as at Aru; in fact, I have never got so many species in the same time; yet there is hardly anything fine: no *Lo-mopteræ*,—in fact, not one duplicate *Cetonia* of any kind, and only two solitary specimens of common small species! No *Lucani*! perhaps nowhere in the world are *Lamellicornes* so scarce,—only fourteen out of 1040 *Coleoptera*, and most of them small and unique specimens. Of *Longicornes* there are full as many as at Aru; many the same, but a good number of new and interesting species. *Curculionidæ* very rich; some remarkable things, and the beautiful *Eupholus Schœnherri* and *E. Cuvieri*; the former rather abundant. There is a very pretty lot of *Cicindelidæ*; two *Cicindelas* and three *Therates* will probably be new to the English collections; they are *C. funerata*, *Bois.*, a very pretty species, with a peculiar aspect; *C. d'Urvillei*; also a small new species, near *C. funerata*, very scarce. *Therates basalis*, *Dej.*, a very pretty species, I have sent a good many of; *T. festiva*, *Dup.* (I think), a pretty brilliant little species, not common, and another of the same size, and, I think, quite new, rufous

and black marked, also scarce; *T. labiata* and *Tricondyla aptera* are the same as sent from Aru. I have never before found so many species of *Therates* in one place: they form quite a feature in the Entomology of Dorey. *Carabidæ* were very scarce: I picked up, however, some pretty things, especially two most brilliant *Catascopi*, but both unique. For a long time I took no *Staphylinidæ*: at last I found a station for them, and by working it assiduously I got between eighty or ninety species: some are the handsomest of the group I have yet taken, and there are many curious and interesting forms. Talk about *Brachelytra* being rare in the tropics! of their place being supplied by ants, &c., &c.! why, they are absolutely far more abundant in the tropics than anywhere else, and I believe also more abundant in proportion to the other families. I see in the 'Zoologist' two local lists of *Coleoptera* (Dublin and Alverstoke), in which the numbers of *Staphylini* are 103 and 106 species respectively; these are the results of many years collecting by several persons, and in a country where all the haunts and habits of the tribe are known; here, in two localities (*Macassar* and *Dorey*), I have taken at each nearly the same number of species, in three months' collecting, on a chance discovery of one or two stations for them, and while fully occupied with extensive collections of all orders of insects, in a country where every other one is new. The fair inference is, that in either of these localities *Staphylini* are really ten times as numerous as in England; and there is reason to believe that any place in the tropics will give the same results, since in the little rocky island of Hong-Kong Mr. Bowring has found nearly 100 species; yet Dr. Horsfield, who is said to have collected assiduously in Java, did not get a solitary species. My next richest and most interesting group is that of the *Cleridæ*, of which I have about fifty species, perhaps more, for they are very puzzling: I have never got so many in one locality, nor should I now had I not carefully set them out and studied their specific characters, and thus separated many which would otherwise certainly have escaped notice. In another small and obscure group, the *Bostrichidæ* and allied *Scolytidæ*, I obtained no fewer than thirty-eight species, whilst the *Lampyridæ* and allied groups were in endless and most puzzling variety. I have also got an exceedingly rich and interesting series of *Galerucidæ* and *Chrysomelidæ*. The *Elaters* are small and little interesting. The *Buprestidæ* also are very inferior, and of the only fine species (*Chrysodema Lotinii*) I could only obtain a single pair. With so many minute *Coleoptera* I could not give much attention to the other orders; there are, however, some singular *Orthoptera*, and among the *Diptera* a most extra-

ordinary new genus, the males of which are horned ; I have three species, in two of which the horns are dilated and coloured, in the other long, slender and branched ; I think this will prove one of the most interesting things in my collection. One would have thought Dorey would have been just the place for land shells, but none were to be found, and the natives hardly seemed aware of the existence of such things ; I have not half-a-dozen specimens in all. Although Dorey is a miserable locality,—the low ground is all mud and swamp, the hill very steep and rugged, and there are only one or two small overgrown paths for a short distance, my excursions were almost entirely confined to an area of about a square mile,—yet the riches in species of Coleoptera, and a considerable number of fine remarkable forms of which I could obtain only unique examples, sufficiently show what a glorious country New Guinea would prove if we could visit the interior, or even collect at some good localities near the Coast.

You ask me if I go out to collect at night ; certainly not, and I am pretty sure nothing could be got by it : many insects certainly fly at night, but that is the reason why they are best caught in the day in their haunts, or else by being attracted to a light in the house. Besides a man who works, with hardly half an hour's intermission, from 6 A.M. till 6 P.M., four or five of the hottest hours being spent entirely out of doors, is very glad to spend his evenings with a book (if he has one) and a cup of coffee, and be in bed soon after 8 o'clock. Night work may be very well for amateurs, but not for the man who works twelve hours every day at his collection.

I am perfectly astonished at not yet meeting with a single *Paussus* ; Several are known from the Archipelago, and have been taken in houses and at light, yet my four years look-out has not produced one. How very scarce they must be ! You and Dr. Gray seem to imagine that I neglect the mammals, or I should send more specimens, but you do not know how difficult it is to get them : at Dorey I could not get a single specimen, though the curious tree-kangaroos are found there, but very rare : the only animal ever seen by us was the wild pig. The Dutch surveying steamer bought two kangaroos at Dorey whilst I was there : it lay there a month waiting for coal, and during that time I could get nothing, everything being taken to the steamer. I send from Dorey a number of females and young males of *Paradisea papuana* ; these females have been hitherto erroneously ascribed to *P. apcda*, of which I am now convinced my specimen from Aru is an adult female ; it is totally brown : the females of *P. papuana* are smaller than the young males, and have the under parts of a less pure white : the bird

figured by Levaillant as the female of *P. papuana* is a male of the second year which has acquired the green throat in front, but not the long feathers of the tail or flanks : to all the female specimens I have attached tickets,—all not ticketed are males.

Whilst the Dutch steamer was at Dorey a native prow came from the Island of Jobie, and bought two specimens of *Atrapia nigra*, which were sold to a German gentlemen, who is an ornithologist, before I knew any thing of them : I believe that island is their only locality, and the natives are there very bad, treacherous and savage. That is also the country of the rare species of crown pigeon (*Goura Victorix*); a living specimen of this was also purchased on board the steamer. I have great thoughts, notwithstanding my horror of boat work at sea (for a burnt child dreads the fire) and my vow never to buy a boat again, of getting up a small craft and thoroughly exploring the coasts and islands of the Northern Moluccas, and to Waigiou, &c.; it is the only way of visiting many most interesting places,—the Eastern coast of the four peninsulars of Gilolo, the Island of Guebe, half-way between Gilolo and Waigiou, a most interesting spot, as Gilolo and Waigiou possess quite distinct Faunas.

A. R. WALLACE.

Extract from a letter of M. MOUHOT to Mr. S. STEVENS.

Bankok, October 13, 1858.—I have had great difficulty in procuring the few specimens I now send you, as I arrived here just at the end of the rainy season, when the country was completely inundated; besides this, my first and charming collection of beautiful insects was devoured by ants, which swarm here in an extraordinary manner; in the space of one night they destroyed about sixty Lepidoptera, with about one hundred Neuroptera, Hemiptera, &c.; in the morning nothing remained of them but shapeless atoms. In vain I employed the most efficacious means to get rid of them, and such as had hitherto always succeeded; oil Bombay or the Siam wood-oil alone was effectual. During sixteen days that my boxes were oiled the ants kept away from them, and it is no longer necessary to have recourse to suspended plauks or to place the feet of the table in basins of water. I consider this an important discovery,—the more so, as none of the inhabitants of Bankok, who have their magazines frequently ravaged by these destructive insects, could inform me of a remedy.

Siam is a terrible country to explore; there are no other means of communication than by water or on elephants; I have therefore purchased a boat and engaged rowers, who have consented to follow me.

The country is certainly most interesting and beautiful, and if I am spared to return to Europe I hardly know how I shall like our cold, dull and rainy seasons, our pale sun and our stunted vegetation: I shall live in the memory of all that is most beautiful in Nature. How pleasant it is to awaken to see the brilliant sun, to hear the thousand sounds, the humming of insects and the noise of other beings: no repose here. Always and everywhere an extraordinary vitality.

I am more than surprised here at seeing little children of two and three years of age towing barks of large size on the deep, rapid river; they swim like fish, and are exceedingly intelligent and precocious; for a small piece of cigar or tobacco they will run after butterflies and render me a thousand little services; whilst my great idle domestics, on the contrary, sleep a great part of their time with a cigar behind each ear and a third in the mouth. My little companions are ready to help me everywhere.

I have found here a kind of spider which produces silk; she allows herself to be milked or drawn, one may say, for you have only to take a card and wind the silk, which comes from her abundantly: it is very strong and very elastic.

How happy people may be in this country! Nature is so lavish of her bounties; excellent vegetables are found upon the trees, and roots of the bamboo and others; in the woods exquisite fruits, and the rivers overflow with fish.

November 4, 1858.—To day I have caught about twenty butterflies, killed two owls, a cuckoo (quite black) and the most beautiful dove I have ever seen, with green wings and a yellow head,—a very great beauty.

Notice of the Various Species of Bovine Animals. By the Editor of the 'Indian Field.'

(Continued from p. 6367.)

THE second group of taurines is exemplified by the domestic cattle of Europe or ordinary humpless cattle. Their horns, as in the bison-tines and also the humped taurines, are cylindrical;* whereas in all

* There is a considerable tendency to a flattened form in the horns even of many humped cattle.

that follow the horns are much flattened; and the *typical* flexure of the horns is first outward, then forward at about a right angle with the line of visage, and finally upward and in some inward at the tip. In all other Bovinæ, without exception, the horns do not *typically* curve forward beyond the plane of the face (a line drawn from the forehead or crest of vertex to the nose), but just attain to that plane, and mostly incline backward at the tips. Abnormally curved horns are very common in the humped cattle, but if they turn forward beyond the plane of the visage, the flexure passes downward and inward; as shown among other instances, by the hugely thick horns of the Borneese cattle of Denham. The typical curvature of horn of the humped cattle is similar in direction to that of a yak's horn (only laterally more oblique in the set); or as shown by the immense head-gear of the African Galla cattle.* That of the humpless taurines now treated of may be familiarly exemplified by the horns of our British Devon cattle, the so-called wild cattle of Chillingham Park, and equally so by those of the fossil *Bos primogenius*, *Bos namadicus*, and others.† Various abnormal forms of horn occur in the domestic breeds of European cattle, but these do not resemble the abnormal forms of horn of the humped cattle; and, to our apprehension, the mere typical or normal flexure of the horn of the "zebu" or humped cattle (as will be obvious on a little study of the subject) resembling that of the yak's horns as before remarked, and more or less all the rest of the tribe, as opposed to the group of *humpless taurines with cylindrical horns*, is sufficient evidence of the specific distinctness of the humped races. We might have added the configuration and physiognomy of the skull to the other distinctions, the specific difference being here also well marked.

* In the small Bengali race of cattle there is a decided exceptional tendency, at variance with the other races of humped cattle. The horns mostly incline forward at a considerable angle with the plane of visage, as remarked by Buchanan Hamilton, when noticing the contrary in the different races observed by him in Southern India; but they have an abnormal look, and very commonly curve downward and even inward at the tips, as mentioned above. Indeed, not unfrequently the prolongation of the growth would cause the tips of the horns to enter the orbits and so destroy the eyes, if those tips were not sawn off in time to prevent such injury! This, therefore, must necessarily be an *abnormal* curvature!

† The Devon and Spanish cattle quite come up to our notion of a typical form of the conventional or artificial species yclept *Bos taurus*. Why we call it so will appear in the sequel. The Herefords are the same thing magnified and coarser. The Alderneys smaller and still neater. We confess, too, a considerable admiration of the little shaggy Highland cattle, so artistically portrayed by the pencil of Rosa Bonheur.

As with the humped cattle, the living races of the humpless with cylindrical horns have the latter thicker and shorter in the bull, longer and more slender in the ox and cow ; but it does not appear that this rule held with the more ancient of two races currently assigned to *Bos primogenius*. This more ancient race, which was contemporaneous with the long-horned form of bison (*B. priscus*), the *Elephas priscus*, &c., had horns which were both longer and thicker, *i.e.* every way larger in the bull than in the cow, and we have measured a pair (the largest of several examined), the *horn cores* of which were 3 feet long and 19 inches round at base.* In this type the horns tend to approximate towards their tips,—not so in the other. The skull too is smaller, notwithstanding the huge magnitude of the horn-cores. In the other, or less ancient of the two races, apparently, the remains of which are found chiefly in peat-bogs, instead of the older clays and gravel-drift which contain the bones of the former, the horns (as in our modern cattle) were comparatively thick and short in the bull, longer and more slender in the cow.—*Vide* Nilsson's figures of a bull-skull in the 'Annals and Magazine of Natural History,' 2nd series, vol. iv. pp. 257, 259, and Professor Owen's figures of a cow-skull in his 'History of British Fossil Mammals and Birds,' pp. 498, 507. This race we take to be the true *urus* of Cæsar and other Roman writers (*ure-ox*, *uhr-ox*, *aurochs*, as variously written, which last has been transferred in Germany to the bison, as in modern times it is applied to the Cape buffalo by the Dutch colonists of South Africa),—a gigantic animal, which lived down to comparatively modern times, and of which Mr. Woods, as quoted by Professor Owen, cites the discovery of a skull and horns in a tumulus of the Wiltshire downs, as "evidence that a very large race of genuine taurine oxen originally existed in this country (England), although most probably entirely destroyed before the Invasion of Britain by Cæsar, since they are not mentioned as natives of Britain by him."† In all other bovines, the horns are both longer and thicker in the male sex,—the only exception (in the former respect) that occurs, being the Indian buffalo in some instances.

* Another of the same linear dimensions, but eighteen inches in circumference at base, is noticed in the 'Annals and Magazine of Natural History,' vol. ii. p. 163 (1838).

† It surely does not follow, that even great Cæsar himself should know the animals of the country by intuition ! Our countrymen were long enough in India before they discovered the *Gaour* ! What, too, about the former tradition of the *dun cow* of Guy, Earl of Warwick ? One of the oldest known sub-fossil skulls of the giant ox is, we believe, still exhibited in Warwick Castle : and the tradition may have reference to it and be purely imaginary.

Another particular in which the humped and round-horned humpless races agree, while differing from all the rest, is in the greater length of tail, which, with its tuft, descends considerably below the hocks; the short-horned Italian race of buffalos alone approximating them in this respect.

At the present epoch, no cylindrical-horned humpless taurines are known for certain in an aboriginally wild state, though immense herds have gone wild in the pampas of South America, and there are many in the Falkland Islands, which have been finely described by Darwin, and more recently in the narrative of Sir James Ross's Antarctic Expedition. These are of Spanish descent, and therefore akin to our British Devons.—(*Vide* Jacobs 'Travels in Spain,' p. 154). Wild cattle of some sort, however, quite possibly aboriginal, inhabited the British forests during the middle ages, and likewise the great forest of the Ardennes,* and in the Vosgian mountains, as mentioned by

* The latter, however, were perhaps bisons. Dr. Weissenborn (who so ably argues for the identity of the urus and bison, despite the evidence afforded by sub-fossil remains) quotes the work of a monk of St. Gallen, who describes a hunting party of Carolus Magnus, which was held in honour of the Persian Ambassadors, not far from Aachen (Aix la Chapelle), probably in the Ardennes, in order to kill "uri or bisons;" and of one wounded by Carolus Magnus and killed by Isambardus, which he calls "bison vel urus," mentions that its horns were of an enormous size ("immanissimis cornibus in testimonium prolatis"), which should rather indicate the urus; but we have the testimony of Herberstein regarding a bison, "within whose horns three stout men could sit." A peat-bog skull of the *Bison priscus* type, of the age of the later uri so often met with, would serve alike to corroborate Herberstein's statement, and to help to identify the *Bison priscus* with the modern bison—or, better, as regards the latter, gradations of form in the intermediate period. It seems clear that the ecclesiastic cited did not distinguish between the bison and urus, which may indicate that the latter had already been long extirpated in his vicinity, and the name only vaguely preserved at the time he wrote. Of the so-called "wild cattle" preserved in certain British parks, the white colour is alone strong evidence of their former domesticity. Any cattle preserved as they are would become similarly wild in the course of a few generations. A recent writer describes those in Cadzow Park, belonging to the Duke of Hamilton, to be "about the size of our modern bullocks, but differing from them in their extraordinary breadth of chest and strength of forearm. They are of a creamy white, the ears, muzzle, and tips of horns being jet black. The old bulls have a shaggy mane a few inches in length. They have the range of an extensive park, the remains of an ancient oak-forest, through which they roam unmolested; they thus retain many of their normal habits and much of their original ferocity. When a calf is born it is carefully concealed by its mother, and if any one is so rash as to approach it the whole herd rush to the rescue, when most people think it safest to retreat. The old bulls in particular are very savage. A few years ago Mr. Minto, head-keeper to the Duke of Hamilton, while riding through the park was charged by one; his horse was thrown to the ground and severely gored

various writers ; FitzStephen, for example, notices the Uri Sylvestres, which, in his time, that is about 1150, infested the great forests round London. In the Nineveh representations the hunting of the wild bull is often depicted, and would appear to have been a favourite pastime of the ancient monarchs ; and the animal would seem to have been a humpless taurine of the present group, but nothing whatever is known of it beyond what the Nineveh figures supply. " Wild cattle " are often noticed by travellers in North Africa ; but the Bubalis (a species of " Harte-beest "*) is generally intended, and sometimes even the Leucoryx or white oryx ; while the gnoos are the " wilde beests " (i.e. wild cattle) of the Dutch colonists of South Africa, who again call the hippopotamus the " sea cow," a name elsewhere applied to the Manati. The wild cattle of Madagascar we know nothing about, except that they are stated to be humpless, and longer in the legs than European cattle ; † and the fine South-African domestic Caffre cattle are of the present group of taurines, though not introduced by Europeans ; a fact all the more remarkable, as we know only of humped domestic races in all middle Africa and in Madagascar ; but we have seen part of a fossil skull, with the particular flexure of horn, from the neighbourhood of the Gariep or Orange River. ‡ The horns of the Caffre cattle extend out excessively, almost in a line with each other,

in the flank, but gaining its feet it galloped off, followed by the infuriated animal, so affording its rider an opportunity of effecting his escape. I believe that the Dukes of Hamilton are bound by an old charter to preserve the breed, and great attention is now being paid to prevent the race degenerating."—*Field*.

* We have seen what appear to be two distinct species of Bubalis from North Africa, one as big as the South African Caama or " Harte-beest," with black feet ; the other considerably smaller, with feet coloured like the body. A third from Tunis is mentioned by Dr. J. E. Gray, as being probably distinct, with a dark brown streak on the outer side of the front of the fore legs, as in the Cape " Harte-beest." Some notice of the herds of Bubalis will be found in Barth's recent ' Travels.'

† Flacourt : we were wrong in terming this, the boury, which name refers, according to this author, to a large race of domestic humped cattle common in the island. " Horned cattle are numerous, both tame and wild : many of the latter resemble, in shape and size, the cattle of Europe."—*Ellis's History of Madagascar*.

‡ Perhaps of the same species as the enormous fossil noticed in the ' Proceedings of the Geological Society ' for 1840, p. 152 : — " Cores and portions of an ox in the alluvial banks of the Moddea, one of the tributaries of the Gariep or Orange River, and forty feet below the surface of the ground. The cores, with the breadth of forehead, measured 11 feet 7 inches, but it is calculated that 5 inches had been broken off at the end of each tip, and circumference of piths at base was 18 inches. The orbits were situate immediately under the base of the horns." The only wild bovine at present existing in South Africa is the Cape buffalo.

but what flexure remains is nevertheless sufficiently typical.* Again, the Indian fossil *Bos namadicus*, from the Nerbudda deposits, is surprisingly like the European *B. urus* or *B. primogenius*;† and we have much reason to suspect that an existent species of the same group, with cylindrical horns, inhabits certain of the forests of Indo-China, in addition to the different flat-horned taurines to be noticed in due course.

The un-named species referred to is probably that mentioned by Crawford in the following passage:—"The ox is found wild in the Siamese forests, and exists very generally in the domestic state, particularly in the southern provinces. Those we saw about the capital were short-limbed, compactly made, and often without horns, being never of the white or gray colour so prevalent among the cattle of Hindustan. They also want the hump on the shoulders which characterizes the latter. They are used only in agricultural labour, for their milk is too trifling in quantity to be useful, and the slaughter of them, publicly at least, is forbidden even to strangers. Hence, during our stay, our servants were obliged to go three or four miles out of town, and to slaughter the animals at night. The wild cattle, for the protection of religion does not extend to them, are shot by professed hunters, on account of their hides, horns, bones and flesh, which last, after being converted into jerked beef, forms an article of commerce with China."—'Mission to Siam and Cochin China,' p. 430. It is probable that different species of wild cattle are here referred to, including one or more of those with flattened horns. The Rev. J. Mason,

* The beautiful small Zulu cattle of Natal are humped. The fine Caffre cattle, with very long horns directed almost at a right angle with the axis of the body, and more or less tensely spiral, are large and noble game-looking beasts, with unusually long limbs: from them were the famous "war-oxen" of the Caffres selected and trained.

† The unfortunate supposition entertained by Linnæus as well as Buffon, that the European bison was the original wild stock of all domestic cattle, and the non-recognition of the ancient *urus* as distinct from the bison, have led to sad confusion in the systematic nomenclature, which can only be satisfactorily remedied by a violation of the generally accepted canons based on the rigorous acceptance of the first-applied systematic names, in this wise:—

Bos americanus, vel *Bison americanus*: the American bison.

Bos Bison, vel *Bison europæus*: the European bison. *B. priscus*, we apprehend, had better be retained, at least for the present; if even in the form of *Bison europæus* (*priscus*).

Bos urus: the comparatively modern ure ox.

Bos primogenius: the more ancient type, which we suspect to be quite distinct; albeit the name may have been first bestowed on the other.

in his 'Notes on the Fauna, Flora, &c., of the Tenasserim Provinces' (1852), remarks that "a small ox from the Shan country is brought down sometimes in considerable numbers, which resembles in its form the English rather than the Indian ox, but is probably derived from the wild race. Occasionally a young wild ox is domesticated, and brought under the yoke." By the latter, we suspect he means the tsain, a flat-horned species akin to the banteng; and by the former the indigenous round-horned species before referred to. It is to be regretted that the last is so very vaguely brought to notice.*

To the above may be tacked Sir Stamford Raffle's notice of the domestic cattle of Sumatra. "There is a very fine breed of cattle peculiar to Sumatra, of which I saw abundance at Menang Kabu, when I visited the capital of that country in 1818. They are short, compact, well-made animals, without a hump, and almost without exception of a light fawn-colour, relieved with white. The eyes are large and fringed with long white lashes. The legs are delicate and well-shaped. Among all that I saw I did not observe any that were not in excellent condition, in which respect they formed a striking contrast to the cattle generally met with in India. They are universally used in agriculture, and are perfectly domesticated. This breed appears to be quite distinct from the (flat-horned) banteng (*Bos sondaicus*) of Java and the more eastern islands.—'Transactions of the Linnean Society,' vol. xiii. p. 267.

There is a wild race of some kind in the Island of Celebes, which has not yet been scientifically described. In an account of the province of Minahassa, published in the 'Journal of the Indian Archipelago,' vol. ii. p. 891, we find it thus noticed:—"Wild cows are also found here, principally in the higher parts of the mountains; but they bear little resemblance to the banteng of Java; are below the middle size, yet possess, notwithstanding, an incredible strength." This is vague enough, but undoubtedly refers to some unknown quadruped,—bovine most probably, but not likely to appertain to our present sec-

* There is a horn powder-flask in the museum of the Asiatic Society, Calcutta, which is cylindrical, and of true semi-circular bisonine curvature, which was brought from the Shan country by the late Mr. Landers, who assured the writer that he had seen (had a good distinct view of) a true shaggy bison, "resembling the American bison," in the pine forests there. On our expressing doubt, he said that he possessed a horn of it made into a powder-flask, and afterwards presented this to the museum, being the specimen above noticed: certainly it has every character of a true bisonine horn, but might perhaps be that of a wild taurine of the present group. The mere conversion of it into a powder-horn, as a sort of trophy, is rather in favour of its having belonged to a wild bull of some kind.

tion of the taurines. The statement is nevertheless worthy of citation. The curious little straight-horned buffalo, known as *Anoa depressicornis*, is however perhaps meant.

For the same reason we quote the following from Earl's 'Voyage to the Molucca Islands and New Guinea,' p. 361 :—"Wild cattle are numerous in Timor Laut, of a brown colour, with upright horns, and size about the same as that of two-year old cattle in Holland. The natives catch them with rattan, and also shoot them with arrows."

Again, Mr. Hugh Cuming assured us, that the tamarao of the island of Mindoro (one of the Philippines) is a small bovine species, but fierce and dangerous to attack, of a dark colour, with horns rising at an angle of 45° from the forehead; therefore not akin to the *Anoa depressicornis*, which seems to be a diminutive buffalo.

The Tartar cattle of the steppes lying northward of the great Asiatic watershed are, we believe, *all* of the European type; while in China this would appear to be more or less mingled in blood with the humped races,—as the domestic geese of India are obviously of a hybrid race between *Anser cygnoides* and *A. cinereus*! Our information is, however, exceedingly scant and unsatisfactory concerning the breeds of cattle in the Chinese region, comprehending Mongolia, Manchuria, the Korean peninsula, Japan, Luchu,* &c.; nor are the essential characters seized with reference to classification of those above described in Siam and Sumatra. The main object of the present sketch is to direct the attention of observers to those leading differential characters.

It would seem that the humpless Tartar cattle referred to interbreed with the yak in the northern limits of the range of the latter, as the

* The cattle of the Luchu islands are described by Captain Basil Hall as "a small black breed, used principally for agricultural purposes." The presence or absence of a hump is not mentioned, which should be negative evidence of the latter. In some districts of China the humped would seem to predominate, and these are often represented in Chinese paintings. In Chusan the race appears to be mingled, with no great admixture of blood of the humped species. Cattle are generally rare in China, the strange inhabitants of that region having an aversion to milk, omnivorous as they are in most other respects: the Manchurian Tartars, however, are particularly fond of milk. About Canton, if we mistake not, only buffalos are met with, which are employed to till the ground. It is probable that where taurine cattle are kept, the humped races predominate in the south, the humpless northward, with intermixture of blood where the two meet. The cattle of Butan would seem, from all we can learn, to be of the European or Tartar race, now, it would appear, becoming rare in the province, and the exportation of them strictly prohibited: if so, they have, doubtless, been brought round by an eastern route.

humped cattle are made to do in the southern limits of its range: at least we have the evidence of Marco Polo to that effect.

To return now to Europe, which may be regarded as the headquarters of the cylindric-horned humpless cattle,* and from which part of the world they have been introduced into the Americas and Australian colonies, to the exclusion of other domestic cattle, though perhaps the finer breeds of humped cattle might be better suited to the warmer and drier localities of those grand regions of the earth. *That* is an experiment still worth trying. After the camel, the large humped bullock is the animal of all others best adapted for Australian or South African explorations.

The establishment of Spanish cattle in America "dates from Columbus's second voyage to St. Domingo. They there multiplied rapidly; and that island presently became a kind of nursery, from which these animals were successively transported to various parts of the continental coast, and from thence into the interior. Notwithstanding these numerous exportations, in twenty-seven years after the discovery of the island, herds of 4,000 head, as we learn from Oviedo, were not uncommon, and there were even some that amounted to 8,000. Acosta's report was 35,444; and in the same year there were exported 64,350 from the ports of New Spain. This was in the sixty-fifth year after the taking of Mexico, previous to which event the Spaniards, who came into that country, had not been able to engage in anything but war."—'Quarterly Review,' vol. xxi. p. 335.

Having noticed the rapid multiplication of Spanish cattle in the New World, it occurs to us, as worthy of remark, that European cattle do not thrive equally in India. Why should they not do so as well as at Rio Janeiro? Perhaps because the cattle of intertropical America are derived from an ancestral stock inured and thoroughly acclimatized to the torrid summers of Spain. And perhaps the same race of cattle, if imported into India from Rio or the Bahamas, would take more

* A round-about expression; but we have positively no English word to designate the species generally,—bull, cow, ox, bullock, steer, heifer, calf, &c., of which "beeve" (analogous to the French *bœuf*) comes nearest to the mark, more so than cattle, but will hardly apply till the beast is of an age to yield beef! "Black cattle" is most absurd, seeing that they are of all colours; and "horned cattle" equally so, as being neither exclusive nor applying to the "polled" or hornless breeds. Sometimes, as in the Dutch language, this animal is emphatically the "beast," as, in the feathered class, the commonest of domestic birds is emphatically the "fowl;" but has no proper name in English, beyond such as are of more or less general application to all birds, as cock, hen, chick, pullet, capon, &c.; or sometimes emphatically "poultry," which may be compared to "beeve."

kindly to the climate than the improved and pampered breeds sent out from Britain. We happen to be among the dissentients who do not regard the beef of the humped ox—even well-fed Gyna beef—as equal to our finely interstratified (with fat and lean) Christmas beef at home; and therefore think that the cultivation of European cattle is desirable, especially in the Nilgiris and other elevated localities when the land-leeches do not interfere to prevent it.

Our notice of the “feral” humped cattle has elicited some information from a friend, who tells us that there are many in the now famous Jugdespore jungles, which he has often shot over. The late Kooer Singh granted permission to our informant to shoot what he pleased, so long as he spared the wild cattle, which, according to tradition, had inhabited the district for at least 400 years. Our friend, of course, respected the injunction, but was curious about them, and had opportunities of watching them somewhat closely. All he saw were rather of small size, of an earthy-brown colour, with shortish horns, and he thinks without the Nilgai markings on the feet. We have very long been of opinion that such was the primeval hue of the humped races; but the mottling of the feet—a white ring above the hoofs, set off above and below with black—is so very prevalent among our domestic humped cattle that we cannot help thinking it an aboriginal marking. Another friend informs us that there are many wild cattle of the sort upon the *churr*, or alluvial island, known as the “Siddee churr,” lying S. E. of Noacally in the Eastern Sundarbans. He adds that their colours vary, as in ordinary domestic cattle; and he especially approves of the quality of their beef. On this *churr* there is no high tree-jungle, and scarcely brush-wood enough to afford cover for tigers, which do not occur on the island.

To return now to our general subject. The question has been much disputed whether the urus of the old Romans was identical with their bison; and the affirmative has been very ably argued, as by Dr. Weissenborn, in the ‘Annals and Magazine of Natural History,’ vol. iv. p. 239 *et seq.*; but the two are so repeatedly contrasted that we could never doubt that the names referred to different animals, as in the following passage of Seneca:—

“Tibi dant variæ pectora tigris,
Tibi villosi terga bisontes
Latisque feri cornibus uri.”—HIPPOL., *Act I. v. 63.*

The most striking feature of each animal, from what we know of the still-living bison and of the sub-fossil skulls of the huge taurine found

in the peat-bogs, being here distinctly indicated. "Wide-horned" might indeed suit the *Bison priscus* type, of a long anterior and far ante-human period, but is much more applicable to the great extinct taurine than to the modern type of bison. Again, Professor Owen, in common with the other writers on the subject, quotes a very famous couplet, as follows:—"It is remarkable that the two kinds of great wild oxen recorded in the 'Niebelungen Lied' of the twelfth century, as having been slain with other beasts of chase in the great hunt of the forest of Worms, are mentioned under the same names which they received from the Romans.

'Dar nach schlouch er schiere, einen wisent und einen elch,
Starcher ure viere, und einen grimmen schelch.

'After this he straightway slew a bison and an elk,
Of the strong uri four, and a single fierce schelch.'

Which last is believed by some to be the famous so-called 'Irish elk' of common parlance, though Owen is decidedly opposed to that opinion, while offering no other suggestion beyond an allusion to the superstitious fables which abound in that romance. Other authors would identify the schelch with a lynx!

The fact is, that the Roman names are derived obviously from the Teuton. As Professor Nilsson remarks, "The denomination 'urox' is derived from the language which the Germanic race seems to have had in common in the earliest times, and signifies 'forest ox,' wild ox (*Bos sylvestris*), for 'ur' or 'or' signifies 'forest' or 'wood,' 'wilder-ness,' and is still used in many places in Sweden, Norway and Iceland. * * * Also, in the older German, 'ur' signifies 'wood,' 'forest,' but has, in compositions of later times, been changed to 'auer;' *ex. gr.* 'auerochs,' *auerhahn*. The Romans, when in Germany, first heard the word 'urocs,' and as they generally changed all names after the fashion of their language, turned it into 'urus.' The uroxen which were conveyed to Rome, and highly prized in the bull-fights of the circus, were by the ignorant confounded with the African Antilopine 'bubalis,'—an error which Pliny notices; for example:—

"Illi cessit atrox bubalus atque bison."—MARTIAL, *Spect.* 23.

"By our forefathers in Scandinavia, as well as in Germany, this wild animal is, however, not called 'urox,' but 'ur,' or 'ure,' as in the poem of the 'Niebelungen,'—thence 'ura-horn' in our old Sagas. In certain provinces an angry bull is still called 'ure.' The canton of Uri,

in Switzerland, takes its name from this animal, and bears a bull's head in its arms."

The name "bison" is equally of Teutonic origin, and Cuvier thought that "wisent," &c., are derived from the German "bisam" (musk); but Dr. Weissenborn suggests, far more plausibly, that "bisam" is derived from the name of the animal in which the smell of musk forms so striking a feature. This author, however, also suggests that the name "bison" may still be of Greek origin, derived from the Greek verb signifying "to cough;" whence "bison," the coughing ox, as the voice of this animal must have struck the Greeks as much as that of the *Bos grunniens* did the travellers in Tibet; and in this respect the Indian humped bull resembles the bison, its voice, however, being even more like a cough than a grunt, while that of the cow is also as unlike the low of the European cow as can well be. The latter explanation of the word "bison" we take to be founded on a mere coincidence.

Professor Nilsson remarks of the *urus*, "This colossal species of ox, to judge from the skeleton, resembles almost the tame ox in form and the proportions of its body, but in its bulk is far larger. To judge from the magnitude of the horn-cores, it had much larger horns, even larger than the long-horned breed of cattle found in the Campania of Rome. According to all the accounts the colour of this ox was black; it had white horns with long black points; the hide was covered with hair, like the tame ox, but it was shorter and smooth, with the exception of the forehead, where it was long and curly.*

"The only specimens which we now possess of this extinct wild ox, are some skeletons dug up, of which two are at present preserved here, at the Museum of the University of Lund, where are also preserved about a dozen of skulls of earlier and later specimens. * * *

"In the Museum of the Royal Academy are fragments of the cranium

* Lengthened and curly hair on the forehead is, indeed, an especial feature of the present group of taurines, as before remarked, and not only as compared with the smooth-fronted humped cattle, in which hardly a tendency to lengthened hair upon the forehead is commonly shown, but equally with the third or flat-horned group of taurines, as the *gaour*, *gaya*, *banteng*, &c. True, Mr. Hodgson figures his *Gourigau* with a very curly forehead ('*Journal of the Asiatic Society*,' x. 470); but he describes the hair there as merely "a little elongated and slightly waved or curled" (p. 464); and of several *gaour*-heads, with the skin on, that we happen to have seen, not one presented anything like the curly front of an English bull, and in fact the lengthening of the hair had to be looked for to be observed at all, and its waviness still more so. The hair of the forehead is a little elongated also in the *gaya* and *banteng*, but only noticeably so when specially examined.

of the urox, which must have belonged to an animal more than 12 feet in length from the nape to the root of the tail, and $6\frac{1}{2}$ feet high. On one the distance between the base of the horns above is $9\frac{1}{2}$ inches, below $13\frac{1}{2}$ inches; the thickness at the root 15 inches [*i. e.* of the bony horn-cores! The skull of a cow in the British Museum, figured by Professor Owen, measures 30 inches from crown to tips of inter-maxillaries!] The largest Scanian ox I have seen," continues Professor Nilsson, "and which was of an unusually large size, measured in length, from the nape to the root of the tail, 8 feet, and was 5 feet high over the mane. When we now consider that bulls and cows never reach the size that oxen do, and that we ought to compare the bull or the cow to the wild ox kind, we shall then easily perceive that this last-mentioned was much larger than the tame ox, and perhaps he was even somewhat bigger in the southern regions, for example, in Germany, than here in Sweden. Cæsar's account that the urus was '*magnitudine paulo infra elephantos*,' was not so exaggerated as one has imagined."

The size of the urus may, in fact, be estimated as at least one-third larger, in linear dimensions, than the largest breeds of existing European cattle, and with proportionally even larger and longer horns than certain Italian, Sicilian and Hungarian bullocks, which are noted for the size of these appendages. Such were the formidable animals which Julius Cæsar describes as both strong and swift, at the same time so spiteful that they spared neither man nor other creature when they once caught sight of them. With the chase of these animals the Germanic youth became hardened, and the greater the number of horns of dead oxen they could exhibit the more highly were they esteemed.—(Bell. Gall. vol. vi. chap. 28.) One of Professor Nilsson's specimens "has on its back a palpable mark of a wound from a javelin. Several celebrated anatomists and physiologists of the present day, among whom," he remarks, "I need only mention the names of John Müller, of Berlin, and And. Retzius, of Stockholm, have inspected this skeleton, and are unanimous in the opinion that the hole in question upon the backbone is the consequence of a wound which, during the life of the animal, was made by the hand of man. The animal must have been very young, probably only a calf, when it was wounded. The huntsman who cast the javelin must have stood before it. * * * It was yet young when it died, probably not more than three or four years old, and not unlikely was drowned by falling through the ice into the water, where, in after times, a turf-bog has formed over it. The skeleton lay

with its head downwards, and one of its horns had penetrated deep into the blue clay which formed the bottom under the turf." *

A middle-sized European taurine is named *Bos frontosus* by Professor Nilsson. Its remains "are found in turf-bogs in Southern Scania, and in such a state as plainly shows that they belonged to a more ancient period than that in which tame cattle existed in this country [Sweden]. This species has lived in Scania contemporaneously with the *Bos primogenius* and *Bison europæus*; that it has also been found in England is shown by a cranium in the British Museum. As with us it belongs to the country's oldest 'post-pliocene Fauna.' * * * If ever it was tamed, and thereby in the course of time contributed to form some of the tame races of cattle, it must have been the lesser large growth, small-horned and often hornless, which is to be found in the mountains of Norway, and which has a high protuberance between the setting on of the horns above the nape."

A third is the *Bos longifrons* of Owen, small and of slender build, and elaborately described by Nilsson. Found in turf-bogs, and in relatively older beds, together with bones of elephant and rhinoceros. Professor Owen thinks it probable that the small shaggy Highland and Welch cattle ("kyloes" and "runts"), with short or often no horns, are the domesticated descendants of *Bos longifrons*. †

Professor Nilsson sums up by remarking that, "We believe we come nearest to the truth in this difficult subject, if we assume—

"1. That the large-sized lowland races, with flat foreheads, and for the most part large horns, descend from the urus (*Bos primogenius*),

* According to Colonel C. Hamilton Smith, "the bull-fights in Spain originated in the chase of the wild urus; and a Celtiberian vase, with an undecyphered Celtiberian inscription, represents the animal and its hunter." The Spanish bull-fights are generally supposed to have descended from the Roman combats of the circus.

† Within the last two or three years we have read in one of the scientific periodicals, but just now have sought in vain for the notice, of a quantity of bones that were dug up in some part of England, together with other remains, of what seemed to be the relics of a grand feast, held probably during the Roman domination of Britain (if we mistake not, some Roman coins were found associated). There were skulls and other remains of *Bos longifrons*, quite undistinguishable in form from the antique fossil, whether wild or domesticated, which of course remains a question; but Cuvier figures, in his 'Ossements Fossiles,' the skull of a small Scottish Highland ox (as we take it to be), which can scarcely be other than a domesticated descendant of that particular aboriginal species. We also happen to possess a drawing of the skull of a small Highland bull, with descending horns, as in Cuvier's figure, which we have no hesitation in referring to the antique species. If we mistake not, the discovery of the quantity of bones above mentioned, is recorded in the first volume of the 'Proceedings of the Linnean Society,' which does not happen to be available to us just now.

and came into Sweden with a race of people who immigrated from the south and west.

"2. The somewhat small-growth Highland races, with high occiput, and small or no horns, descend from the high-necked ox (*Bos frontosus*).

"3. How far the small-grown hornless Finn-ko race descends from the dwarf ox (*Bos longifrons*) may be more fully determined through future investigations.

"We can take it for a given and general rule," he adds, "that the tame race is always less than the wild species from which it springs."* Of this we are not so sure. Indubitably the larger breeds of domestic rabbits, geese and ducks, pigeons and common fowls, vastly exceed in size their wild progenitors; and the heavy dray-horse is probably another instance. We therefore feel a difficulty in reconciling even the largest races of humpless domestic cattle with the gigantic urus. The probability is, that other and unknown wild races have contributed to produce the domestic cattle of Europe and Northern Asia,—*e. g.* that formerly inhabiting the Ardennes, &c. (if different from the bison), even the Assyrian wild cattle, and perhaps more that we know not of; and the races so originating being now variously intermingled. An exceedingly near congener of the urus, but smaller, existed in the Indian fossil *Bos namadicus*;† and it is likely that others have existed which may yet be recovered in a sub-fossil state. Moreover, this supposed multiplicity of origin of the races of domestic humpless cattle may serve to hint the probability of more than one primal origin for the humped races, varying, as they do, so immensely in size, and more or less in a few other particulars.

The name *Bos taurus*, accordingly, seems to crumble to pieces like *Ovis aries*, *Capra hircus* and one or two more; but will always be useful in designating the aggregate of the particular domestic group, as apart from the humped races, which most assuredly have no common origin with the others.

We conclude this long notice of the present group of taurines by giving some measurements of large bullock-horns, which we took many years ago in the Museum of the Royal College of Surgeons, London. What the horns of an ox urus might have attained to we are almost afraid to conjecture.

* Professor Nilsson's admirable treatise will be found translated in the 'Annals and Magazine of Natural History,' Second Series, vol. iv., pp. 256, 349 and 415.

† There is a fine skull of this species at the Museum of the Geological Survey Office, Calcutta.

Lithuanian ox (No. 1084 of Museum Catalogue). Absolutely similar in flexure to *B. primogenius*. White with black tips; 28 inches long, 12 inches in girth, and 88 inches from tip to tip.

Transylvanian ox (No. 1087). Colour black; 3 feet long, and 13 inches round at base.

Italian ox (No. 1088). Mottled white, dark-tipped; 37 inches long, 13 inches round at base.

Remarkable pair brought from America (No. 1091). Slender and curved as in the more ancient type of *B. primogenius*; 49 inches long, 12 inches round at base, and from tip to tip—following the curvature outside, and including forehead—10 feet 4 inches.

From a note supplied by Mr. John Stanislaus Bell, who resided some time in the interior of Circassia, we cite that “there were no cattle of a humped breed, nor any with coats so shaggy as those of our Highlands. The only remark I recollect to have made was, that there had been much mixture of Highland and Lowland breeds, from the low stature and short and slightly curved horns of some, and large ponderous frame and huge curved horns of others; while the colours of all seem to embrace all the varieties we have in our island.”

Colonel C. H. Smith remarks, that “the breeds of the Kirghiz and Kalmuk Tartars, those of Podolia and the Ukraine, of European Turkey, of Hungary, and of the Roman States, are amongst the largest known. They are nearly all distinguished by ample horns spreading sideways, then forwards and upwards, with dark points; their colour [that of the horns] is a bluish ash passing to black. That in the Papal dominions is not found represented in the ancient bas-reliefs of Rome, but was introduced most probably by the Goths, or at the same time with the buffalo.*

With this quotation we terminate our somewhat rapid notice of the European type of taurines.

(To be continued.)

Reason and Instinct. By the REV. J. C. ATKINSON, M.A.

In the part of the inquiry on which we are now about to enter, a degree of intricacy is noticeable at the outset, which may throw sensible obstacles in the way of our arriving at a satisfactory conclusion.

* We have elsewhere met with the statement that buffaloes were introduced into Italy by the Lombards in the sixth century.

We have already established, from the results of observation, that a vast variety of animals, beginning with man at the head of the scale, and proceeding downwards, manifest, in addition to the workings of Instinct—whether more or less potential and operative—certain peculiarities of conduct, which can only be attributed to the possession and the action of a power of Reasoning. And we have also glanced at what appeared to be sufficient reason for arriving, *à priori*, at the conclusion that such would be the case; those reasons originating in the fact that there is valid ground for supposing the minds of the inferior animals to be essentially of the same nature as that of the human race; and that therefore it would be strictly reasonable to look for general features of resemblance in the different series of actions performed by the animals in question; the resemblance, of course,—however variable in degree,—being such as must result from the operation of the same or similar disposing causes, but combined for operation in very variable degrees. And, from the results of observation, thus reinforced by those of a course of independent reasoning, we deduced the conclusion that Instinct presupposes Reason; at least with certain limitations, and subject to certain definitions.

Our first apparent difficulty is,—it may be from entire want of information,—that in not a few of not the lowest animals in the scale of Creation, we find certain indications of Instinct as an influential principle of action, but scarcely any of Reason; I say, in not a few of not the lowest,—for there seems to be but little reason for believing that in many of the lowest gradations in animal life there is any power of action, properly so-called—that is, of conscious action—at all. Most of the movements of such creatures, perhaps even all their movements—in other words, every individual evidence of their possession of animal life—seem to be due to organic sensibility or irritability, and to that only. Take the familiar illustration of the oyster, whose life even is almost made a jest of,—and there are hosts of other creatures even lower than the oyster in Nature's animated chain, we scarcely venture to raise the question that it may procure its food and propagate its species, and by the use of the limited means for that purpose at its disposal, avoid certain risks to its well-being or continued existence, through Instinct. We seem forced to conclude that it has no consciousness, but a faculty of Sensation we concede; although, even in this, it must be observed, we are proceeding in the dark; for what do we know—not assume as known—but really know of these and kindred matters, in connection with the oyster and other similar, or lower forms of existence? We reason from what we do

know, and by analogy, to what we do not know; and certainly it is conceivable that our conclusions may be wrong.

But I am sure of this, that whether or no we are wrong in denying the presence, at least, the operation of Instinct in all these creatures, the Instinct of those creatures in which the presence and influence of that Power is only just displayed is very different in power or degree (probably not the least so in nature), and in results, from that of the alligator, the salmon, the swallow or the rabbit. In the one case, it is a stream flowing on to its outlet, but a stream of small volume and inconsiderable motion; and one or two small mouths are sufficient for its debouchure. In the other case,—that of the higher animals,—on the contrary, the stream is of greater—it may be, vastly greater—volume and velocity; and it rushes on to the ocean of Action through many and various and considerable branches and outlets.

I think that this is an important consideration:—that Instinct—assuming that Power or Attribute or Essence to be the same in all cases; viz., a “determination to act, given by Almighty Wisdom”—acts with different degrees of intensity, as estimated by its collective results, in the different orders of creatures whose conduct is perceptibly influenced by it. I mean, that in some—at the lower end, so to speak, of an ascending scale—the operation or influence of unquestionable Instinct is only just recognisable with sufficient distinctness; in others near the other end of the scale it is very strong and influential indeed; and that between these extremes every intermediate modification of power and energy in its action may be met with. That this observation is well-founded, I think scarcely any one will be disposed to deny who compares the instinctive actions,—say of an earthworm, a snail or a caterpillar with those of a wild duck, a dog or a monkey,—and then bears in mind the list of heads, confessedly imperfect, under which the instinctive actions of animals must be arranged, and how remarkably, as we descend the scale of animated life, the decrease of evidences of instinctive action, in its strongest forms, keeps pace with the descent. It would not be difficult to illustrate this point by successive comparisons of the instinctive tendencies and performances, taken separately and collectively, of a reptile with those of a fish, a bird, and a quadruped belonging to one of not the highest classes: and we shall adduce something of the sort a little further on.

And with a view to obviating the difficulty suggested above, I would observe that the successive comparisons just named will probably lead

the way to—perhaps even prompt—the suspicion, that where Instinct is very inert in the exercise of its influences, there Intelligence also must be found to be proportionably low: that as the impulses of Instinct become more pronounced and decisive, the operation of some other motive to action—also of variable power, and sustaining accessions of strength co-ordinate to those of Instinct itself—may also present unmistakeable evidences of its presence and potency; this other motive being, in plain terms, the motive of Reason and Will.

And certainly, the suspicion, once aroused, will, in no long time, be converted into conviction: Instinct and Reason will appear to go hand in hand together, at least up to a certain point; at which this is seen to take an immense stride in advance, that to become, as it were, oppressed and obscure, and more and more unable to exhibit either its power or its presence, as heretofore. I do not mean that up to the point specified they keep even pace with each other; that a certain increased activity of the Instinctive agencies presupposes a certain corresponding and proportionate increase in the Intelligence or Rational faculties; but simply, that as we proceed from one class of animals to another, if we find Instinct is, in the new class, more strongly developed and more remarkably exercised than in that we have just passed from, we shall also find that in that class greater Intelligence also and greater Adaptiveness—without attempting to say how much greater—will be observed to prevail than in the former class. It may be then, that when we are investigating the case of an animal in which the manifestation of Instinct-agency is as low as possible consistently with admitting of recognition, the intelligence of the animal in question shall be so low as not to be discoverable. At the same time, while admitting the possibility of this, we ought to bear in mind that in very many of the cases which might, perhaps, be alleged as cases in point, we are, as yet, possessed of no information, sufficiently precise and close, as to the habits and lives of such creatures; no information such as only intimate acquaintance with them and the closest observation of their ways would furnish us with. And for my own part I feel little doubt that where we are fortunate enough to possess adequate information, the result will go to prove the truth of the theory that under the limitations above adverted to, Instinct presupposes Reason.

And certainly, as we proceed with an examination of the successive links of the chain, presenting—as we have said—up to a certain point, successive advances in the tokens and proofs of Instinct-energy, we shall meet with much to assure us that we ought not too

hastily to conclude that this or that quality cannot be then because we fail to recognise it at the outset of the inquiry. For we shall find, from time to time, certain Instincts themselves, under the influence of altered circumstances, fading away, almost dying out; only to recover their pristine force when the altered circumstances revert to their former type; and besides that, new habits and manners—certainly not due to Instinct at all—growing up and obtaining permanent subsistancy, in cases where nothing of the sort would have been looked for originally, and most certainly not found if looked for.

And now we have reached a point at which it may be permitted us to advert to the confirmation secured to our theory by the successive developments of the brain in the several classes of animals; noticing at the same time their corresponding psychical development, as we successively proceed from the lower to the highest classes of animated life.

I suppose that it can scarcely be seriously objected that the comparative Anatomy of the brain can have no connection with, or bearing on, the enquiry in which we are engaged. It seems as impossible to question the fact that the brain is the material organ through which, in the animal, Instinct acts, as that it is the organ through which, when more highly developed, true Reason or Intellect acts. Anatomy shows that from the simplest, indeed, most rudimentary form of brain in the lower animals, to its highest, most complete development, there is a mechanical contrivance and arrangement employed, identical as to its general principle, in all from the lowest to the highest; differing only in what may be called the degree of nicety and completeness and finish with which the plan is carried out in each successive step. In every creature in existence possessing a brain, however rudimentary, there are a series of nerves of sensation (few, or inconceivably many, as the case may be) which are the telegraphs to the brain of external incident; and there are nerves of motion, which are telegraphs from the brain, of instruction and direction for the various organs which are elements in the composition of each several creature's physical frame. And in addition to this principle of general identity, experiment steps in and declares authoritatively not only that there is no apparent or discernible difference between the uses and the operation of the nervous system in the highest animal and in the lowest, but that also such and such parts of its cerebral centre may be demonstrated to have and to fulfil such and such functions. So that, in point of fact, we may at once assume it to be placed quite beyond controversy that the entire brain, or some part or parts of it—the variation between the

whole and a part depending on the class in the animal series which may happen to be under discussion—is the mechanical engine through which Instinct acts upon the other faculties of the animal. Indeed a good deal has been already done in the direction of deciding what particular parts of the brain are connected with such and such Instinctive tendencies and operations : thus Sir B. Brodie says, “Those bodies situated in the base of the brain, to which in the human subject we give the names of *medulla oblongata*, *cerebellum*, *thalami*, *corpora striata* and *tubercula quadrigemina*, and the parts corresponding to these in other vertebrate animals, are connected with that class of phenomena which belong to the animal appetites and instincts.”—p. 175.

We proceed then with our endeavour to show that the Comparative Anatomy of the brain, from the most rudimentary to the most complete, in the various orders of animal life as contrasted with the different, but corresponding, degrees of development of Instinct and Intelligence jointly—displayed as each order in succession comes under observation—is not simply very interesting, but very significant likewise. And this, too, notwithstanding the fact that the sum-total of our information on the entire subject is confessedly, in many respects, meagre and unsatisfactory to a degree.

Commencing with a very brief notice of the nervous system of the Radiata, we find no traces of a brain or even of a brain substitute, properly so called. In some of the higher Echinoderms there is an apparent advance in the nervous apparatus and an occasional glimmer of something which looks like incipient Instinct. The instances adduced by Mr. Couch (Ill. Instinct, p. 12) are not only interesting but contain one more proof, if proofs were wanted, how invaluable accurate and abundant information as to the habits and peculiarities of the lower animals would be to us ; as they also suggest the more than possibility that Physiology has still much more to do than it has already done, in revealing to us the complete structure and uses of the nervous system and its separate components, especially in these lower classes : he says, “The class of star-fishes (*Asteriade*) show the earliest manifestation of an advance towards a true nervous system : for though seemingly very inert and destitute of intelligence they display some sagacity in the discovery and choice of food, as well as in the manner of seeking it. The common sea-hog or sea-egg (*Echinus Sphæra*) though apparently destitute of every sense, or possibility of regarding external objects by sight or hearing, will travel up the rods of a crab-pot, enter the opening, descend within, mount again

to the situation of the bait, and select the particular one that pleases it best."

Proceeding now to the Mollusca, we find in the lowest class of this department no very striking advance in nervous development over the creatures last noticed; but as we proceed with our investigations in the higher classes, we meet with what either is or may be regarded as a brain proper. A certain ganglion receives an accession of size, and at the same time is evidently charged with the performance of certain distinct functions, such as are unquestionably discharged by the true brain. But I cannot do better here than avail myself of Mr. Couch's able and lucid statement on this part of our present subject. "In this manner in the Molluscan Conchifera, there is a ganglionic distribution to the single organ termed the foot, by which voluntary motions are elicited; and we are thus enabled to judge that this enlarged portion answers to at least a portion of the cerebellum: and this is the earliest development of real brain to be met with in the ascending scale; and the advancement undoubtedly does not consist in the mere increase of size, but in an acquirement of some additional organization. The common mussel (*Mytilus Edulis*) possesses this foot and corresponding ganglion; and, therefore, though not capable of positive change of place, it is able to extend and direct the organ in such a manner as, with some approach to consciousness, to direct the application of its mooring threads or byssus, so as to secure stability of situation. The oyster, *Anomia* and kindred genera, which remain fixed by calcareous adhesion, are destitute of the foot and the ganglion, and are consequently among the lowest in the scale of nature of molluscan animals. But in the highest of these orders or families, the Gasteropods or cuttle fishes, not only is this nervous system much more highly organized and developed, but the ganglia begin to assume the form of a real brain, inclosed in a defensive case approaching to the nature of a cranium; and accordingly their faculties of intelligence and passion approach closely to those of fishes. They are capable of manifesting some degree of curiosity, as is seen in their moving up to a shining object to examine it; and in the presence of danger they become suddenly suffused with a decided blush of red, and then eject the contents of their ink-bag, by which they become shrouded from observation and baffle pursuit."—'Ill. Instinct,' pp. 10, 11.

Now it may be fairly remarked here that these creatures not only exhibit, in their actions, indications of Instinct in respect of fear, food-craving, sexual love, hybernation and local direction, but also, from time to time, at least faint traces of a power of action with an end

in view. The cuttle fish in discharging its ink must be guided by some sort of judgment; the garden snail, too, which not only retreats into its shell at the approach of apparent danger, such as the adhibition of the finger or other object, but after a pause issues and seems to be occupied in investigating the cause of disturbance, if it be still near but not actively offensive.

Our next step in advance brings us to the class of Fishes. Among these, universally, the mass of the brain is very small in proportion to the mass of the body, though the proportion is an exceedingly variable one; but still the encephalic mass consists of more parts, and those parts comparatively more developed. There is a cerebellum in addition to the spinal cord and medulla oblongata; and besides this, the optic lobes are well defined, and there are what appear to be rudimentary cerebral hemispheres; while in some, olfactory nerves are found also. Endless variations in relative size of these several ganglia are also found, as well as the variations of total size of brain already referred to, many of which already admit of illustration in the habits and peculiarities of the several fishes concerned, and about which no doubt progressive physiological and Natural History discoveries will reveal much more before long; but, on the whole, it is an unquestionable fact that the brain in the class of fish is, in respect of contrivance and development, an advanced and advancing organ. And on the other hand Instinct and Intelligence both keep pace, speaking generally, with the ascertained advance of the mental organ. The former operates, taking the class as a whole, in most of its accustomed channels,—powerfully in some. As cases in point I may cite the parental affection of some species for their ova or young; the strong evidences of the operation of the instinct of sexual love, which the history of others affords; the return to their breeding streams of others again; and the periodical arrival at, and passage beyond given points, of inexhaustible shoals of other varieties; and so on. In fact, the increased operation of Instinct in fishes is too evident to require more than passing notice or illustration; and, moreover, in strict analogy with the advanced organization of the brain, we find marked advances in Intelligence or towards Rationality in all the varieties of fish with which we have anything like a sufficiently intimate acquaintance. Thus, some of them are known to recognise sounds, and to connect with the sound the idea of food; some have recognised persons even, manifesting no great unwillingness to be even handled by some favoured one, but carefully avoiding familiarity with strangers; they certainly learn by experience, as in the case of the artificial fly, which is eagerly seized

the first time it is offered, and as obstinately rejected—however pertinaciously presented to them—on all subsequent occasions, if the cheat have been safely detected at the former trial. Similar intelligence is displayed also in another line. Almost all the fish which may be taken with a bait, whether natural or artificial, seem to feed on with perfect indifference, although sheep or cows or other quadrupeds are standing conspicuously, or feeding, on the bank of the stream or other water containing the fish; but if the angler displays himself carelessly and conspicuously, the rule is that the fish he wishes to capture will not take his bait; and it is a rule that does not admit of many exceptions. The clearer the water the more need to fish fine and far off; the higher the bank, the more necessity to get to its bottom, and by no means to make a public spectacle of yourself on its edge. Nay I have even thought, in some of my angling experiences, that my pointer dog, if he advanced a few paces in the direction in which my flies were thrown, effectually rendered all my skill to no purpose, while half a dozen sheep quietly feeding in the same place would have made scarcely any difference; and this certainly evidences a distinct power of comparison as possessed by the scaly tribe. No doubt, in the case of the artificial fly, rejected after experience once had of its fictitious nature, the impression produced by it on the mind of the fish is evanescent: it may be taken in the same place by the same fly the next day, or after discoloration and re-clearing of the water, and possibly even with a precisely similar fly sticking in some part of its mouth, but this simply proves that its memory is bad, and does not in the least degree affect our argument. Again, in ascertaining and selecting, and maintaining by force of arms, if necessary,—very likely using those means for the purpose of ejecting a former occupant of the position best calculated for furnishing a good supply of any coveted food (an established habit of divers fishes, which every angler, who knows even the rudiments of his science, is not slow to avail himself of, particularly in waters which are familiarly known to him),—fish manifest a principle of action which is clearly not instinctive, but depending on observation and experience, and therefore intelligent. The same point is strangely, though painfully, illustrated by the shark, which follows the course of the slave ship with inveterate pertinacity; or, it may be, the other ship in which a mortal sickness is raging and consigning daily victims to the deep.

The next step higher brings us to the Reptiles; among them—with different degrees of comparative variation, as before—we find, on the whole, a larger proportionate brain, and its constituent parts somewhat

more highly developed; and, at the same time, a gradual advance in both particulars as we ascend from the lower to the higher members of the class. And once more, in perfect analogy with what we have advanced in speaking of fishes, we meet with stronger instinctive impulse—stronger, that is, in the aggregate, or sum-total of instinct-influence—and correspondingly stronger developments of Intelligence. It is a sufficiently well-known fact that toads and frogs, tortoises, lizards and snakes* are all capable of domestication; and the mere fact of susceptibility to such influences as are implied in the word “domestication” at once invests those creatures to whom it can be correctly applied, with something very distinct from, and much in advance of, mere Instinct. The domesticated creature evinces in such of its actions, or series of actions, as give rise to the declaration that it is domesticated, the presence of memory, of confidence, of attachment. The confidence it manifests results, beyond doubt, from a process of reasoning founded on continued experiences recorded by means of memory, and becomes developed into personal attachment: and this, altogether independent of the fact, that a certain course of training is necessarily carried on, by which the domesticated creature is permanently affected in other ways besides those of its affections. And the inevitable inferences, thus deduced from a portion of the history of the reptile tribe, are sufficiently confirmed by a reference to the observed habits and peculiarities of others of the tribe still in the state of nature, and unsubjected to any influences beyond those which are, strictly speaking, natural to them. For the purpose of illustrating this remark, I must be content with a reference to observations made by Dr. Livingstone on some of the habits of the alligator, and a brief notice of the power of fascination undoubtedly possessed by many species of snakes. The alligators not only, like the fish already noticed, manifest considerable judgment in selecting favourable places as feeding-grounds, but display evidences of careful design in their attempts to seize their prey; thus one of these reptiles, on one bank of a river, is observed to

* I pass by without comment in the text the exaggerated idea of the craftiness and so-called wisdom of the serpent, which seems to have prevailed universally in the ancient world. Such expressions as “wise as serpents” are probably due to this idea as their origin, as also the fabulous tales recorded by Pliny and others as to the subtlety and astuteness of those creatures. I may observe also that whatever the reputation of those creatures for cunning or wisdom in these old myths, the enormous magnitude and might, as commonly attributed to them in ancient fable or tradition, is equally remarkable. Whence the origin of this popular and wide-spread impression of the attributes of the serpent is a question opening an ample field for a most resting and instructive enquiry.

notice a possible prey on the other bank, or rather entering the water from it; the wily creature sinks itself below the surface on its own side and swims under water swiftly across in the direction of its intended victim, the ripple on the water sufficing to reveal to the observant human eye, which was watching the evolutions of the brute, the secret path that would have been unnoticed by its destined quarry. This appears to me to be a most remarkable instance of intelligent design, and a distinct advance on any which, so far, is recorded of a fish.

The fascinating power possessed by serpents—and certainly by man and some other animals, at least in a degree—is a most remarkable power. Unfortunately we know too little of its nature and mode of operation, and of the means by which it is exercised, to render any argument founded upon it a safe one. It is alleged to reside in the eye of the snake employing it; and there is an unquestionable power resident in certain human eyes, both over mankind and over the lower animals. But whatever it be, and wherever situate, it seems to be perfectly volitional on the part of the reptile employing it. It is one means, among others, by use of which it procures its prey, and I believe nothing is more certain than that it does not make use of it, if it be enabled to secure its prey by other means; and if this be so it appears to argue a species of adaptiveness in its appliance by its possessor which renders the circumstance equally interesting to us, and for the same reason, with that anecdote of the alligator just quoted.

Our next advance places us among the Birds; and in this class, while we find a greatly advanced development of those parts of the brain which are believed to be connected with the various instincts, we find also, not perhaps a proportional, but still a very considerable, advance in the development of the cerebral hemispheres; and their connecting medium, the corpus callosum, begins now to have a rudimentary existence. In other words, those parts of the brain, believed with utter certainty to be connected with the higher functions of Reason and Will, begin to have a distinctly developed existence. It is hardly necessary to say the corresponding psychical advance, including under that term both instinctive and rational peculiarities, is certainly equally marked with that of the material organ through which those powers are enabled to act.

In point of fact, the presence and operation of Instinct is almost, or fully, as strongly and variously manifested in the different orders and families of birds as in any portion of the animal creation whatever;

and without question, on the whole, very much more decisively and distinctly than in any of the lower classes. Indeed, so remarkably is the truth of this statement borne in upon the observer, that we feel ourselves constrained to assent to the opinion expressed by a great physiological writer, that the bird is indeed the creature that of all others acts under the impulses of Instinct. And when we contemplate the wondrous skill with which the tiny architect constructs its first nest, or the marvellous power of self-guidance with which it wings its way, for hundreds on hundreds of untracked miles, or the readiness and decision and perfect mastery of its limbs with which the young water-bird, for instance, takes to its destined element, when yet but an hour or two old, or the wonderful discernment by which others go to their food,—their means of information and discovery being perfectly beyond the reach of any powers of investigation belonging to man,—or any other of the wonderful Instinct-prompted achievements of members of this class,—bearing in mind the while that oftentimes several of these marvellous powers are centred in one and the same individual,—it does seem difficult to attempt to gainsay the opinion we have just now quoted.

But, however marvellous the Instincts of the bird, the Intelligence of this class as a whole is, though less conspicuous, still a very real and important element in its character and qualities. The docility of many of even the wildest and fiercest members of the family; the remarkable adaptation of numbers of others to the influences of domestication; the strong personal attachments formed by hundreds and thousands, of endless varieties, to their owners or their companions, feathered or quadruped; the innumerable instances of cleverness, reasoning (within certain limits), judgment, comparison, persevering labour for a given end, combination to effect a desired object and the like,—all show the bird to be as much beyond the reptile in intelligence or rationality, as the latter is above the classes beneath that to which itself belongs.

The last step, before that which brings us to Man, places us among the Mammalia: here we find a remarkable development,—remarkable for its progressiveness as well as for its ultimate magnitude,—as we ascend the scale from the Marsupialia to the Quadrumana. The true brain from being but little in advance, in point of organization and relative magnitude, over that of the bird, becomes at last inferior, in proportionate size and development, only to that of man himself, while those portions of the encephalic mass which are appropriated to the several instincts, though maintaining positively some sort of relation to

the size of the animal, become, relatively to the continually increasing development and magnitude of the cerebral hemispheres, as continually less and less.

Instinct, then, in this class, according to the testimony of Physiology, should—without losing much or perhaps any of its intrinsic energy, as exhibited in preceding classes—cease to assert the paramount power and influence it has hitherto exerted: and accurate and trustworthy observation, so far as its results have yet been accumulated in anything like a satisfactory or sufficient amount, goes far towards supporting the inference. Instinct may be still, in the lowest classes, the influential motive to action, though still, in general terms, rather less so than in the bird; but somewhere between the lowest and the highest classes—it is perhaps impossible, in the present state of our knowledge, to fix the precise place where—there is a point at which Instinct, never ceasing throughout the class to exert its own appropriate power and produce the requisite results, yet seems to forego its hitherto imperious claims, and either to employ, in a much greater degree than ever before, or else become subservient to, the co-ordinate power of Rationality. Any way it is most certain, that as we go from link to link in the long chain presented by the Mammalia, whether it be that the beings composing those links, especially towards the higher part of the chain, are for the most part better and more familiarly known to us, or that the workings of their rational part or intellectual essence are more distinctly visible to us,—constellations, as it were, contrasted with nebulae,—we are, as our attention is roused to note their proceedings, sometimes almost startled, always strongly impressed with the signs and tokens and proofs that their mind is a reality,—a something far, very far beyond a mere engine of nothing better than instinctive workings.

J. C. ATKINSON.

Danby Parsonage, Grosmont, York,
February, 1859.

The Tiger "Jungla" and a Bull-calf of the gigantic Gaour (Bos gaurus) shipped for England.—By the "Nile," which proceeded down the river yesterday morning, we hear that the celebrated huge tiger "Jungla," the largest and most beautiful of the famous fighting tigers of Lucknow, is shipped for sale in England. This splendid animal is not only remarkable for his size, which far surpasses that of any tiger or lion yet seen in Europe, but for the extraordinary beauty of his colouring and markings, having all his body-stripes double: he is, moreover, extremely tame and gentle to those he knows; but many a big buffalo has been felled by his tremendous sledge-

hammer of a paw: there was, in fact, no sport at all about his method of procedure; he went most systematically to work, and the business was done in no time. In a civilized country he will of course have to forego the pleasure of such feats; but we doubt not that he will become an object of great admiration for his size and beauty. By the same vessel is likewise forwarded for sale in England a fine, healthy yearling bull-calf of that very rare animal to obtain alive, the gigantic gaour (*Bos gaurus*), which sportsmen in India persist in miscalling the bison: it is the largest of existing bovine animals, the finest bulls even exceeding 20½ hands high, measuring from the summit of the singularly elevated dorsal ridge (*vide* 'India Sporting Review,' new series, vol. iii. p. 329, and vol. v. p. 210). This indeed is one of the most remarkable features of the species, the spines of some of the dorsal vertebræ measuring 16 inches in length. Another characteristic of the adult animal consists in its very broad concave forehead, surmounted by a high transverse arched bony ridge between the horns; the skull is extraordinarily massive: we have seen one which, with the horns attached but minus the lower jaw, weighed exactly thirty pounds. The peculiar form of the head is scarcely even indicated in the yearling calf, and the animal is a very slow grower; we have heard of one which lived for three years in the possession of an officer in the Madras Presidency, and was still to all appearance a mere calf. This is doubtless the first gaour (*Bos gaurus*) ever shipped for Europe, and the species must not be confounded either with the gayal (*B. frontalis*) or with the banteng (*B. sondaicus*). Though only generally known as a wild animal, we have been assured that the gaour, in addition to the gayal, is domesticated in the interior of the Tippera hills. The calf at present on board the "Nile" retains not a vestige of wildness, but is as quiet and tractable as any ordinary domestic animal.————— Calcutta, December 8, 1858.

Occurrence of a Piebald Specimen of Mus rattus near Carlisle.—A beautiful piebald specimen of this small animal was caught at Coathill on the 6th of January, 1859. On one side of the animal is a large clear white patch, on the other several smaller ones; the head, neck and breast is of a lightish brown, intermixed with numerous jet-black hairs; the hinder part is of a similar colour.—Thomas Armstrong; 12, Barwise Court, English Street, Carlisle.

Showers of Feathers.—In reading a most interesting article by Captain Blakiston, in the 'Zoologist,' I was attracted by the following passage (Zool. 6324):—"While we were in that land of water-fowl below Cumberland, I witnessed a shower of feathers: as we sailed up a reach of the river with a fresh breeze, without the knowledge of a human being within many miles of us, it appeared to be snowing; this was nothing more than small feathers, and we supposed that at some Indian camp in the swamps to windward the operation of goose-plucking must be going on; these feathers had likely travelled many miles, and would continue while the breeze lasted." Now Herodotus, in speaking of the northern Scythian tribes says, "But as to the upper country, which lies to the north of the extreme inhabitants of the land, they say that it can neither be passed through nor discerned by the eye, on account of the showers of feathers (πτερόν μεχουμένων); for the earth and the air are so full of these that they effectually shut out the view."—(Book IV. chap. 7.) To this Mr. Blakesley appends the following note:—"This is a misrepresentation of the falling flakes of snow, which, in the old German mythology, was represented as feathers tumbling from the bed of

the goddess Holda, when she shook it in making it." In the thirty-first chapter of the same book Herodotus delivers a similar opinion in these words, "Concerning those feathers, of which, as the Scythians say, the air is so full that they are neither able to see the country that lies beyond them nor to travel through it, my opinion is this: in the upper parts of this land there are continual falls of snow, and these are less frequent in summer than in winter, as one would naturally suppose: whoever has observed, from close by, snow falling thickly, will understand what I say, for the snow resembles feathers; and owing to this severity of the climate the parts to the north of this region are uninhabitable: the feathers, then, is a name which the Scythians, in my opinion, give to the snow, indicating the similarity." I merely make these quotations for the purpose of ascertaining whether the theory of Captain Blakiston is to be received against that of Herodotus and Mr. Blakesley, and with the hope that an investigation of the subject may throw light on two passages of the great historian. It also shows that, as our researches in Natural History extend, so will other works become more comprehensive to us, and particularly the writings of Greek and Roman authors. Captain Blakiston does not say whether he was actually in the shower or not; and, should this meet his eye, I trust that he will make a further communication on the subject. If he only saw them at a distance, I must say that I incline to the opinion of Herodotus. In case of his ever being caught in a similar phenomenon, it would be worth while to send by post to England one or more of these feathers,—if they be *bonâ fide* goose-down, and not snow-flakes,—for this would settle the matter beyond doubt or dispute.—*T. W. Greene; Tonbridge, February 3, 1859.*

Occurrence of the Goshawk in Suffolk.—About three weeks since an immature female of this species was killed at Somerleyton, near Lowestoft, which much resembled in plumage the one lately obtained at Hampstead, in Norfolk, as recorded in the 'Zoologist' (Zool. 6326). This latter specimen was, I believe, shot by Mr. Gould, while on a visit to Sir Morton Peto, at Somerleyton.—*H. Stevenson; Norwich, February, 1859.*

The Jay a Bird of Prey.—As there are few recorded instances of this bird attacking and making prey of other birds, and having had the opportunity of witnessing this (supposed) rare fact, I think it worthy of being made a note of. About ten o'clock one morning, last March, I was looking into the garden from one of the windows of my house, and observing and hearing an unusual bustling and rustling among the branches of a tree, I soon perceived that a small bird was pursued by a larger one, when presently the lesser bird was struck down from the tree (shrieking and crying) to the ground, and was instantly followed by its unequal opponent, which seized the little bird in its claws and stood upon it, and was evidently exercising the muscular power of its talons, for the little bird kept up broken cries of alarm. The bigger bird very coolly gave a very systematic peck or dig with its bill into the body of the captive, then looked up and repeated the last-mentioned acts, with the same coolness and as systematically as before; the little bird at each thrust it received cried with convulsive ejaculations of distress, which grew fainter and fainter, until, as I suppose, for want of life, cried no more. My view of this butchering scene ended here, for the bird of might flew off with the body of the bird of lesser power. The smaller bird I did not satisfactorily determine the species, but it was the size of the titmouse (*P. caruleus*), and I believe it to be that species. The large bird was the jay (*Corvus glandarius*). All authors agree that the jay is a "shy bird;" it, however, exhibited no symptoms of shyness on this occasion, for it was daringly impudent,

carrying out his designs "right under my nose," and treated with unconcern (amounting to contempt) my uninterrupted "tapping at the window."—*J. J. Reading; Plymouth, January 26, 1859.*

Note on a new British Woodpecker.—The bird, which I describe, was shot by E. P. Cambridge, at Bloxworth Rectory, Dorset, December, 1836, from his bed-room window, as it crept amongst some low shrubs in one of the flower-beds on the lawn. We took it to be only a large and distinctly-marked specimen of *Picus minor*, noting especially at the time that it had more vivid red on the head and more white on the wings and back, and was larger than one or two other specimens of *Picus minor* which my brother had shot before; and I recollect well our hunting Bewick on the subject, and concluding that it might possibly be his "middle spotted woodpecker," but for the red on the head; however, the bird went to the stuffer's, and in due time came back labelled "least woodpecker, male adult." It was stuffed by Havell, at the Zoological Gallery, 77, Oxford Street, an establishment I know not how long since broken up and gone; from this time until April, 1856, the bird remained in my collection as "*Picus minor*," and was frequently seen, and by some experienced British ornithologists, but no one ever perceived that it was not *Picus minor*, until, in April, 1856, my friend, Mr. F. Bond, saw it was something strange almost as soon as he entered the room where it was, and taking it down, at once, with his usual acumen, pointed me out the distinctions from *Picus minor*. At my suggestion, he kindly took it and submitted it to the late Mr. Yarrell, who acknowledged its distinctness from *Picus minor*, but confessed himself ignorant of the species, and regretted that his last edition was either just out or had got too far on in the printer's hands to allow of its notice there: the examination of this bird was, I believe, almost one of the latest acts of Mr. Yarrell's life, and is very interesting. Shortly after this I made some notes of an American species in the Durham University Museum, labelled "*Picus pubescens*," and found them to agree in the main with my specimen; and since then it has been, until lately, in Mr. Bond's hands, waiting the examination and dictum of Mr. Gould. Mr. Gould examined it, and I cannot precisely understand what conclusion he came to, for all I heard of it was, that "he would like to see other specimens of the same species, from the same locality, before describing it. This would, doubtless, be highly satisfactory, but meanwhile (as getting these other specimens may take possibly some little time, seeing that it is now twenty-two years since this one was killed), I venture to request an insertion of this account and description, and hope any of the readers of the 'Zoologist' who possess British small spotted woodpeckers will compare their specimens, critically, with my description, as I consider it is not at all improbable that other British specimens exist and pass for *Picus minor*. As far as I can gather, from a desultory correspondence, neither Mr. Bond nor Mr. Gould were satisfied of its identity with *Picus pubescens*, though Mr. Bond considered it was nearer to that than to any other species. I have lately compared it with several American specimens of *Picus pubescens*, and also with a Scandinavian specimen of *Picus minor*, through the kind permission of the curator of the Derby Museum at Liverpool. The result of this comparison I subjoin to the description of my specimen, and, on the whole, after having also read carefully Audubon's descriptions of *Picus pubescens* and the allied species, and Cassin's observations on *Picus pubescens*, and the distinctive marks of American woodpeckers in general, I believe it to be identical with *Picus pubescens* (the downy woodpecker); still there is one main difference in it from all the specimens of *Picus pubescens* I have seen myself, and that is that mine has distinct black bars

across the white on the back, while those had in no case the white on the back barred at all. Some other minor differences will be mentioned in the "distinctions from *Picus pubescens*." The description of my specimen is as follows:—

Length from tip of beak to tip of tail $6\frac{1}{2}$ in. Length of upper mandible $\frac{1}{2}$ in. Span of toes and claws $1\frac{1}{2}$ inch. Capistrum dirty white; bristly feathers projecting over the nostrils dirty white, mixed with blackish. Forehead broadly black. Top of the head crimson-red; the red extending quite to the nape of the neck, and meeting that and the upper part of the back, which are jet black. From the eye a broad black streak runs back, and, at the upper corner of its extremity, which is truncate, and wider than near the eye, it meets the crimson of the head and black part of the back, forming a continuation of the black forehead. From the corner of the mouth a blackish streak runs downwards, and dilates itself into a black patch beneath the point of the metacarpus of the closed wing. The space between these two black streaks is white, with a yellowish cast, and forms an L-shaped isolated marking. Between the crimson on the head and the black streak from the eye is also formed an isolated longish oval marking of white with a yellowish cast. The whole of the under side to the vent, inclusive, is dirty white, with a brownish yellow cast. Wings jet black; the lesser coverts tipped with pure white; the greater coverts, tertials and scapulars tipped and spotted with white; the primaries and secondaries tipped and spotted with white along the webs; all these white markings, when the wing is closed, form eight regular white bars (beside the white tips on the primaries); the first and second bars are formed by the tips on the lesser coverts and spots on greater coverts; the third by the tips on the greater coverts and spots on the tertials and scapulars; these three bars are curved; the fourth bar consists of spots on the outer webs of the primaries and secondaries; this bar (as well as all those of the next) is sharply angulated, and but little of it is seen in the closed wing, being hidden under the greater coverts and scapulars; the fifth, sixth and seventh bars consist of spots on the outer webs of the primaries and outer and inner webs and tips of the secondaries and on the scapulars; the eighth bar consists of three or four spots on the outer webs of the primaries and tip of the first secondary; the black intervals between these bars are all well marked, though of different widths; those between the three bars on the coverts being prettily and regularly vandyked. Back white, with a yellow cast, and barred with black. The two outer feathers of the tail on each side white, with one or two black markings; the next two black, with irregular white margins, and the middle feathers black; under side of the tail irregularly barred with black.

The main distinctions that I could trace between this bird and *Picus minor* are as follows:—First, the greater size, *Picus minor* being $5\frac{1}{2}$ to $5\frac{3}{4}$ in. long, only. Second, *Picus minor* has only five bars across the wings; three are across the primaries and secondaries and scapulars and two on the coverts; wanting entirely that on the lesser coverts nearest the shoulder, and the two nearest the tips of the primaries; also the black intervals in *Picus minor* are not vandyked, and all are more regular on the edge and in width more equal: Yarrell's description only gives four white bars, but he evidently overlooked that one which is almost hidden under the coverts and scapulars. Third, *Picus minor* has no black streak from the eye: this alone is sufficient to distinguish it at a glance; the red on the head in *Picus minor* is also much less vivid and does not reach so far down the nape of the neck.

The main distinctions between my specimen and those of *P. pubescens*, examined in the Liverpool Museum, appeared to me as follows:—*Picus pubescens* had only a

narrow red occipital band, agreeing exactly with Audubon's figure and description. The value, however, of this distinction does not seem to be much, as we know that the immature males of *Picus major* have the head much suffused with crimson, while in adult birds it becomes merely a small patch at the occiput; and John Cassin ('Illustrations of Birds of North America,' published at Philadelphia, 1856), says "the young male of *Picus pubescens* has the head above entirely crimson; the adult, a narrow occipital band." Second, the back in *Picus pubescens* was pure white, without any trace of black bars, while mine is distinctly barred: Audubon makes no mention of black bars on the back. Third, the black stripe from the eye in *Picus pubescens* differs in commencing wider than the eye, swelling out in the centre and contracting gradually to the crimson band; while in my specimen it is narrowest by the eye, equal to the width of the eye only, and widens gradually, ending abruptly truncated. Fourth, the white bar nearest the shoulder in one specimen of *Picus pubescens*, examined, was hardly apparent, consisting only of a few confused spots, and not forming a distinct bar from the second bar; in another specimen, the development of this bar was more complete, but nothing like, in distinctness and regularity, my specimen, where the black interval is very clear. Fifth, Length of the two *Picus pubescens* examined, was $6\frac{1}{2}$ in., that of mine $6\frac{1}{2}$ in.; Audubon's measurement $6\frac{1}{2}$ in.; widest span of toes and claws in *Picus pubescens* $1\frac{1}{2}$ in.; in mine, $1\frac{1}{2}$ in.; the bill of *Picus pubescens* was less robust than mine. Sixth, under parts of *Picus pubescens* much whiter than in mine, which are more like the under parts of *Picus minor*. A description in Audubon of a species he calls "*Picus Gairdnerii*" (which appears, however, to be only a variety of *Picus pubescens*) agreed with mine in the quantity of crimson on the head.

I have given these distinctions, minutely, more for the purpose of showing that I am of opinion myself that my bird is "*Picus pubescens*," than to try and show it to be distinct. Its distinctness from *Picus minor* is clear enough, and, but for the barred back, which may, however, be only the immature state, there appears but little in the above distinctions to justify its claim to a "species" of itself. My chief reason for wishing the above descriptions to be made known, is to get collectors to compare with them all their specimens of British small spotted woodpeckers, and also to get further descriptions of the true *Picus pubescens*. I have been minute in describing the shooting, &c. of my specimen, because it is necessary to be particular when a native of a foreign land is brought forth as an inhabitant of Britain, after having been killed so long.—*O. Pickard-Cambridge; Southport, Lancashire, February 4, 1859.*

A Hen catching a Mouse.—Whilst one of my brothers was out riding this morning, in passing a farmyard, he saw a barn-fowl (a hen) seize a mouse which was running into a stack, catch it in its beak, and throw it about a foot up into the air; this it repeated three or four times, letting it come on the ground each time; not being a naturalist, he did not stay to see the result, but he says it was in a very fair way of being killed.—*W. H. Leatham, Jun.,; Hemsworth Hall, near Pontefract, Yorkshire, February 5, 1859.*

Occurrence of the Little Bustard near Padstow.—A female little bustard was shot in a turnip-field very near the town of Padstow, in the early part of January last, and the fact was kindly communicated by C. G. P. Brune, Esq., of Prideaux Place, Padstow.—*Edward Hearle Rodd; Penzance, February 10, 1859.*

Birds Singing at Night.—On the night of Tuesday, the 18th ult., or rather the 25th, the moonlight was particularly strong, from the vertical position of the full

moon. A friend of mine returned home late that night to his country residence, and a sudden violent gust of wind and rain overtook him on his way home. On his approaching a woody valley, where his residence lies, after the shower had passed away, between one and two o'clock in the morning, redbreasts and thrushes were in full song, principally redbreasts. It may be accounted for thus: the mornings in January had been very dark and sluggish; the gust of wind had probably awakened the birds, and, from the before-mentioned strong moonlight, they most likely thought it was day-break.—*Id.*

Occurrence of the Black Swan on the South Coast.—Mr. Thomas Clark, in the 'Zoologist' (Zool. 6379), asks, respecting the black swans at North Moor, Bridgewater, Is it probable that they escaped from some preserve? The fact of the tameness mentioned appears to indicate a preserve, but in the 'Times,' of November 1st, 1855, the following may be read, which would establish the black swan as a British bird, if true:—"During the past week a bird of unusual size was observed flying towards Exmouth, on the Devonshire coast, from the sea. On arriving near land it wheeled round, and after flying back some distance, was seen through a glass to descend into the sea, near Straight Point. Two men immediately put off, and were fortunate enough to capture it. On examination, it turned out to be a black swan; it was poor in flesh, and evidently exhausted by long flight, but showed by its plumage and other indications that it had never been in captivity. It is supposed that by a long succession of storms it has been driven from the Pacific, its only known habitation." I remarked there had been very severe gales for some time past and made a note of it at the time.—*George Dawson Rowley; 5, Peel Terrace, Brighton, February 12, 1859.*

Occurrence of the Longtailed Duck on the Norfolk Coast.—In my last notice of winter arrivals on our coast I mentioned, as a not uncommon event, at this season, the capture of an immature specimen of *Harelda glacialis*, off Blakeney, the young birds of this species taking a far wider range, even in mild winter, than adults. I have now, however, to record the very unusual fact of five adult specimens of this truly Arctic duck having been recently killed on the sea-shore, at Winterton, near Yarmouth. The first of these birds, a male, in full winter-plumage, was shot on the 10th of January; the other two pairs, male and female, respectively between the 15th and 17th, and being sent up to Norwich for preservation I had an early opportunity of examining them. The females exhibited the usual sombre tints of the winter-plumage, and the males that rich contrast of colouring which makes them so conspicuous in collections. The one first killed was, if anything, the darkest on the breast, with scapulars more white than gray, but three finer specimens I never had the chance of handling. To what cause, accidental or otherwise, we are indebted for the appearance of these hardy visitors during this mildest of winters, is a matter of no little speculation. A season so unprofitable to the wild-fowl shooter I never remember, whilst the absence from our shores of the most common species would betoken no great amount of cold as yet in more northern regions. The long tailed ducks, however, according to Yarrell, are amongst the last to proceed southward, even in the most severe weather, "remaining as long as any surface of water continues unfrozen," and certainly, during the sharpest winters we have had within the last ten years, I have looked in vain for an adult *Harelda* in this country, amongst many rarities.—*H. Stevenson; Norwich, February, 1859.*

Occurrence of the Fulmar Petrel in Barnstaple.—On the afternoon of Wednesday,

the 2nd of February, a strange sea-bird was observed flying low over the people's heads in the fish-market at Barnstaple, the fish-market being near the river (Taw). A violent gale from the N.W. had been blowing all day. The bird continued flying up and down the street for some little time, until at last it was shot from the street by some person who had gone for a gun. It was taken to the bird-stuffer in the town, where I saw it in the flesh, and found it to be a young bird of the fulmar petrel. It had, extraordinary to relate, an immense wen-like protuberance on the neck; this protuberance was the size of a small orange, perfectly spherical, and to a great extent nude of feathers; the skin of the bare part seemed hard and horny. The bird-stuffer skinned the bird while I was present, but was obliged first of all to remove the wen from the neck, which came off without much difficulty: the body of the bird was fleshy and well covered with fat; all its internal parts seemed healthy, and, from dissecting it, I found it to be a young male. The tumour which was removed from the neck weighed a trifle under three ounces, and, on making an incision in it, I found it composed of a firm, fleshy substance. It is probable that the bird must have been incommoded and weakened by this tumour, so as to have been unable to contend against the strong winds which drove it to a place so far south. A specimen of the longtailed duck was shot close to this town towards the end of last November: this is another bird not often obtained so far south as this.—*Murray A. Mathews; Raleigh, near Barnstaple, February 5, 1859.*

Occurrence of the Adult Glaucous Gull in Orkney.—The winter here has been very stormy, but unusually mild: I procured an adult specimen of the glaucous gull (*Larus glaucus*) on New Year's day; this is only the third adult specimen I have seen during my five years' residence at Stromness. We have seen two immature specimens this winter, but did not obtain either: some winters we have seen as many as half-a-dozen immature specimens.—*Robert Dunn; Stromness, Orkney, January 24, 1859.*

Interesting Fossil Bones in Philadelphia.—A remarkable exhibition of fossil bones was made by Mr. Foulke and Dr. Leidy, before the Academy of Natural Sciences, at a very full meeting, last evening, to which the attention of our readers is invited, because the new light which it shed upon, and the greatly enhancing interest it gave to, the common bone contents of the innumerable marl-pits of the Atlantic seaboard, make it, in a scientific light, the duty, and probably will make it the pleasure, of the intelligent and liberal-minded living in their vicinity to watch their periodical excavation, and secure still more valuable relics than any yet discovered. * * * * A month or two ago, according to Mr. Foulke's graphic historical exordium, he visited a neighbour's house, near his own summer residence at Haddonfield, in New Jersey, a few miles out from Camden, on the Camden and Atlantic Railroad; and, in the course of conversation, Mr. Hopkins described from memory some teeth and vertebrae which had been thrown out from a marl-pit on his property, not less than twenty years ago: one by one they had been given away to curious friends or casual acquaintances, or lost: he could remember no long or large bones, but only teeth and vertebrae. Receiving permission to re-open the spot, Mr. Foulke set a gang of marl-diggers to work at the bottom of a small ravine, near where it opens upon Cooper's Creek, and about twenty feet below the surrounding farm-land of the neighbourhood; three or four feet of soil brought the workmen to the face of the marl, and discovering the old

digging, went down along its edge, six or seven feet, through a small bed of shells, to where the bones had been exhumed; and here, sure enough, were the rest of them untouched; a hind thigh-bone 40 inches long, a shin-bone 35 inches long, a splint-bone to match, an arm-bone 19 inches long, with one of the fore arm-bones to match, dozens of vertebræ, neck, back and tail, huge masses of the pelvis and shoulder-blade, some few bones of the foot or toe-joints, and a tooth,—all lying upon a second bed of shells: as the teeth were all-important and were liable to be disturbed, the soil of the pit was re-dug and carefully examined, and with great success. When Dr. Leidy was informed of the discovery, he and some other Members of the Academy, Mr. Lea and Dr. Le Conte among them, saw nothing in it but the common occurrence of Mastodon or mammoth bones entombed in an ancient bog. On going to the rooms, to which they had been with care conveyed, he recognised at a glance the evidences of their reptilian character: since then, weeks of patient adjustment and study have resulted in the noble lecture which he gave us last evening upon the Hadrosaurus Foulki of the green sand of America. He first enumerated the indications of reptilian form; the thigh-bone ossified, not like the mammals, from half-a-dozen centres, but from one single centre, as in the iguana, alligator, &c., and furrowed at the ends with the large blood-vessels of reptile-joints, instead of being smooth as in all mammalians. The whole form of the bones was different, and the vertebræ of the tail were armed above with the backward-leaning processes, and below with the loosely-shaped and likewise backward-leaning spines, which characterize the powerful, long, thin, deep reptilian tail. The teeth were also reptilian, and not carnivorous, like the crocodile's, but herbivorous, like the iguana's, and most curiously shaped and set. The creature was evidently of unimagined dimensions; its hind leg bones, when put together, would reach seven feet, upon which the pelvis and back-bone and upper skin would still go on, making it nine or ten feet upon the haunches: on the contrary, the fore legs were so disproportionately short that, had they been found at a different time or in a different place, no anatomist would have hesitated to assign them to animals of different kinds, or at least to different individuals; but the animal which this one most resembles, discovered in an English rock of the same age by Dr. Mantell, shows the fore and hind legs equally dissimilar. The fact, no doubt, is, that we have here the relics of a kangaroo-like alligator, of more than mammoth size, living near the great tertiary rivers and lagoons, and feeding on the vegetation, as it sat erect on its vast hind legs, supported by its tail. To get at its length, Dr. Leidy took the number of neck and back vertebræ common to all kinds of reptiles, and averaged the number of tail vertebræ between the hundred in a tail of the iguana and the twenty or thirty in the tail of the crocodile, and thus fixed the probable length of the whole creature at twenty-five feet; its tail must have been three feet deep, its neck thin, and its head no doubt small; its teeth are but two inches long, but set in such a tessellated wall around the mouth as to make a formidable cutting and grinding apparatus. * * * * The enormous size of this creature was exposed by a comparison of its thigh-bone with one of a mammoth in the Academy collection, only two-thirds as long; but what was the astonishment felt to see the Doctor lift from the table a fragment of a thigh-bone nearly half as long again, describing its reception some years ago from the same district, and its being stowed away as an uncharacteristic, and therefore, for the time being, a worthless specimen, since there were no more perfect bones of the same shape with which to compare it and determine its relations. This is one of many examples constantly afforded by

collections, of the possible future value of all objects of Natural History, when properly labelled and arranged. Some happy accident is sure to come to the relief of the most helpless of fossils, the most shapeless of fragments. * * * * The family must have been very extensive, for Dr. Leidy is now able to recognise its representation by some before enigmatical fragments from Nebraska and from the Lower Mississippi: the formation, we know, extended across the Continent, because its shells are found from Mexico to the Arctic Sea, and on Vancouver's Island. At the time this Haddonfield individual browsed in the Valley of the Delaware,—for of course he did not live at Haddonfield, at that time many fathoms under sea,—the Gulf Stream passed up the immense strait or narrow tertiary ocean, bounded on the east by the rocks of Missouri, Iowa and Lake Superior, and on the west by the Rocky Mountains, into the Northern Sea. The climate of the Delaware was at that time deprived of its present equatorial winds from the south-east, but was equally well secured from the north-westerns, which come out from the centre of the British possessions. The average cold was no doubt greater, but the variation less severe. England was then as damp as now, but much colder, and the mountains of Scotland were covered with ice and snow; yet the *Iguanodon*, cousin of the *Hadrosaurus*, found himself comfortable there. As whales can exist in every zone of latitude, as mammoths and elephants once lived on the shores of the Siberian Circumpolar Sea, as well as in the jungles of India, so no doubt these gigantic two-legged saurians made their earthquaking hops as friskily in cold and heat, whenever the continental rivers ran strong and the ocean shore was near.—*Friends' Intelligencer*, December 17, 1858.

Is the Mud-Fish a Fish or an Amphibian?

By EDWARD NEWMAN.*

It cannot but appear strange to those experts in Natural History, who may chance to be unacquainted with the mud-fish, that there should exist any animal of large size and clearly pronounced form, which when dead has undergone the anatomical scrutiny of an Owen, and when living has been exposed to the observation of a hundred well-instructed eyes, yet concerning which doubts exist as to its amphibious or ichthyac character. Such, however, is the case, and if by chance, in conversation, we meet with any one who doubts or contravenes the assertion, we shall find on inquiry that he has adopted without examining the ichthyac or amphibian hypothesis by the simple process of pinning his faith on another man's sleeve, has saved himself the trouble of thinking at all by adopting implicitly the thoughts of another. One man will say, "Oh, that question has long been settled: Fitzinger

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has proved it an amphibian; you should read him." Another will assert, "There is do doubt *now*: Owen has dissected it, and proved it a fish: you must study his paper; it is quite conclusive." I have been told a hundred times over this story of the affair being "settled," but two successive informants have rarely admitted the same mode of settlement, and it therefore appears perfectly legitimate for the truth-seeker to reopen the question and consider the subject *de novo*. And here, in the very outset, I cannot too distinctly disclaim any knowledge of the internal structure of the animal beyond that which I find in Professor Owen's invaluable memoir: in common with other naturalists, I regard that great anatomist's definitions of the structure of the mud-fish as all that can be desired; difference of opinion as to its ichthyac character originates in the inferences drawn from acknowledged facts. One character alone has been the subject of discussion and doubt, and to this I shall briefly allude hereafter.

The genus *Lepidosiren* was founded by Fitzinger, in Weigmann's 'Archiv' for 1837, on two specimens of an animal discovered by Dr. Natterer in South America: one of these was found in a swamp on the left of the Amazon, about Villa Nuovo, the other in a pond near Borba, on the river Madeira, a tributary of the Amazon. Fitzinger unhesitatingly accepted the four tendril-like processes attached to the ventral surface of the animal as legs, and hence concluded the creature was amphibian, but of a new and uncharacterized family. The species was named *L. paradoxa*, a name expressing the author's difficulty in reconciling its conflicting affinities. The genus was re-described by Professor Owen, in the 'Transactions of the Linnean Society,' in 1840. The species, differing essentially from Natterer's, is a native of the Old World, was taken in the river Gambia, and presented to the Royal College of Surgeons, in 1837, by Mr. Thomas C. B. Weir, together with a smaller dried specimen in indurated clay, baked hard by the sun. The new species was called *L. annectens*: it is perfectly distinct from *L. paradoxa*, having a less elongate form and only thirty-six pairs of ribs, whereas the South American species has no less than fifty-six.

Living specimens of *L. annectens* were imported from Western Africa in 1856, and exhibited in the Crystal Palace: we have two published accounts of them; the first by Mr. Waterhouse Hawkins, in the 'Illustrated London News' for September 20, of that year, and the second by Mr. Bartlett, in the illustrated 'Proceedings of the Zoological Society' for the same year, at p. 346. This latter is included in a paper by Dr. Gray, intituled "Observations on a living African

Lepidosiren in the Crystal Palace." I select Mr. Bartlett's communication for reprinting, because it not only comprises the main facts noticed by Mr. Hawkins, but gives additional matter of much interest.

"In June last," says Mr. Bartlett, "I received from Western Africa a case containing four specimens of this animal. Each specimen was imbedded in a block of dry, hard, muddy clay, about the size of a quartern loaf; these blocks of clay were each sewn up in a piece of canvas to prevent the clay crumbling or falling to pieces. According to the instruction I received from Captain Chamberlayne, the gentleman who sent them, I placed them in a tank of fresh water, at the temperature of 83 degrees; in doing this a portion of the clay crumbled off one of them, and partly exposed the case in which the animal was contained; I was watching the operation when suddenly the case or cocoon rose to the surface of the water. I at first thought the animal contained in it must be dead, but I shortly afterwards observed a slight motion: apparently the animal was endeavouring to extricate itself, and this it soon afterwards accomplished by breaking through the side of its tough covering: it swam about immediately, and by diving into the mud and clay, which by this time had become softened, rendered it difficult to make further observations. I removed the case or cocoon, which still floated. On the following morning I found that two more of the animals had made their appearance, their cases, however, were not to be seen; they evidently remained imbedded in the soft clay. In the course of the next day the fourth animal suddenly floated to the surface, enveloped in its case; as it showed no signs of life I removed it, and found the animal had been dead some time, as it was much decomposed. At the time these animals first made their appearance they were very thin, and about nine inches long; they began to feed immediately upon earth-worms, small frogs, fish, &c., occasionally taking raw flesh. I saw them sometimes attack each other; and one of them (I imagine in endeavouring to escape) leaped out of the tank into the large basin in the Crystal Palace in which the tank was standing, and is still at large among the water-lilies, &c. The remaining two lived together for some time, apparently on good terms; but, in the month of August, the one now remaining in the tank seized its companion and devoured nearly half of it, leaving only the head and about half the length of its body. In feeding, this creature masticates its food much, frequently putting it forward almost quite out of its mouth and then gradually chewing it back again, and often (when fed upon raw flesh), after having so chewed it for some time, it will

throw it out altogether. The growth of these animals is most extraordinary ; in June, as I have before stated, they were about nine inches long : in three months they attained their present size, which cannot be less than eighteen inches in length. It rises frequently perpendicularly to the surface to breathe, and at other times it supports itself on its fin-like appendages, and, with the aid of its tail, raises its body from the ground, the fins being bent or curved backwards. The movement of this animal is generally very slow, and would give one the idea that it was very sluggish ; this, however, I have good reason to know is not the case, as in attempting to capture the one at liberty in the large basin it darted away with the rapidity of an arrow. I have reason also to believe the animal finds its food as much by scent as by sight. With reference to the cocoon, the end covering the nose of the animal is rather pointed, and has an aperture about the size of a pin's head, which I have no doubt enables the animal to breathe through during its state of torpor. The animal, when in its case, is coiled nearly twice round, and I observed in each of the blocks of clay a small hole about the size of a mouse-hole, which was quite smooth on the inside, as though the animal had crept through it."

Dr. Gray, to whom this admirable letter of Mr. Bartlett's is addressed, publishes the following additional particulars, and apparently from actual observation :—"The mouth is firmly closed by the overhanging upper lip, except in front, where there is a small oblong transverse horizontal opening on the outer edge of the lips, admitting the water to the small open external nostrils, which are on the middle of the under side of the upper lip. This opening does not extend to the hinder part of the lips, which are closed behind it, so that water cannot enter the mouth in that direction, except through the nostrils. In this quiescent state the lateral gill-opening is generally closed, but sometimes it is slightly elevated, and a small current appears to be emitted now and then from it, as if a small quantity of water were taken in by the nostrils and emitted by the gill-flap ; but this action is not continuous nor very distinctly visible. While remaining under the water the animal sometimes opens the mouth to its full extent, leaving it open for some time, dilating the throat by the action of the *os hyoides* ; when fully dilated it closes its mouth, opens the gill-aperture, and, contracting the throat, emits a strong current of water through the lateral gill-aperture. It occasionally, but at uncertain periods, rises perpendicularly to the top of the water, until the front part of the head and the whole mouth are exposed above the water ; it then opens its mouth, which it retains open for a time, dilates its

throat, as if taking in all the air it can contain, closes the mouth, descends under the surface and contracts its throat, as if it were forcing the air into the lungs: sometimes during this action one or two very small bubbles of air are emitted at the gill-aperture, and then the animal takes up its old position near the bottom of the vase. I once saw the animal ascend, and so take in air almost immediately after it had been passing a fresh supply of water to its gills: when I have been observing it, it appeared to take in air more frequently than water. It often rises with its body perpendicular, as if it were going to take in free air, but descends without reaching the surface of the water."

I will now give some account of my own interviews with the mud-fish. These interviews were three in number, and I had the opportunity of examining the creature under two different aspects: on the occasion of one visit, the second, he continually came to the surface, holding his body at an angle of about 45° , keeping his four tendrils in constant and graceful undulation, and frequently opening his mouth, apparently for the purpose of breathing atmospheric air. Although, however, this action was frequently repeated, an idea occurred to me that he might have some other business in hand than merely satisfying his spectators as to what class of endosteate animals he belongs; because I observed that the gold fishes in his immediate neighbourhood were also hanging from the surface of the water at a similar angle, were also smacking their lips, and were also apparently bent on inhaling atmospheric air. This, instead of inducing me to speculate on the exact site occupied by the mud-fish in the System of Nature, led me to advise the officer on duty to change the water, concluding that mud-fish and gold-fish had combined together to exhaust the oxygen of the small allowance of water in which they were confined. Be this as it may, it is quite clear, that whatever conclusions are drawn from the fact, that one fish in a tank appears to seek a supply of atmospheric air, must be applicable to a second, and a third, and a fourth fish, which, under precisely identical circumstances, seek the same means of supporting life. Thus it appears to me that the observations of Mr. Waterhouse Hawkins, Mr. Bartlett and Dr. Gray, coinciding as they do most precisely with my own, go simply to prove that fishes, having exhausted the oxygen of the small portion of water allowed them, seek to obtain that element of existence from the atmospheric air. On the occasion of my other visits, the conduct of the mud-fish was widely different; he kept constantly below the surface, and, with a sort of unhealthy restlessness, perambulated his prison like a caged tiger; still the movements were free and unfettered; and the involun-

tary functions of breathing, &c., may be supposed to have been performed in a somewhat natural manner. The first character in this function that struck me as worthy of comment was the extreme regularity of the rythmical inspirations. I had not the opportunity, on either occasion of observing the fish during anything like an entire minute; its motion was incessant, but I marked the internals of inspiration by a watch, and although, in many instances, the observation extended to but three inspirations the measurable recurrence of the act was established beyond a doubt; the conclusion resulting from observations made during twelve consecutive minutes being, that the creature inspired water thirty-one times per minute. On the occasion of another visit, a second set of observations was made with equal care, and a somewhat different result obtained, the average number of inspirations being thirty-three per minute: hence it must be admitted that, in a state of confinement, in a limited quantity of water, and with an atmosphere heated to 70° Fahr., the mud-fish breathes once in two seconds, and it may be inferred from the vigour and activity displayed by the animal, and from its enormous increase in size, that this rate is that of health, and not the result of peculiar circumstances. These inspirations differed very considerably from those of the gold-fish, inasmuch as the interior fleshy substance contained between the rami of the lower jaw rose after each inspiration, and being pressed against the palate, entirely precluded the return of the water through the mouth. This mode of breathing I subsequently found was that of the Esocidæ, and is beautifully exemplified by a pike in one of the tanks at the Zoological Gardens. His extreme quiescence greatly facilitates the observation. I failed to observe the characters of the external aperture, or gill-opening, but of the existence of such an aperture there could be no doubt, for I saw, after every third or fourth inspiration, a number of minute bubbles, having exactly the appearance of globules of quicksilver, escape in front of the anterior tendril, and ascending to the surface of the water there become amalgamated with the atmospheric air: the number of these globules was usually five or six, sometimes seven or eight: one or two were always larger than the rest, but still minute, and likely to escape the notice of a hasty or superficial observer. During the two visits the creature never once ascended to the surface, but frequently ascended almost perpendicularly towards the surface, and before reaching it altered his course and turned downwards among the weeds: this observation, probably made prior to Dr. Gray's, is exactly corroborated by him. "It often rises with its body perpendicular," writes Dr. Gray, "as if

it were going to take in free air, but descends again without reaching the surface of the water." This action would perhaps, in some minds, induce the conclusion that the alteration of course proceeded from the fear of coming in contact with atmospheric air, but the action is so common among fishes, both in aquariums and ponds, that it simply proves that the mud-fish has, in this respect, the normal habits of a fish. The curious position in which the creature is figured in the 'Proceedings of the Zoological Society' I had not the good fortune to observe. It seems to be walking on its tendrils, and to be taking an enormous stride with the hind pair: Dr. Gray does not, however, describe this mode of progression. The creature, in the passage I have cited, is described as simply resting on these tendrils at the bottom of the tank, but this resting seems scarcely requisite in a creature whose specific gravity is exactly equal to that of water. It is, however, worthy of observation that this seeming habit of resting on the four extremities is constantly observed in fishes and some even use their extremities for terrestrial progression, a fact noticed by Dr. Gray. There is then no single act, as far as yet observed, of the mud-fish that indicates an amphibian rather than an ichthyac character. The ascertained fact of its imbedding itself in clay, and the supposed fact that it passes from river to river by some overland route are equally susceptible of parallels among undoubted fishes: of this there are many instances, but I prefer one already cited by Dr. Gray from the 'Zoological Journal.' Dr. Hancock observes "When the water is leaving the pools in which they commonly reside; the yarrow (a species of *Esox*, Linn.), as well as the round-headed hassar (*Callichthys littoralis*) bury themselves in the mud, while all other fishes perish for want of their natural element, or are picked up by rapacious birds. The flat-headed hassar (*Doras costata*), on the contrary, simultaneously quits the place and marches overland in search of water, travelling for a whole night, as is asserted by the Indians, in search of their object. I have ascertained by trial that they will live many hours out of water, even when exposed to the sun's rays. Their motion overland is described to be somewhat like that of a two-polled lizard: they project themselves forward on their bony arms by the elastic spring of the tail exerted sideways; their progress is nearly as fast as a man will leisurely walk."

Again, I would invite those who are familiar with fishes and the more common amphibians to pay particular attention to the habit, so particularly emphasized by Messrs. Bartlett and Hawkins, of dashing or darting through the water; the very expressions indicate the move-

ments of a fish, not of a reptile ; and if we institute a comparison, in this respect, between the mud-fish and those lethargic amphibians, with which it has been more especially associated, the contrast becomes still more striking.

From the actions of the living animal, let us now proceed to consider its structure. In the first place, the limbs of all reptiles, including the batrachians, are used as levers for propelling forwards a body which rests on the ground ; hence there is always a prominent elbow giving to the creature a most ungainly aspect in walking : now the limbs of the *Lepidosiren* are represented as being used as perpendicular props to support the body clear of the ground when at rest in the water. We can have no reason whatever to doubt the accuracy of the observations I have cited or the beautiful drawing of Mr. Ford, but we cannot fail to observe, that the action and position thus described and indicated, are those of a fish, not those of a reptile. We must also consider what is the composition of these tendrils : each is composed of a single bone clothed with skin, which throughout its length is produced into a thin membranous wing, the bone itself being composed of from thirty to forty minute joints, exactly similar to those which constitute the soft rays of malacopterygian fishes, and totally different from the bones which compose the limbs of amphibious or oviporous animals.

A second external character of importance is, the position of the nostrils ; these are placed on the under side of a slightly projecting snout, as in the cartilaginous fishes, and not all in front, as in the amphibians : the very important question, whether these nostrils are olfactory organs, mere blind sacs as in fishes, or respiratory organs communicating with lungs, as in reptiles, has yet to be decided. Professor Owen, after the most elaborately careful dissection, declares them blind sacs ; and the living animal proves they are olfactory organs of great power, since, as Mr. Bartlett and all other observers declare the animal seeks its food by scent, and not by sight. Dr. Gray, but apparently without having made the dissection, states that each nostril has an opening within the mouth, and that a probe may be passed from the external to the internal opening. In this instance I cannot courteously discard either assertion ; but it must at once strike the naturalist that one or other of the statements is erroneous, and the tendency will be to agree with that which is based on dissection, and which corresponds with every act of the living animal. Dr. Gray's belief that the mud-fish respire

through its nostrils is supported by another assertion, that the creature has "two well-developed cellular lungs of nearly equal size. (See Owen, Trans. Linn. Soc. vol. xviii. plate 25, fig. 3, plate 26, figs. 1, 2.)"

Nothing can be more candid than the way in which Dr. Gray here gives chapter and verse for the assertion he has made, and no authority can be higher than that which he quotes. All that can be required of a naturalist is thus to refer to the source of his information, and, making the required reference, we find Professor Owen using the following words:—"The lungs, for I know not how otherwise to designate, according either to their physiological or morphological relations, those organs, which in the technical language of the ichthyologist, would be termed the swim- or air-bladder." Here then we find the only authority for the well-developed lungs, carefully explaining in parenthesis that he applies that term for want of a better to that very familiar organ, the swimming bladder. Now this conversion of the swimming bladder of fishes into a lung-like organ is an abnormal, but by no means uncommon, character in fishes, and has attracted the attention and consideration of all our ichthyologists. Cuvier, and in ichthyology we cannot have a higher authority, has particularly noticed this fact in the genus *Amia*, also an inhabitant of rivers: of this genus, he says, at p. 327 of the second volume of the '*Règne Animal*,' that the swim-bladder is cellular, like the lung of a reptile; the fact would appear to be that the swim-bladder of fishes is in some measure the representative of a lung, and, like the lung, can be voluntarily inflated: the walls of this organ in *Amia* and *Lepidosiren* become incrassated and cellular, and certainly in this state represent the lung; but it is not allowable to take this as evidence of the reptilian nature of the mud-fish, unless we make the application of the theory universal, and thus transfer a perfectly normal malacopterygian, which *Amia* certainly is, to the class of reptiles also. The mud-fish is acknowledged on all hands to possess a perfect apparatus for breathing water; it has exactly those proper fish-gills which are the characteristic of fishes; and although the external opening is small, this character simply indicates an approach to the viviparous, rather than the spawning fishes.

The next structural character to which I wish to invite attention is, the dermal envelope; this it will be seen is completely covered with scales exactly like those of a fish, and on these scales is a lateral line as distinctly and strongly pronounced as in the most typical of the

spawning fishes. Dr. Gray, naturally anxious, of course, to explain away so decidedly an ichthyac character as the possession of a lateral line, which had previously been pointed out by M. Dumeril, and also by myself in a paper read before the Linnean Society, makes use of the following words:—"Authors have laid great stress on the fact of its being provided with a lateral line, overlooking the fact that the common eel (*Triton cristatus*) has similar lines on both the sides and head." Now, has not Dr. Gray overlooked the fact that the lateral line of fishes is on the external surface of the scales, and that amphibians being destitute of scales cannot by any possibility possess the true ichthyac lateral line? Dwelling for another moment on the very complete armature of scales with which the mud-fish is covered, it must be remarked that this character alone is quite sufficient to separate it from the Amphibia, which are, without exception, totally destitute of scales; indeed, almost every naturalist has made this a leading character in distinguishing the spawning from the oviparous reptiles: the possession of scales, and the lateral line on those scales, are both of them unmistakeable proofs that *Lepidosiren* is a fish, and not an amphibian.

Lastly, let us make a transverse section of the body of the mud-fish, and we find its vertical diameter incomparably the greater as in fishes, while in reptiles, including the amphibians, a contrary character obtains, the transverse diameter being invariably greatest. I think that no attempt can be made to associate the mud-fish with the isogenous, oviparous or scaly reptiles, because the only reptilian character it possesses are those of the true amphibians; indeed no one has assumed the existence of any affinity between the mud-fish and the oviparous reptiles. Allow me then to recapitulate the characters in which it differs from the amphibians.

- 1st. Its rythmical breathing and its mode of taking atmospheric air at the surface of water, when the oxygen of the water in which it has been kept is exhausted.
- 2nd. Its velocity in swimming, as particularly pointed out by Mr. Hawkins and Mr. Bartlett.
- 3rd. Its mode of eating.
- 4th. The composition of, as well as the mode of using, its four extremities.
- 5th. Its scaly covering and lateral line.
- 6th. The greater diameter of a vertical section of its body compared with a transverse section.

These six characters appear to afford conclusive evidence that *Lepidosiren* is a fish, and not a reptile.

But if we find the true or normal characters of a class thus, as it were, dying out, and the more obvious and positive distinctions utterly failing, shall we not conclude that one class thus gradually merges in another exactly in the same way that a species has lately been said to have no precise or definite limits? I cannot admit the position in either case, or the validity of the reasoning that thus breaks down the barriers which nature appears to have set up. How numerous are the opinions on record that the *ornithorhynchus* is something intermediate between a suckler and a bird, and that it obliterates the line of demarcation between the two. I cannot think so: I believe in Nature's barriers, and I regard the difference from what is called a type as the simple and inevitable consequence of diversity in structure; in fact it is but another mode of expressing a self-evident truism. The Lamarckian hypothesis would, I suppose, regard the *ornithorhynchus* as a suckler struggling to become a bird, the mud-fish a reptile struggling to become a fish. All that I can see in these creatures is that they are forms to which we are unaccustomed: had our knowledge of their respective classes commenced with these two, and had the perch and the monkey been the recently discovered rarities, we should have experienced precisely similar difficulties in associating them with the mud-fishes and water-moles. The belief in connecting links appears to be gradually fading under the light of elaborate investigation; superficial similarities, as that of a bat to a bird, a whale to a fish, a pangolin to a lizard, have their own signification and teaching, but the more carefully these forms are investigated the more palpable does it become that the distinctions philosophers have laid down are absolute discoveries of what has always existed, not the mere creations of the brain. In Entomology the multitude of species enables us to see this more clearly: for instance the coleopterous type of structure gradually fades away, becoming less and less pronounced at a variety of points, but still the beetle is to be traced; we found it nowhere so altered or depauperated as to be mistaken for a member of some other division of the world of insects. And thus the seemingly paradoxical mud-fish is still a fish, although so reptilian in its superficial aspect as to have induced such conflicting opinions.

The remaining mud-fish at the Crystal Palace finally fell a prey to that fatal disease of fishes, so well-known as the fungus: at first the extremely minute filaments protruded about the base of the anterior tendrils, but after a time the whole surface of the body was covered,

as in an envelope of mould. Thus, even in its death, the creature proclaimed its ichthyac character.

EDWARD NEWMAN.

An Acarus injurious to Orchids.—For several years past the beautiful tribe of Orchids cultivated in this country have been troubled with what has been termed the "Orchid disease." No one knew the cause of this so-called disease, or its cure: about twelve months ago it was very bad in several valuable collections of these plants; it was then recommended to place the plants in a drier atmosphere and give them a higher degree of temperature; this was certainly beneficial, but it did not indicate the cause. The drier atmosphere dried up the decaying tissues of the leaves, caused by the puncturing of the insect I am about to describe: this left the leaves full of brown blotches, which of course very much impaired the functions of the plants, not to mention the unsightly appearance. About the 16th of January I was shown what appears to be the cause of this disease; several plants had been observed to be what is called "going wrong:" this led to the investigation of them with a lens; the little Acari were then detected busily engaged in their work of destruction, puncturing the leaves with their beak-like nostrums and sucking out the vital juices of the leaves. As soon as they have sucked out their food from one part they move on to another more healthy portion of the leaf; they are not to be found where there is decay or the leaf has been drained of its vital fluid, which shows that these creatures have nothing to do with the decay of the leaves,—that is, they are not attracted by the decaying vegetable tissues, but feed on the healthy sap. This apterologous creature appears to be undescribed: it is undoubtedly an East Indian species, and has been imported with the plants on which it feeds. The following is a description of it, and I have called it

ACARUS ORCHIDARUM.

A. rubro-miniatum, dorso nigro bilineato curvato, ovato-ellipticum antice acuminiatum, postice elongato-obtusum, depressum, subtilissime corrugatum, marginibus pubescentibus striatis, disco in mare carinato, pedibus rufescentibus pallidioribus articulis subspinosis. $\frac{1}{4}$ — $\frac{1}{2}$ lin.

Ovato-elliptical, depressed; the back of the male running up into a strong keel or dorsal ridge; the female is without it. The body striated and flattened on the margin, so as to admit of the creature adhering closely to the leaves, similar to a female Coccus; the margin finely pubescent. The male is of a vermilion-red colour and marked on the back with a black line, which encloses a fiddle-shaped space. The female is paler and rather larger, being of a yellower colour; the lines on the back irregular and broken into dots; the dorsal ridge obsolete; the legs pale reddish yellow; the articulations set with spines.—*Edward Parfitt*; 4, *Weirfield Place, St. Leonards, Exeter*, February 7, 1859.

Occurrence of Vanessa Antiopa at Torquay.—A very fine specimen of *Vanessa Antiopa* occurred here on the 26th of December last; it had settled on an iron railing

in the town, and allowed my brother, who discovered it, to approach quite close: this is the second met with here this season, my father having seen another in September, on the wing.—*H. W. Battersby.*

Food-plant of the Genus Acronycta.—In the 'Zoologist' (Zool. 6382), I find the Rev. H. Harpur Crewe doubts the larva of *A. Ligustri* feeding upon privet; but that it does so, the following facts will prove. While collecting in the lane that leads from Greenhithe to Darenth Wood, a few years since, I found a long slender green looper on privet, which spun up on the 25th of August, and on the 22nd of September produced a fine female of *A. fuscantaria*. As this larva was new to me, I endeavoured to procure others, and in beating along the hedge I obtained from privet several fat green larvæ, slightly hairy, the hair hardly perceptible, unless held against the light; these produced *A. Ligustri* the following May and June. I have also frequently beaten them from ash, but as this food dries up very soon when put into the breeding-cage, I invariably give them privet, upon which they thrive equally well. In September last, I obtained the beautiful larva of *A. tridens*, respectively from willow, birch and oak.—*William Mackin*; 35, *William Street, Globe Fields, Mile End, London, January 5, 1859.*

Food-plant of Acronycta Ligustri.—I hasten to acknowledge myself in error, in doubting (Zool. 6382) whether the larva of *A. Ligustri* ever fed upon privet. Mr. Doubleday kindly informs me that he has for years past been in the habit of taking it upon a privet-hedge in his garden.—*H. Harpur Crewe*; *Drinkstone, Woolpit, Suffolk, February 7, 1859.*

Note on Tephrosia crepuscularia and T. laricaria.—It is a very odd thing that if these two insects be, as Mr. Gregson supposes, the same species, they should so regularly occur at different periods of the year. Neither species is very uncommon in some parts of Hampshire, and when staying with my friend, Mr. Hawker, I have had some opportunity of becoming acquainted with their habits. *Tephrosia laricaria* begins to appear in March, and continues through the greater part of April. We never saw a specimen of *T. crepuscularia* before the beginning of May, when not a single *T. laricaria* was to be seen. I am well acquainted with the larva of *T. crepuscularia*, having both taken it on willow and aspen, and reared it from the egg. I have tried, but could not succeed in getting the females of *T. laricaria* to lay eggs. Breeding both species from the egg is of course the only way to settle the question satisfactorily, and this I am happy to know is likely to take place during the present season. The exhibition of a long series of varieties of either insect amounts to nothing. Mr. Gregson might just as well take a long row of *Acronycta Psi* and *A. tridens*, and, because the members of the Northern Entomological Society could not distinguish one species from the other, endeavour to prove them identical.—*Id.*

Observations on the Solenobia of Lancashire, &c.—Herewith I send, for your examination, six bred male specimens of *Solenobia inconspicuella* and a card with females and cases, also seven males of my *S. triquetrella* (partly bred) and three females and cases. I think, if you will refer to Bruand's work, you will satisfy yourself that these are really identical with the species he describes as *S. triquetrella*: it is impossible to make anything out of the plates representing the males of *S. inconspicuella* and *S. triquetrella*. The cases of *S. inconspicuella* are found here on beech trees in Prestwich Wood, and the moths appear early in April, and are most sluggish creatures. The cases of *S. triquetrella* are found on large millstone-grit stones on

the moors (occasionally on stone walls); in order to get them it is necessary to turn over these big stones (not a very easy job, by the way), as these little rascals prefer the sides nearest the ground. These insects appear in the perfect state from the 1st to the 20th of May, and are very active on the wing, and, what is very singular in this genus, one rarely gets a female. The female chrysalis is seen projecting from the case,—the insect is missing; whether its economy is different from that of *S. inconspicuella*, or they become a prey to spiders, Coleoptera, &c., I know not: what females I possess are chiefly bred: the anal aperture in the female is considerably less woolly than in *S. inconspicuella*. These *Solenobis* are a very difficult group: it is impossible to know much about them without a deal of attention to their habits; but if my insect is not the true *S. triquetrella*, depend upon it is a new species. The cases found on granite rocks in North Wales may some time or other be bred. Another species occurs in extraordinary numbers on an old limestone (I think) wall between Conway and Llandudno; it is like none that I know of: I bred an apterous female out of a lot of three cases (that I thought were not going to produce anything), and it was of a yellowish colour and exceedingly active on its legs. Again, on some fir trees in the centre of a large wood at Rudheath, Cheshire, I met with some twenty cases, from which I bred a single female. Then there are cases on beech trees which I find at Dunham Park; for years these only produced females: these larvæ take two years to arrive at perfection. I send some of these larvæ by the post for your artist to figure, and I will shortly send you some larvæ of *S. inconspicuella*, from beech trees at Prestwich, which regularly produce both sexes every year, and afterwards you shall have some of the millstone-grit larvæ, so that you can compare all three together. Perhaps between us we shall throw a little light on the subject. It is very odd how this group is neglected by collectors generally: I am sure if they were systematically worked a good many species would turn up. — *R. S. Edleston; Bowdon, near Manchester, January 17, 1859.* [We are extremely obliged to Mr. Edleston for the above valuable communication. On a close scrutiny of the insects sent, and a comparison with Bruand's work, we have come to the conclusion that the *S. triquetrella* of that author is, in point of fact, our *S. inconspicuella* (the *S. triquetrella* of the German authors being a larger, darker insect), and we cannot ourselves distinguish the *S. triquetrella* of Mr. Edleston from his *S. inconspicuella*, individual specimens of the former differing more from one another than they do from *S. inconspicuella*. Indeed the result of this investigation has been greatly to shake our faith in the specific distinctness of *S. Douglasii*. The neuration of the hind wings of these insects varies to a very curious degree in the same species, two veins being either separate at their starting points, or starting from the same point, or even fused together for some distance, whereas, in one specimen we possess, one of these two veins has disappeared altogether! But we admit that the difference of habit and periods of appearance has great weight with us, and possibly the species which does not appear till May may be really distinct from the early April insect, *S. inconspicuella*. Time will show.—*H. T. Stainton.—Intelligencer.*]

Observations on Butalis grandipennis.—On the 19th inst., being well in advance of my printers, I resolved to open the campaign by visiting the classic ground of Wimbledon Common. My object was to try and obtain, either by inspection or beating, the larvæ of *Coleophora albicosta*; but either I was not at the precise spot frequented by that insect, or else the larvæ are not obtainable at this period of the year, for eyes and beating-stick were both used to no success, and no *Coleophora*

larvæ rewarded my labours. Instead thereof I fell in with the larvæ of *Butalis grandipennis*, and wanting some of these to send abroad I proceeded to collect them very eagerly. The webs they make in the furze bushes are very conspicuous, but often very inaccessible; the larva likes to have its habitation where four or five branches start off from the main stem, and to obtain them you must cut the main stem below the web, and then proceed to tear off the branches *seriatim*. It is not possible to avoid pricking the fingers. When the web is thus laid bare, it is too opaque to allow of your seeing whether it is tenanted or not, and it must be cautiously removed from the stem and pulled to pieces; in this process the larvæ are eventually brought to light. I thus obtained between forty and fifty, and got a good notion of the creature's habits. It is a very artful little animal, and, though very often solitary, one sometimes meet with individuals so amiable that five or six will live harmoniously together. On two occasions I found that the larva, not satisfied with the natural protection of the web, had pressed a great coat into its service, in the form of an old seed-pod of the *Ulex*. The outer web is tolerably thick and fluffy-looking, but besides that, nearly every larva is separately enveloped in a white *robe de soie*. The creatures were all quite active, by no means torpid, but then it was a mild, spring-like day, and, with the thermometer above 50° and a light breeze from the south-west, torpidity was not to be expected. Owing to the dry season Wimbledon Common was far from being in its normal state; it was comfortable and clean walking, and the wet places were all dry! *Genista anglica* was putting forth its young green leaves, without any superfluous moisture at the roots of the plants. Thus I opened my season of 1859.—*H. T. Stainton; Mountsfield, Lewisham, January 20, 1859.*

Occurrence of Psyche roboricolella, P. salicolella and P. tabulella in Britain.—I lately forwarded to Mr. Henry Doubleday specimens of some Psychidæ which were unknown to me, and he has kindly informed me that they are the following species:—*P. roboricolella, Bruand* (No. 72).—I bred a male of this insect on the 26th of last June, and two or three females a few days after. The cases, which were similar to those of *P. nitidella, Steph.*, I found at West Wickham, on birch, the early part of the same month. This species may be distinguished from *P. nitidella, Steph.* (*P. intermediella, Bruand*) by the wings in the male being rounder and much blacker than in the male of *P. nitidella*, and the female of *P. roboricolella* has the anal tuft of hair entirely white. *P. salicolella, Bruand* (No. 74).—I bred a male and female of this species on the 23rd of June last, from two cases that I found about a week previously, near Hampstead, on buckthorn. The wings in the male of this insect are black, but longer and narrower than those of *P. roboricolella*. The case is very different, being covered over with pieces of bark, and is similar to that of *P. fusca*, but only a third of the size. *P. tabulella, Bruand* (No. 75).—On the 24th of July, 1854, I took a male specimen of a *Psyche*, which was new to me, flying round some beeches, at Mickleham. Mr. Doubleday now informs me it is this species, and that he has also a single specimen taken near Epping, among beeches: the wings are very long and narrow and of a pale brown colour.—*H. Tompkins; 44, Guildford Street, Russell Square, London, February 11, 1859.*

Topsell's "History of the Wasp." By FREDERICK SMITH, Esq.

A FEW pages might, we think, be occupied with far less amusing matter than a few extracts from the "*History of the Wasp*," as given in "*The History of Serpents; or, the second Book of living Creatures: wherein is contained their Divine, Natural and moral descriptions, with their lively Figures, Names, Conditions, Kindes and Natures of all venomous Beasts: with their several Poysons and Antidotes; their deep hatred to Mankind, and the wonderful work of God in their Creation and Destruction.* London, 1608. By Edward Topsell."

In the first place, our author describes a wasp as "a kinde of insect, that is swift, living in routs and companies together, having somewhat a long body encircled, with four membranous wings, without blood, stinged inwardly, having also six feet, and a yellow colour; the body seemeth to be fastened and tyed together in the midst of the breast with a certain fine thread or line, so that they seem very feeble in their loins, or rather to have none at all."

After this very graphic description, it will be most orderly if we turn to our author's opinion as to their origin, for we have no intention of following the order of things as given in this delectable history, but just to pick out such morsels as shall give the reader a tolerable idea of the history of the wasp, as recorded two hundred and fifty years ago.

"They differ also in their first breeding, stock, sex, place, feeding, and manner of labour: some say wasps do first proceed from the rotten carcases of dead asses; but I am rather moved to think they were first bred from the dead body of some warlike and fierce horse. And surely their incredible swiftnesse in their flight, their ardent and burning desire they have to fighting, are sufficient inducements to move me to think that they took their first beginning from some gallant horse. And I rather lean to this side because else I do not know what sense I should give to that Aristotelian proverb, 'All hail, ye daughters of swift-footed horses;' for, besides the truth that lieth in the bare words, I take the morall of it to be uttered as a witty check, or a figurative flout, conceitedly to rebuke and hit in the teeth those shrewd women, curst and scolding wives, which are so peevish that they will not be pacified, who are like unto wasps in their sullen, displeasing humours, tempestuous madness and pelting chafe."

Their nests, says worthy Topsell, are "light, slender and thin, like paper, dry, transparent, gummy not thin, and all made of one fashion, but very different, some of them representing a harp, some made much

after the fashion of a pear, a toadstool, a bottle, or budget of leather, and some like a standing cup with handles."

"They have such a tender care over their females (especially at such times as they are great with young), and suffer them so much to have their own wills, as they will neither permit them to take any pains abroad for their living, nor yet to seek for their meat at home; but the males flying about, like good purveyors, bring all home to their own dwellings, thereby, as it were, strictly enjoying the females to keep themselves within doors."

"They make their combs in the beginning of summer, fashioning their small cells with four little doors, wherein small worms do breed; these increase for the most part in autumn, not in the spring, and especially in the full of the moon. This one thing here is to be noted, that wasps do not swarm, and that in summer time they are subject to kings, and in winter the females prevaileth. And when they have renewed and repaired their issue with a great supply, and that they be fresh and lusty, the empire again returneth to the masculine kind.

"Wasps are not long-lived, for their dukes (who live longest) do not exceed two years; and the labouring, that is the male wasps, together with autumn do end their days. Yea, which is more strange, whether their dukes or captains of the former year, after they have ingendered and brought forth new spring-up dukes, do die, together with the new wasps, and whether this do come to passe after one and the self-same order, or whether yet they do and may live any longer time, divers men do diversly doubt."

Our author informs us further, that there are two kinds of wasps, one "wilde and fell," the other "meek and quiet;" of the former kind he once found a colony in Essex, in a wood, where, as he informs us, "going unwarily to gather simples with another physitian, and offending one of this fumish generation, the whole swarm of them presently rushed forth about mine ears, and surely had I not had in mine hand some sprigs or branches of broom for my defence, I had undoubtedly paid dear for this my unadvisedness, if it had not cost me my life, for they pursued me in every place in the wood, with a vehement rage, for a long season, insomuch that I was fain to take to my heels, and so to seek to save myself from further danger. And if our countryman Sir Francis Drake himself had been there, although he was '*Omnium aucum nostri seculi fortissimus ac famosissimus*,' yet I make no doubt but he would have taken my part, and been a companion with me in this my fearful flight."

Worthy old Topsell, notwithstanding the "wild and fell" attack recorded, proceeds to enumerate some of the uses of wasps, which, he says, "is great and singular; for besides that they do serve for food to those kind of hawks which are called kaistrels or fleingals, martinetts, swallows, owls, to brooks or badgers, and to the camelion: they also do great pleasure and service to men in sundry ways, for they kill the Phalangium, which is a kinde of venomous spider, that hath in all his legs three knots or joynts, whose poyson is perilous and deadly, and yet wasps do cure their wounds." Another and still more remarkable use in the wasp follows; it is, says our author, "very effectual against a quartain ague, if you catch her with your left hand and tie or fasten her to any part of your body (always provided that it must be the first wasp that you lay hold of that year)."

The remedies for the stinging of wasps are too numerous to be given collectively, but a few samples may prove useful and entertaining, with, in the first place, some of the effects produced by their stinging. "Of the stinging of wasps there do proceed divers and sundry accidents, passions and effects, as pain, disquieting, vexation, swelling, rednesse, heat sweatings, disposition or will to vomit, loathing and abhorring of all things, exceeding thirstinesse, and now and then fainting or swoounding. I will now set before your eyes and ears one late and memorable example of the danger that is in wasps; of one Allen's wife, dwelling, not many years since, at Lowick, in Northamptonshire, which poor woman resorting, after her usual manner in the heat of summer, to Drayton, the Lord Mordan's house, being extreemly thirsty, and, impatient of delay, finding by chance a black jack, or tankard, on the table in the hall, she very inconsiderately and rashly set it up to her mouth, never suspecting or looking what might be in it, and suddenly a wasp, in her greedinesse, passed down with the drink, and stinging her, there immediately came a great tumour in her throat with a rednesse, puffing and swelling the parts adjacent; so that her breath being intercepted, the miserable wretch, whirling herself twice or thrice round, fell down and dyed."

Wasps have their enemies, but quaint old Topsell is the only author who I remember that mentions the fox as one of them. "Raynard the fox likewise, who is so full of his wiles and crafty shifting, lies in wait to betray wasps, after this sort. The wily thief thrusteth his bushy tail into the wasps' nest, there holding it so long till he perceive it to be full of them, then drawing it sliely forth, he beateth and smiteth his tail full of wasps against the next stone or tree, never resting so long as he seeth any of them alive; and thus playing his fox-like parts many

times together, at last he setteth upon their combes, devouring all that he can finde. And thus much for the History of the Wasp."

FREDERICK SMITH.

Bees roosting by the Mandibular Process.—Mr. Kearley and M. Guenzius seem both to claim the right of patenting this process, but if priority goes for anything, I have the means of showing that it was very familiar to me as far back as the year 1832, and that by availing myself of this secret I obtained large supplies of two little bees, *Nomada furva* and *N. borealis*, previously unknown to our apiarians, who were very glad to welcome the little strangers when I had the pleasure of introducing them. When I first beheld the process in operation I was at Leominster, in company with my lamented friend Edward Doubleday, whose extended reading *de re entomologica* had previously apprised him of a similar fact; and, ever ready with references, he gave me chapter and verse, which, sorrowful to say, I have forgotten; still he was delighted with this ocular demonstration, and remarked, as the fragile grasses gave way in his attempts to withdraw them from the grip of the bees' canines, that they, the bees, were *tenax propositi*. Since that period scarcely a year has past but I have seen bees in a similar situation, and never unaccompanied by a pleasant reminiscence of the delightful excursion during which I first observed this episode in the wild bee's life. When long grass, in "the sear and yellow," hangs over a sandy bee-bank, you may make sure of finding the self-suspended bees attached to the blades on a rainy or cloudy day, or, better still, at early dawn, when the sun with slanting ray gives abundant light but little warmth.—*Edward Newman*.

Note on Xylocopa nigrita, Fabr.—In the fourth volume of the 'Zoologist' (Zool. 1446) will be found some remarks on the habits of *Chelostoma florissomne*, as detailed in the first volume of the 'Entomological Magazine': the observations appear to have been partly based upon Reaumur's history (theory?) of the development of *Xylocopa violacea*. At p. 160 of my 'Monograph of the Bees of Great Britain,' the following observations occur:—"I will take this opportunity of correcting a very widely diffused error, which appears to have originated with Reaumur, as, if his account of the development of *Xylocopa violacea* be correct, it differs from that of every wood-boring bee which inhabits this country: he says, 'When the larva assumes the pupa, it is placed in its cell with its head downwards, a very wise precaution, for thus it is prevented, when it has attained to its perfect state, and is eager to emerge into day, from making its way out upwards and disturbing the tenants of the superincumbent cells, who, being of later date each than its neighbour below stairs, are not yet quite ready to go into public.' Having bred, at various times, nearly all the wood-boring bees which inhabit this country, and having always observed their development to be in the very reverse order to that laid down by the great French naturalist, I have been led to adopt an opinion that Reaumur's account of the bees emerging as he states was conjectural; I could not, judging from the results of my own observations, believe his history to be entirely founded on facts. Still I could not, never having observed the development of a species of *Xylocopa*, speak positively on the subject, and therefore observed that if such was its history it was at variance with every observation which I had made on the development of wood-boring bees." I adduced one or two examples in support of my opinions, showing instances in which the escape of the bee inhabiting

the first cell formed was a matter of impossibility. In the case of *Osmia aurulenta* or *O. bicolor*, constructing their cells in the whorls of a snail-shell, how could the bee in the first-formed cell, at the end of the tube, make its escape? I have on numerous occasions obtained straws and reeds containing cells of bees and wasps, so that by removing a strip the whole of the cells became exposed and a larva was seen in each; in every instance I have found the larvæ of males attain their perfect condition some days earlier than those of females. I have at length had an opportunity of examining the burrows of a species of *Xylocopa*, *X. nigrita*, an inhabitant of Sierra Leone. Mr. J. Foxcroft, who has for some time past been engaged in forming collections of insects in that locality, has from time to time forwarded nests of Hymenoptera to the British Museum, where a log of wood perforated by *Xylocopa nigrita* has just been received. There are three distinct tunnels formed by the bee in the branch; each terminates in the heart of the wood, without any outlet at its apex; one of these has the first cell formed, leaving at the end a short space, like the end of a thimble, unoccupied; the burrows are $1\frac{1}{2}$ inch in diameter, and would probably contain about five or six cells each. These excavations have all been worked upwards, so that all dust or raspings would be easily removed. One tunnel has a branch one commenced, which is about two inches in length; the number of cells intended to occupy a tube is marked by a slight contraction of the diameter at the length of each. This interesting specimen of insect-labour is confirmatory of my opinion, based on the observation of the habits of our native wood-boring bees, and proves, in my opinion, that Beaumur drew upon his imagination when he penned the account of the development of *Xylocopa violacea*. Let each one, therefore, who would avoid error, study the pages of the book of Nature—the book of truth; records from these will live in the memories of succeeding generations. Trust not to the imagination, however plausible the reasoning may appear—however certain results may apparently be calculated upon. The means whereby Nature arrives at her perfection of things are infinite in variety, in wisdom unlimited, and offering to every one an inexhaustible amount of enjoyment and instruction.—*Frederick Smith; Richmond Crescent, Islington, N.*

Proceedings of Societies.

ENTOMOLOGICAL SOCIETY.

Anniversary Meeting, January 24, 1859.—Dr. GRAY, President, in the chair.

Messrs. J. Lubbock, E. Sheppard, H. T. Stainton and G. R. Waterhouse were elected Members of the Council, in the room of Messrs. F. Bond, W. W. Saunders, J. T. Syme and J. O. Westwood. Dr. J. E. Gray was re-elected President; S. Stevens, Esq., Treasurer; and Messrs. E. Shepherd and E. W. Janson, Secretaries.

The Report of the Library and Cabinet Committee and the Treasurer's accounts were read and received; the latter showed a balance in favour of the Society of £266 13s. 2d.

The President delivered an Address on the affairs of the Society, and the general progress of Entomology, for which the meeting passed a cordial vote of thanks, and ordered it to be printed.

February 7, 1859.—Dr. GRAY, President, in the chair.

Donations.

The following donations were announced, and thanks ordered to be presented to the donors:—‘An accentuated List of the British Lepidoptera, with hints on the derivation of the names,’ published and presented by the Entomological Societies of Oxford and Cambridge. ‘List of the Specimens of Lepidopterous Insects in the Collection of the British Museum,’ by Francis Walker, F.L.S., &c., Part xvi., Deltoides; by the Author. ‘Journal of the Proceedings of the Linnean Society,’ vol. iii. No. 2; by the Society. ‘The Zoologist’ for February; by the Editor. ‘The Journal of the Society of Arts’ for January; by the Society. ‘The Literary Gazette’ for January; by the Editor. ‘The Athenæum’ for January; by the Editor. ‘A Manual of British Butterflies and Moths, No. 25;’ ‘The Entomologist’s Weekly Intelligencer,’ Nos. 119—122; by H. T. Stainton, Esq. ‘Proceedings of the Berwickshire Naturalists’ Club,’ vol. iv. No. 2; by the Club. ‘Catalogue of Hispidæ in the Collection of the British Museum,’ by Joseph S. Baly, M.E.S., &c., Part I.; by the Author. ‘Stettiner Entomologische Zeitung,’ Nos. 10—12, for 1858; by the Entomological Society of Stettin.

Nomination of Vice-Presidents.

The President nominated Messrs. F. Smith, H. T. Stainton and G. R. Waterhouse Vice-Presidents for the year.

Election of a Member.

Godfrey Howitt, Esq., M.D. of Melbourne, Victoria, was balloted for and elected a Member of the Society.

Exhibitions.

Mr. Stevens exhibited a box of insects received from Mr. Bates, containing a beautiful series of Micro-Lepidoptera from the Upper Amazon; and some fine Coleoptera taken by Mr. A. R. Wallace in Amboina, amongst which were *Euchirus longimanus*, some new and beautiful species of Buprestidæ and Anthribidæ, a magnificent new species of Batocera, and a fine *Prionus* also new to Science.

Mr. Pascoe has furnished the following diagnoses of two fine longicorns in this Collection:—

Monohammus Grayii. *M. aterrimus*; prothorace antice, elytrisque fasciis quatuor, et macula basali hirtis, ochraceis, his chalybeo-atris, nitidis, parce punctatis. Long. 13 lin.

Dixi in hon. J. E. Gray, Ph.D., Ent. Soc. Lond. Præses, &c., &c.

Agnia fasciata.—*A. aterrima*; elytris parce punctatis, fasciis quatuor hirtis, ochraceis. Long. 9 lin.

Precedenti facie simillima, sed *Agnia*, *Newm.*, genus bene distinctum, pertinet.

Mr. Janson exhibited a series of *Symbiotes latus*, *Redtenbacher* [Faun. Austr. 1st ed. 198, 184 (1849), 2nd ed. 371, 382 (1857), *Gerstaecker*, Mon. Endom. 400, 1 (1858)] illustrating the variations in size and colour to which this species is subject. These specimens were captured by himself, within the London district, on the 30th of June, 14th of July, and on the 8th and 29th of August, 1858, and, as previously stated, in localities upwards of a mile apart. He remarked that he had experienced no difficulty

in determining, within a few hours of first meeting with this insect, the genus to which it pertained. The analytical method pursued by Dr. Redtenbacher, in his admirable work above cited, and the clearness and precision of his generic characters, affording peculiar facilities to the student; but having advanced thus far, *safe* progress was interdicted, for, although Dr. Redtenbacher's description of *S. latus* satisfactorily applied, in most respects, to the insect before the Meeting, two, apparently important, discrepancies presented themselves, namely, that of his *S. latus* the author distinctly says that the thorax has "the upper surface *smooth, shining, not punctured*," and "the interstices between the striz of the elytra *not punctured*," whereas, in all the individuals of the insect under consideration, the prothorax is conspicuously, although minutely and sparsely, punctured, and the interstices of the elytral striz present numerous irregularly disposed punctures, very evident throughout the basal moiety, but obsolete on the apical half. Under these circumstances, he had considered it right to defer bringing the insect before the Society until he had ascertained its legitimate appellation, for which purpose he had intended to transmit specimens to Vienna on the first opportunity which should present itself. In the meanwhile, however, Dr. Gemstaeker's valuable 'Monographie der Familie Endomychidæ,' Berlin, 1868, came to hand, in which the genus *Symbiotes* is treated, and the species fully described, and at once all doubt as to the identity of our insect and *S. latus*, Redt., was dispelled. As the present insect so closely resembles in its facies the common *Mycetæa hirta*, Marsh., Steph., that it may be very pardonably confounded with it (its usually larger size and more parallel elytra might perhaps betray it), the following comparison of the characters of the two nearly allied genera, jotted down some months back for a friend, may prove acceptable to English students:—

MYCETÆA.

Antennæ. With the first joint of the triarticulate club very little wider than the preceding (8th).

Labrum. Transverse, truncate.

Maxillæ. With the two lobes nearly equal in length.

Max. Palpi. With the apical joint elongate-ovate, acuminate.

Lab. Palpi. With the second and third joints nearly equal in width.

SYMBIOTES.

With the first joint of the triarticulate club conspicuously wider than the preceding (8th), very nearly as wide as the succeeding (10th).

Transverse, slightly emarginate.

With the inner lobe very short and narrow

With the apical joint ovate obliquely truncate.

With the third joint much wider than the second (penultimate), globose.

Mr. Smith exhibited the nest of a species of *Larradæ*, and that of *Sphex Lanierii*, Guérin, and read the following.—

Observations on two Species of Fossorial Hymenoptera which construct exterior Nests.

"The varied economy of the fossorial division of the aculeate Hymenoptera, equals, if it does not exceed, that of the Mellifera. The name proposed by Mr. Westwood for the former division, "Insectivora," is by far the most characteristic, since all the fossors provision their nests with other insects. As far as my knowledge of the habits of the British species enables me to judge, I believe the majority to be fossorial; some,

however, burrow in wood, whilst others avail themselves of ready-formed burrows, &c., adapted to their purposes, never, as far as I have observed, forming tunnels or receptacles for their cells: this appears to be the habit of the species of the Genera *Sapyga* and *Pemphredon*.

"Our knowledge of the economy of Exotic species is very limited; I have had the pleasure of bringing before the Society some very interesting observations, made by M. Guenzius at Port Natal, upon various species of Hymenoptera, some belonging to the fossorial division. Mr. Bates has also contributed occasional notices of the habits of various species of these insects. In a collection lately received from the latter gentleman, a nest with the insect which constructed it was received, than which nothing could be more at variance with our preconceived ideas of the habits of the genus to which it belongs: the insect is a species of *Larrada*; the nest is composed apparently, as Mr. Bates suggests, of the escrapings of the woolly texture of plants; it is attached to a leaf, having a close resemblance to a piece of German tinder or a piece of sponge. With the first nest of this description forwarded by Mr. Bates was received a note, to the effect that he saw the insect issue from it, and he supposed it to be the builder; a second nest has, however, been received with the information that he had now no doubt of the nest being constructed by the *Larrada*, as he had observed it repeatedly busy in its construction. I have raised the nest from the leaf, and found four or five pupae-cases of a dark brown, thin, brittle consistency.

"I am not aware of any similar habit of building an external nest having been previously recorded; our British species of the closely-allied genus *Tachytes*, are burrowers in the ground, particularly in sandy situations; their anterior tarsi are strongly ciliated, the claws bifid and admirably adapted for burrowing. On examining the insect which constructed the nest now exhibited, I find the legs differently armed; the anterior pair are not ciliated, and the claws are simple and slender, clearly indicative of a peculiar habit, differing from its congeners, and how admirably is this illustrated in the nest before us.

"Another nest, also sent by Mr. Bates from Ega, is equally interesting; it is that of a species of *Sphex*, I believe the *Sphex Lanierii* of Guérin: this is constructed of a cottony substance, which fills a tunnel formed by a large curled leaf. Here we have another instance of economy at variance with our preconceived notions of the habits of the genus; we have hitherto regarded the species as being pre-eminently fossorial, and upon examining a large number of individuals I find they have the anterior tarsi very strongly ciliated, and all the tibiae strongly spinose. On examining the *Sphex* which constructed the nest in the rolled leaf, the anterior tarsi are found to be very slightly ciliated, and the tibiae almost destitute of spines, thus affording another instance proving that difference of structure is indicative of difference of habit."

Mr. Tompkins exhibited three species of *Psychidæ* hitherto unrecorded as British, viz.:—*P. roboricolella*, *Bruand*, bred June 26, 1858; *P. salicolella*, *Bruand*, bred June 23, 1858; *P. tabulella*, *Bruand*, taken July 24, 1854 flying about beeches at Mickleham; the names were determined from *Bruand's* Monograph of the family.

Mr. Stainton exhibited specimens of the coloured plates which were intended to illustrate Mr. Logan's projected work on the *Lepidoptera* of Scotland, on which the transformations of the following species were beautifully delineated, viz.:—*Polyommatus Artaxerxes*, *Agrotis lucerneæ*, *Lampronia rubiella*, *L. quadripunctella* and *Lozotænia costana*.

Mr. Westwood exhibited the larva of *Anobium striatum* commonly known as the "bookworm," and a living larva of *Phlogophora meticulosa*, found feeding on southern-wood, which he considered a very extraordinary food-plant for the insect.

Entomology of the Cape of Good Hope.

Mr. Adam White read the following extracts from a letter addressed to him by R. Trimen, Esq., dated Knysua, Cape of Good Hope, November 15, 1858:—

"My experience in this part of the world since last July tends to show that the entomologist in South Africa must not expect an abundance of active insect life; as yet I have not in any place seen as many insects congregated and visible at one time as in the woods of England in June or July. As far as the Lepidoptera are concerned, I have found it hitherto almost impossible to discover the metropolis of any species; with the exception of some common *Pieridæ* and *Hipparchiæ*, which are to be found everywhere, the butterflies appear to be scarce. In this district the entomologist requires a great deal of patience, for the nature of the woods—with their rotting stumps, fallen logs, stones and immense variety of thorns—renders chasing insects an impossibility, and the only way is to stand quietly in some sunny nook, and catch them as they successively visit the spot. The following will show you the respective proportions of the several genera of butterflies, as far as I have been able to obtain them, up to this time, and as well as I can make out the number of species:—

<i>Papilio</i>	3	<i>Euplœa</i>	1
<i>Colias</i>	1	<i>Acrœa</i>	2
<i>Pieris</i>	3	<i>Polyommatus</i>	8
<i>Anthocharis</i>	1	<i>Chrysophanus</i>	1
<i>Erebia</i>	3	<i>Zentis</i>	7
<i>Mycæalis</i> (?)	1	<i>Thymeles</i>	2
<i>Euryteia</i>	1	<i>Steropes</i>	2
<i>Cynthia</i>	1	<i>Pamphila</i>	2
<i>Philognomes</i>	1	——— ?	2
<i>Salamis</i>	1		

"Of moths I have upwards of 120 species, of which *Geometra* and *Pyræles* form the greater proportion; of *Sphingidæ* I have but five species, one *Syntomis*, two *Anthrocera*, one *Smerinthus* and one *Trochilium*. Sugar does not seem to succeed here in attracting them; I sugared twice without the least success, and the third time only found two moths, on sugared flowers. Light succeeds well on certain nights, and I have obtained a good many in that way.

"November 19. It has been very warm all the week and insects are visibly increasing in numbers every day. I have taken another *Anthocharis* (I think *Danaë*), *Danaë Chrysippus*, a beautiful *Zygæna*, intermediate between *Procris* and *Syntomis*, &c.

"My collection of beetles comprises about ninety species of larger size and a good number of small species. The *Lamellicorns* constitute the most numerous section of the *Coleoptera* here, and many of the species are very curious and striking in their appearance. The whole district is overrun by numbers of juvenile green and black locusts, which hang in hundreds on the shrubs and plants, and strip them of their leaves and young shoots in a very short time. The day before yesterday I saw a

Bittacus (of a species very common here) carrying a large fly along by one of its hind tarsi: the fly had evidently been abstracted from a spider's web, as it was wrapped in a webby shroud.

"It is worthy of remark how few species of Lepidopterous larva I can find; I imagine the greater number of them must feed at night, or high up on the trees.

"December 5.—I am going to-morrow to some large woods near at hand to endeavour to obtain some wondrous butterflies I have been informed of; they have, according to my informant (an observant old farmer), 'hard wings' which 'snap' when they fly; they keep entirely within the forests, and are found sucking the sap from the *Polygalæ* that grow there: I thought of *Cicadæ*, and suggested them to my informant, but he knew the latter well, and insisted that those he meant were butterflies; and that there were several kinds, all large, and one with two tails on each hind wing. The only one I have in my descriptions as possessing two tails on each wing is *Charaxes Xiphæus*; it is probably that species.

"December 13.—I have been out to-day in the woods, from 8 A.M. to 3 P.M., but although I visited the express woods mentioned by my informant, I saw nothing of the 'snap-wing' butterflies he described; indeed, though a splendid hot day, I saw very little in the insect way in the forest itself, though near it I captured a large and beautiful *Trochilium*, which must, I think, be quite new to Science, and some fine specimens of *Danaïd Chrysippus*."

Mr. White observed that no doubt the snapping sound alluded to was similar to that produced by the *Ageronæ*.

Mr. Waterhouse read a paper entitled "Notes on the British species of *Heterocerus*."

The President announced that the Council had resolved that all Members and Subscribers, whether residents in London or otherwise, shall in future be entitled to receive the Transactions of the Society gratuitously.—*E. S.*

The Tendency of Species to form Varieties.—Of the papers upon this subject which have appeared in the '*Zoologist*' (*Zool.* 6293—6308), those of Mr. Darwin seem to extend the operation of his theory into a period resembling geological epochs, which carries us at once into the region of conjecture,—a "barren ground," upon the boundless wastes of which I have no inclination to wander. If, however, Mr. Darwin's hypothesis supposes perceptible changes, and embraces the time present, it is submitted that the following observations may be not unworthy of attention in reference to his reasoning, and I would suggest for consideration whether the views (concluding the meaning of both writers to be essentially the same) propounded in the papers alluded to above are not founded upon the imaginary probable, rather than obtained by induction from ascertained facts, which last process I do not hesitate to pronounce the only solid and satisfactory basis of a new opinion. As (the italics are his own) Mr. Wallace writes (*Zool.* 6305), of "*progression and continual divergence*, deduced from the general laws which regulate the existence of animals in a state of nature," he argues (if I understand him correctly) that the production of varieties is of constant occurrence; and, according to his position (*Zool.* 6304), that "the *variety* would

replace the *species*," the several races of animals familiarly known to us now must differ materially from those with which mankind were originally acquainted. But is this the fact? Comparing the oldest extant descriptions with any existing organisms (inanimate as well as animate may be included) which we can identify, is there any appreciable difference between the forms now before us and what are represented to us as the earlier types? I fancy I can anticipate the reply. Again; Mr. Wallace speaks (Zool. 6305) of "the undisputed fact that varieties do frequently occur." No doubt "freaks of nature" do occasionally happen in respect to individual wild animals, but how far they are perpetuated is very questionable. If Mr. Wallace's theory is sound, we ought to find in some part or other of this country colonies of white rooks, white blackbirds, &c.; whereas we may challenge the reference to any example of such departures from the normal configuration becoming permanent. Mr. Wallace appears (Zool. 6304) to regard a casual instance of improved physical powers as the regular variation from the original type of an animal; on the contrary, I conceive the rule to be that the variation usually consists in a deficiency of those powers. I by no means deny that among all races of organized beings some individuals may and do possess a superiority in development over their congeners in general, but I do contend that in a state of nature this superiority is not demonstrably continued in successive generations; indeed I will declare my opinion, that, in the wild state, after a very few generations at the utmost, any accidental variation, whether apparently favourable or unfavourable, will be merged in a return to that original condition in which the creature was from the first adapted to the situation in which it was placed. Analogously we may reason from the case of mankind: our own experience must inform us, that monstrosities are not of very rare occurrence in the world, but it will not be argued that these examples have possessed any general influence upon the average standard dimensions of the human race. Reversely I believe it has been expressly noted, that the progeny, if any, of either giants or dwarfs did not prominently exhibit the peculiarities of the parents. I am not aware that the King of Prussia, who showed such a mania for collecting tall men for enlisting in his guards, succeeded in establishing a breed of giants in his dominions, although it is, I think, recorded that Frederick was by no means scrupulous as to his measures for providing his extra-grenadiers with proportionally tall wives.—*Arthur Hussey; Rottingdean, February, 1859.*

Notice of the Various Species of Bovine Animals. By the Editor of the 'Indian Field.'

(Continued from p. 6429.)

THE third or flat-horned group of taurines is distinguished as the name imports, the horns having an oval section, at least towards the base. As far as we know, the type is exclusively Asiatic; and however the details of structure may vary, the species have certain characters in common. A short smooth coat, either black or of an earthy brown colour verging more or less on black, at least in the bulls, and white *stockings* from the mid-joint (inclusive) downwards; as may

be commonly enough seen in the Indian buffalo, of the bubaline series, regular forest animals, that browse more or less, the gayal especially being much given to crop the leaves of trees and shrubs, while the gaour is more of a grazer. Very gentle creatures, where not persecuted; and most readily tamed; inhabiting the upland forests of tropical and juxta-tropical Asia, where they pasture in the more open glades; and assimilating in their general habits to other taurines, and in no respect to the buffalos, though the gayal is very bubaline in figure and proportions. Three species are now well known and thoroughly established, and a fourth less satisfactorily—if it really constitute a fourth, which may be doubted; but the balance of evidence is in favour of its being a distinct species from the banteng of the Archipelago, however nearly akin.

The names *Bibos* and *Gavæus* have been proposed for the group; or rather the former has immediate reference to the gaour in particular, which is especially characterized by its high spinal ridge.

The gaour (*Bos gaurus*, Col. Ham. Smith; *B. gour*, Traill; *B. aculeatus*, Wagler; *Bibos cavifrons*, Hodgson; *B. asseel*, Horsfield (founded on the head of a cow in the India House Museum); *Gauri Gau* or *Gaur*, Nipal (Hodgson); *Jungli Khoolga*, Dukhani; *Kar Kona*, Kanarese, and *Gaviya*, Mahratta (Elliot); *As'l Gayal* of the Hindus in Chittagong, and *Seloi* of the Kukis (Macrae); *Gayal* of Cuttak sportsmen; *Pyoung* of Burmese (Phayre); *Sapi utan* (literally "wild cow") of the Malays of the peninsula.

"It is somewhat remarkable," observed the Hon. Walter Elliot in 1839, "that one of the largest animals of the Indian Fauna, frequenting all the extensive forest-tracts from Cape Comorin to the Himilayas, should only have been indicated distinctly within the last two years. I have seen specimens from Tinivelli, and likewise from the whole range of the Syhadri mountains, up to Mahableshwa, and I know that the animal has been killed near Vellore, in the Shirwaroya hills near Salem, at Asirgurh, in Kandesh, Rajamundri, and I doubt not that it will likewise be found in all the deeper recesses of the Eastern Ghats, and on the banks of all the great rivers passing through them. An imperfect cranium, which seems to belong to a female of the species, in the United Service Museum, is labelled thus,—“Head of a Bison from Keddah, Straits of Malacca.” We happen to have drawings of the specimen referred to, and have published copies of them, showing the skull in three aspects of view, in the ‘Asiatic Society’s Journal,’ vol. xi. p. 470; from which it will be seen that the species is quite

different from the gaour, and we take it to be the skull of a bull (divested of its horns) of the Burmese T'sain or T'soing, from the Keddah coast.

But the gaour is nevertheless plentiful in the Burmese countries, and all down the Malayan peninsula;* and since we last treated of the bovines, we happen to have obtained possession of a fine healthy yearling bull-calf of the species, who is just now quietly chewing the cud within a dozen yards of where we are writing, brought (together with a Malayan tapir) from Singapore,—as gentle and tractable a little fellow (little in comparison with the full-grown beast, not otherwise), as can be imagined, albeit full of life and friskiness occasionally, that will have started on his voyage to England before this notice meets the eyes of our readers, who may look out for a sketch of him ere long in the 'Illustrated London News.'

The gaour is about the largest of existing bovines, a fine bull standing fully 19 hands from the summit of his elevated spinal ridge,† with a huge ponderous body, longish limbs, little trace of dewlap, a broad head, with high upturned frontal ridge occasioning a hollowness of the wide forehead, and a thorough Roman nose; eyes full and lustrous; the ears rather large; tail scarcely reaching to the hocks; and the horns of the bull out with rather a backward curvature, and passing round inwards at the tips, with commonly a slight inclination backwards at the extreme tips, which in general is much stronger in the cows,—excepting in this respect, some cow-horns differ little from those of the bull, save in being much smaller; but others we have seen, more slender, and curving very much backward at the tips, as com-

* What was Aristotle's wild bull of Persia with depressed horns? The extinct Guavera of Ceylon, noticed by Knox, refers clearly to the species now under consideration. A correspondent of the old 'Bengal Sporting Magazine' (for 1835, p. 217), writing from the southern Mahratta country, remarks that "the 'bison' of this jungle differ materially from those of the Mahableshwa Hills. The latter is merely a blue cow, of the colour of a buffalo, but of large size. The regular 'bison' of Dandelly is a tremendous animal, the highest point being the shoulder." We have little faith in any such distinction; and merely suppose that the writer had seen a big bull in one locality, and not in the other.

† In the 'India Sporting Review,' new series, No. III. p. 329, we read of "a most splendid fellow covered with scars from fighting, his teeth gone from age, and most magnificent horns. He measured 20 hands 1½ inch without measuring his hoof." In the same periodical, No. V. p. 210, "a splendid fellow" is mentioned, who "measured 20 hands and 2½ inches. His horns," remarks the writer, "were the finest I have ever seen, either of my own shooting, or any one else's." In the preceding page "a fine young bull" is mentioned, "measuring 18½ hands at the shoulder; horns not very large."

monly in the cow banteng ; and upon such a specimen (of which—the actual individual—we possess figures) is founded the *Bos asseel* of the much respected veteran zoologist Dr. Horsfield. The finest head of a bull we ever saw, of several dozens, we purchased some time ago at a Calcutta auction for one rupee, it being put up as a buffalo skull ; and this remarkably fine specimen is now in the Calcutta Museum.

The horns upon it are beautifully symmetrical ; and—what is unusual in first-rate gaour-skulls—they are not broken away at the tips, the result, we may suppose, of the combats of these gigantic animals. Round the outside curvature they measure each 30 inches, circumference at the base $14\frac{1}{2}$ inches, 6 inches in horizontal diameter across the base, greatest width apart 3 feet (measuring from the outside), tips 21 inches apart, distance apart posteriorly at base $8\frac{1}{2}$ inches ; from forehead to tip of nasal bones 19 inches ; the intermaxillaries reaching 3 inches further ; breadth of orbits apart posteriorly, $11\frac{3}{4}$ inches. Weight of the skull with horns, minus the lower jaw, just 30 lbs. Skull extraordinarily massive. The horns are much flattened as far as the outward curvature continues, rounder where the tips hook inward, and are of a pale greenish glaucous hue, with black tips ; and for nearly the basal half they exhibit a series of bold transverse rugæ. The colour of the beast is brown, passing more or less to black, with whitish fulvescent *stockings* to the four limbs, and the same pale hue on the somewhat lengthened hair of the forehead, and on that lining the ears ; the cows running generally paler. According to Mr. Hodgson, the rugous bases of the horns “are furnished posteally with a fragrant secretion.”

He was a fine fellow who originally owned the above head-piece. There is also a perfect skeleton of a very respectable bull, and another of a cow, in the museum of the Asiatic Society, Calcutta ; together with a stuffed bull, which was in tolerable proportions when first set up, but the great weight and contraction of the skin in drying have spoiled the shape altogether.

The most remarkable feature of the gaour is its high spinal ridge, the apophyses of the longest vertebræ measuring 16 inches in length ; † the dorsal line of them slopes back a little, and then terminates with a remarkable abruptness, which is observed in a less striking degree also in the gayal. In our living gaour-calf, this character is less prominent than might be expected, and the head is much less broad, and is

* Vide figure in the ‘Journal of the Asiatic Society,’ vol. vi. p. 748.

remarkably deer-like; the ears too seem proportionally large, and the legs are conspicuously longer than in a gayal-calf of the same age. In other respects there is considerable resemblance between the two species at this early period of life, and notably in the colouring; but the voice is strikingly different. That of the gayal, which we have often heard, is a prolonged, strange, somewhat shrill metallic cry, as if blown through a horn. Our young gaour's voice, which we suspect is pretty much that of the adult, is an equally prolonged, full, sonorous, and not unplaintive *hoo*, of considerable volume and most peculiar in tone, not to be forgotten when once heard, and which carries one at once in imagination to the jungles; in general likewise this is more or less modulated, and not unfrequently it has almost a human expression of languor and *ennui*. "The voice of the gauri," remarks Mr. Hodgson, "is very peculiar and quite unlike that of the ox, buffalo or bison; but as I am not skilled in bestial languages, I shall not attempt to syllable this utterance."

There is doubtless a difference in the voices of the two sexes, at least when adult; just as White of Selborne remarks of those of European cattle. "Oxen," he observes, "have large bent horns, and hoarse [deep] voices when they low, like cows, for bulls have short, straight horns; and though they mutter and grumble in a deep tremendous tone, yet they low in a shrill high key." How different this from the gruff cough or grunt of the humped bull! One remarkable particular connected with our juvenile gaour is the extreme fragrance of his breath, which is noticeable sometimes at several yards distance; it is that of European cattle intensified, and still sweeter; and we have never remarked this peculiar fragrance in the breath of the humped cattle. That of the gaour is really an exquisite perfume. It may be that we have not chanced to notice the same in the gayal.

Of this species in the sub-Himalayan region, Mr. Hodgson remarks:—"The Gauri Gau never quits the deepest recesses of the sal-forest, avoiding wholly the proximate *tarai* on one side, and the hills on the other. It is gregarious in herds of from ten to thirty, the females much preponderating over the males in the herds, though even in a small herd there are usually two or three grown males, whose conjoint office it is to guide and guard the party. This office is discharged with uncommon alertness, proving the animal to possess great perfection in all the senses, and with indomitable courage too, if need be; so that neither tiger, rhinoceros nor elephant dare molest the herd.*

* We have read of a big gaour-bull being killed by a tiger, but taken no doubt at a disadvantage.

During the heat of the day the herd reposes in the deepest cover, coming forth at morn and eventides to feed in the small and open pastures interspersed throughout the forest. Here the animals spread, of necessity, in order to feed, but in moving to and fro from their pastures they advance in single file, along the narrow beats made by themselves, by elephants, samburs, and other large tenants of the solitary and seemingly impenetrable wilderness.

"On an elephant, and in the day-time, you may, if you show yourself distinctly, approach the herd with facility, and I have seen the males stand with a careless indifference within a few paces; probably because they fear not the wild elephant, and are never molested by sportsmen with the aid of the tame one, the *shastras* having decreed that the Gauri is like unto Bos. No gentleman of the country [Nipal] will attempt to kill the Gauri; and plebeians, if they have less tender consciences, have ordinarily no adequate appliances for the work." A mode of hunting these animals, by people of low caste, is however described; and the pertinacity of the gaour, in watching the tree into which his pursuer may have mounted for shelter, is especially noticed. "In cases in which the luckless climber has dropped his weapon, and his companions have feared to come presently to the rescue, the Gauri has been known to keep his station at the bottom of the tree for twenty-four hours, and it is believed would never have stirred from the spot, so long as the man was above, if the animal had not been eventually destroyed." Mr. Elliot, however, remarks that "the persevering ferocity of the 'bison' of the sub-Himalayan range, described by Mr. Hodgson, is quite foreign to the character of the animal in the southern forests. When wounded, it is true it charges its assailant with determined courage, and many instances have come to my knowledge of its doing so with fatal effect; but in general it will always seek its safety by flight, if permitted."

Mr. Elliot mentions different grasses and other plants upon which the gaours subsist, and adds that "they will eat with avidity every species of grain commonly cultivated on the hills or plains, as the ryots find to their cost. They are so particularly fond of the *Dolichos lablab*, when in blossom, that they will invade and destroy fields of it in open daylight, and despite any resistance the villagers can offer. In other respects it is a very inoffensive animal, very rarely attacking any one it encounters, except in the case of a single bull driven from the herd. Such a one has occasionally been known to take up his location in some deep bowery jungle, and deliberately quarter himself on the cultivation of the adjacent villages. The villagers, though ready to

assist Europeans in the slaughter of these animals, will not themselves destroy them (the inviolability of the cow extending to the gaour); and so bold does this free-booting animal become in consequence, that he has been known to drive the ryots from the fields, and deliberately devour the produce. But in general it is a timid animal, and it is often difficult to get within gun-shot of them.

"The breeding season is said to be early in the year, and the calves are born after the rains. The bulls are often found separate from the herd, which consists generally of from ten to fifteen cows and a bull. They generally feed during the night, browsing on the young grass and the tender shoots of the bamboos, of which they are very fond. In the morning they retire to some thicket of long grass, or young bamboos, where they lie down to ruminate. When disturbed, the first that perceives the intruder stamps loudly with its foot to alarm the rest, and the whole rush through the forest breaking down every obstacle and forcing their way with a terrific crash.

————— *Dat euntibus ingens*

Silva locum, et magno cedunt virgulta fragore.

Æneid, vii. 676.

"When suddenly approached in the night they start off with a loud hissing snort.

"The Gowálahs say that they see great numbers of gaour when pasturing their herds in the neighbouring forest. They describe them as very timid and watchful, more so than any other wild animal, always reposing in a circle, with their heads turned outside, ready to take alarm. They add that they see most calves from June to October, but the greatest number about August. They do not know how long the cow goes with calf, but suppose the period of gestation to be the same as that of the buffalo, or ten months and ten days. The old male drives the others from the herd at the breeding season, and the single ones seen in the jungle are young males of this description, and it is probable that the very old bulls are sometimes expelled also by younger and stronger males.

"For the following particulars derived from the observation of the animal in the Sherwaroya hills, I am indebted," continues Mr. Elliot, "to Mr. Fischer of Salem. 'The bison ordinarily frequent the hills, seeking the highest and coolest parts, but during the hottest weather, and when the hills are parched by the heat or the grass consumed by fire, the single families, in which they commonly range the hills, congregate into large herds, and strike deep into the great woods and

valleys ; but after the first showers, and when verdure begins to re-appear, they again disperse and range about freely. In wet and windy weather they again resort to the valleys to escape its inclemency, and also to avoid a species of fly or gnat which harasses them greatly. In the months of July and August they regularly descend to the plains, for the purpose of licking the earth impregnated with natron or soda, which seems as essential to their well-doing as common salt is to the domestic animal when kept in hilly tracts.

“ ‘The period of gestation is with the gaour the same as with the domestic animal ; they drop their young in the months of September and October. I once had one brought to me so young that the navel-string was still unseparated. I should think that it was then about the size of a common country cow’s calf of four months’ old. It seems a slow-growing animal. A calf I had for three years was evidently in every respect still a mere calf. They seem very difficult to rear. I have known it attempted at different ages, but never knew the animal live beyond the third year. Mr. Cockburn has tried it in vain, in its native climate, the Sherwaroya hills, and I have made the attempt at Salem repeatedly. At one time I had five in my farm-yard ; one lived for three years ; but this one, with all the others, died suddenly in the same week from some disease, marked by refusal of food, running from the nose, and an abominable stench from the mouth. A similar disease, it may be noted, prevailed (as I was informed) among the gaour of the Sherwaroya, Shandamungalam and Nilgiri hills. The calves I had never became in any degree domesticated : the domestic cow could never be induced to suckle them.’ ”

A more domestic-looking little beast than the gaour-calf just outside our window it would be difficult to imagine ; and when an epidemic prevails over the country, as in the instance here noticed, it cannot but be regarded as altogether an exceptive case. The fact happens to be that the gaour, in addition to the gayal, is actually domesticated in the interior of the Tippera hills. Of this we are assured by the Rev. J. Barbe, a well-qualified observer, who to this day is (we believe) the only European who has penetrated into that little-known region. His verbal description left no doubt whatever on the subject ; and in proof of his having correctly determined the species, as distinguished from the gayal, he presented a pair of veritable gaour-horns to the Calcutta Museum as those of one of the domesticated animals which he saw.

The Hon. Walter Elliot thus describes a fine Dandelly gaour which fell to his rifle. He had tumbled over a precipitous bank into a river,

and, "when drawn ashore and examined more minutely, the first sentiment produced in all present was astonishment at his immense bulk and size; but on measuring his height, we found him much taller than his breadth at first led us to imagine.

"The head is very square, and shorter than in the common ox; the forehead ample, the bony ridge rising about five inches in height from the plane of the frontal bone, over which it inclines. When viewed behind, it rises suddenly and abruptly from the nape of the neck, from whence to the vertex it measures 7 inches; the horns make a wide sweep in continuation of the arched bony ridge, and turn slightly backwards and upwards, forming an angle of about 35 inches with the frontal bone; the whole of the head in front, behind the eyes, is covered with a coat of close short hair, of a light grayish brown colour, which below the eyes is darker, approaching almost to black. The muzzle is large and full, of a grayish colour; the eyes are smaller than in the ox, with a fuller pupil of a pale blue colour; the ears are smaller in proportion than in the ox;* the tongue is very rough, and covered with prickles;† the neck is short, thick and heavy; the chest broad; the shoulder very deep and muscular; the fore legs short, the joints very short and strong; the arm exceedingly large and muscular. Behind the neck and immediately above the shoulder rises a fleshy gibbosity or hump‡ of the same height as the dorsal ridge, which is thinner and firmer, rising gradually as it goes backwards,§ and terminates suddenly about the middle of the back. The hind quarters are lighter and lower than the fore, falling suddenly from the termination of the ridge; the tail very short, its tuft only reaching down to the hocks.

* In our calf they are decidedly and conspicuously large; and in form are intermediate to the more lanceolate ears of the humped cattle, and the rounder ears of the European type; we observe, moreover, that his lips are white, and that he has a distinct dark spinal list continued alike over the ridge and behind it. Be it observed that this is a Malayan individual.

† In our young animal the tongue is moderately rough to the feel, and is of a pale bluish colour on its upper surface, carneous below: he readily licks the hand that is held out to him, which affords tolerable opportunity for observation.

‡ Mr. Hodgson, who annotated a reprint of Mr. Elliot's paper in the 'Asiatic Society's Journal,' vol. x. p. 579, puts a note of interrogation respecting this hump; but its presence in the specimen is distinctly and repeatedly noticed by Mr. Elliot.

§ "Quare forwards. The height of the true dorsal ridge declines from the third process of the vertebrae, and the general appearance of the ridge therefore is a declination, not a rise, towards the croup from the withers."—Hodgson. This is well shown in the skeleton.

"The dimensions of this individual were carefully noted as follows:—

	Fect.	Inches.
Height at the shoulder	6	1½
... at the rump, taken from hoof to insertion of tail	5	5
Length from nose to insertion of tail	9	6½
... of tail	2	10
... of dorsal ridge, including the hump	3	4
Height of dorsal ridge, including the hump	0	4½
Girth, taken behind the fore-legs	8	0
Breadth of the forehead	1	3½
From muzzle to top of arched bony ridge	2	1½
Length of ear	0	10½
Circumference of horn at base	1	7½ *
... of the arm	2	6

"The skin on the neck and shoulders and on the thighs is very thick, being about two inches in this one, which has already shrunk from lying in the sun. It is used for making shields, which are much prized.

"The cows differ from the male in having a slighter and more graceful head, slender neck, no hump, a less defined dewlap, and the tips of the horns do not turn towards each other at the points, but bend slightly backwards; the horns are smaller too, and the frontal bone narrower, but the coronal ridge is distinctly marked. The bulls have the forehead broader in proportion to their age. In the young bull it is narrower than in the cow, and the bony ridge scarcely perceptible. The horns, too, in the young specimen turn more upwards.

"The general colour is dark brown, the hair thick and short, but in old individuals the upper parts are often rather bare. That on the neck and breast and beneath is longer, and the skin of the throat is somewhat loose, giving the appearance of a slight dewlap. The legs are white, with a rufous tint on the back and side of the fore legs. The cow has the legs of a purer white. The skin of the under parts where uncovered is of a deep ochry yellow.

"I saw," continues Mr. Elliot, "a young gaour-calf in the possession of some Gowálahs, the owners of large herds of buffalos. It was caught when just dropped in the month of May, and when I saw it was seven months old, very tame and gentle, though timid, licking the hands of the Gowálahs, and frisking about with the buffalo calves. It was the same colour as the old animal, very dark brown, with white legs.

* Query, 1 foot 1½ inch.

The head small, the forehead wanting the breadth so remarkable in the adult, and the bony ridge of the crown was hardly perceptible. The horns were just beginning to sprout, the ears larger and rounder than those of the buffalo, the eyes a pale gray or cærulean colour. The hair on the throat was long, and the dewlap slightly indicated. No hump was perceptible, but the dorsal ridge was distinctly marked." Comparing this description with our living calf, it applies exactly; only our animal is rather older, with horns a moderate span in length; and we estimate his height at the dorsal ridge to be about $3\frac{1}{2}$ feet, or perhaps a trifle more. The great change which the skull undergoes in shape is extremely remarkable, and much affects the position of the orbits, which are placed considerably more backward in the young animal before it develops the extraordinary breadth of forehead. In the old gaour the orbits are remarkably prominent, and are situate very forward in the head; and there is much of corresponding change in the shape of the head also in the geyal, which species we next proceed to notice.

(To be continued.)

Reason and Instinct. By the REV. J. C. ATKINSON, M.A.

(Continued from p. 6441.)

WE have yet one step more, and higher, to take before we close our present investigation; and that is, from among the subject-creatures, to the human sovereign of creation. Touching the power, and place, and functions of Instinct in prompting human actions, our enquiries are too recent to need recapitulation here. Suffice it to repeat three out of the four main positions which we endeavoured to illustrate and make good in a former portion of the present essay (Zool. 6081 *et seq.*)

1. That man, in an uncivilized state, is the most influenced by the impulses of Instinct; so that in some of his actions that essence or attribute may predominate over Reason, as a practical rule of action; in an almost isolated action or two, may even operate to the exclusion of Reason.

2. That, presumably, as he emerges from the uncivilized state, Instinct, by degrees, ceases to have any predominant power, and, infancy past, in no case utterly excludes the operation of Reason.

3. That, in a fully-civilized state, Instinct survives indeed, but is

so restrained and regulated in its operation by Reason, that it becomes difficult to allege any but a very few of man's daily actions as influenced by it, or even to distinguish between the workings of Instinct and the rulings of Reason, in actions which, according to analogy, are originally due to or prompted by Instinct.

The statements and considerations by which we endeavoured to illustrate and establish these positions (Zool. 6083—6091, 6196—6206, 6313—6317) both give and receive mutual light and confirmation, when brought into contrast with similar physiological observations to those appealed to in the case of the lower animals. I do not mean that there are in existence any available observations—at least, so far as I am aware—upon the contrasted brains of uncivilized, semi- or imperfectly civilized, and civilized man,—any series, that is to say, intended to display the comparative conformation of each, and the relative magnitudes and conditions of development of the cerebral hemispheres, and the organs at the base of the brain which are the analogues of the Instinct-organs in the several classes of the brute creation; but, what is clearly approximating in value to such a series of observations, we have the shape and dimensions of the different skulls, and of the cranial cavity in each, which are to be met with among the different communities and tribes of mankind. And it is a sufficiently remarkable fact, that these skulls do arrange themselves in three great classes—distinguished as the Prognathous, Pyramidal and Elliptical type of skulls—corresponding precisely to the three divisions or classes of mankind which we indicated by the nomenclature adopted a moment since, and implied in our three positions; I mean uncivilized, imperfectly civilized and civilized; while the description, given by physiological writers, of each several class of skulls is equally remarkable, taken in connexion with the statements and considerations which were advanced when what we have called our “positions” were under discussion.

The *Prognathous Skull*, which is the prevailing cranial conformation among the most uncivilized or savage communities in the world, is remarkable, says Dr. Carpenter, “for the large development of the parts connected with the organs of sense, especially those of smell and hearing. The aperture of the nostrils is very wide, and the internal space allowed for the expansion of the Schneiderian membrane, and for the distribution of the olfactory nerve, is much greater than in most European heads. The posterior openings of the nasal cavity are not less remarkable for their width than the anterior. The external auditory meatus is also peculiarly wide and spacious, and the

orbital cavities have been thought to be of more than ordinary capacity."

The greater relative development of the zygomatic bones, and of the bones of the face altogether, when compared with the capacity of the cranium, indicates in the *Pyramidal Skull*, which is the type obtaining among peoples or tribes certainly most imperfectly civilized, a more ample extension of the organs subservient to sensation, the same effect being thus produced by lateral expansion as by the forward extension of the facial bones in the Prognathous skulls.

The principal features of the *Oval Skull*, found among all the civilized nations in the world, "are thus of a negative character: the chief positive distinction is the large development of the cranial cavity, and especially the fulness and elevation of the forehead in proportion to the size of the face; indicating the predominance of the intellectual powers over those *merely instinctive propensities which are more directly connected with sensations.*" (Hum. Phys. p. 1075).

Thus, then, we have passed in review a very considerable portion of the entire scale of animated creation; and, almost throughout the whole of the gradations that have been brought under our notice, we have had occasion to observe, that corresponding with the progressive advances in cerebral development, are similar advances in instinctive and intelligent development. Instinct is not developed independently of Reason, nor Reason independently of Instinct, but both simultaneously and co-ordinately, though not by any means, possibly, in any similar or definite proportion. Further, we observe that, at some point near the upper end of the scale, Reason began to assert a dominant power, and that from thence its sway continued to increase ceaselessly and irresistibly, until, at last, it became difficult either to allege any actions as due to its undoubted influence, or even to distinguish its operation in actions which, according to strict analogy, ought to be induced by it.

It is, perhaps, scarcely necessary to advance anything in the way of set proof, that Instinct and Reason are, besides being developed simultaneously or co-ordinately, also developed co-operatively; for, indeed, it is self-evident that the intelligence of the creature—whatever one it may be that we take for the sake of example or illustration—is made to subserve the natural ends peculiar to it; or, in other words, the purposes for which it is endowed by the Creator with the mysterious gift of Instinct. The trout, which eschews the detected cheat of the fisherman's fly; the alligator, which endeavours to conceal his advance upon his prey beneath the water; the flycatcher,

which shelters its young from the fierce beams of the sun by the interposition of its own body and fluttering wings; the fox, which selects the apparently most frequented run at which to lie in ambush for the return of the hares from their feeding ground,—all, as well as every other actor in every conceivable instance of the kind, do what is done in furtherance of an object the pursuit of which is Instinct-prompted.*

I cannot but think that enough has now been alleged to serve as an additional confirmation of the theory advanced in a former page, that there is a necessary and self-existent connection between Instinct and Reason; so that where there is apparent Instinct, there is or may be also (in however small a degree) a Reasoning power, whether latent and perhaps undiscoverable in the present state of our knowledge, or brought out and developed.

I must crave space here, before we pass on to another but allied branch of our enquiry, for a few words in support of a former conclusion, which, though not prominently put forward in our later remarks, has certainly been implied and perhaps tacitly strengthened by almost all that has been said—I mean the conclusion, that the lower animals are partakers in Mind; intending by that, “that the mental principle in animals is of the same essence as that of human beings.” (Zool. 5575).

* How far what I have advanced in the text holds true in respect of animals, which have been not only domesticated, but are in the habit of constant or considerable association with their master, may be open to question. For my own part I confess to a decided belief that in the dog,—not to mention other animals brought much into contact with man, and especially if purposely taught and kindly treated by him,—Reason ceases in great measure to be subservient to Instinct. The sportsman, who—as many a true sportsman does—makes a friend of his dog, has a thousand instances presented to him in which the creature’s Instinct is as clearly made the servant of his Intelligence, as is his own pursuit—Instinct-prompted originally—facilitated by his powers of observation, comparison and reasoning. Certainly the same thing must be conceded in respect of such cases as exhibit one animal interposing in aid of another; *e. g.* a dog for a dog, a dog for a man, or for a horse, and the like; and there are multitudes of such cases on record. The elephants, two in the Eastern military service,—last mentioned in terms of no slight admiration by the ‘Times’ special correspondent (‘Times,’ of January 24th), and often before that by other writers,—in their separate and combined efforts for the extrication of guns sit fast in heavy sand, or other bad roads, afford another and very distinct evidence that their Reason is entirely unfettered by their Instinct. To enumerate other instances will, I fear, be only tedious, and I certainly think unnecessary. It is, at the least, equally unnecessary to say anything as to the relative positions occupied by Reason and Instinct in the human economy.

It is, perhaps, unnecessary to say, that in speaking of mind something quite distinct from any part of the material organization of the animal is intended; although we may and do hold that the mind works through, or by means of, a certain part of that organization—namely, the brain. And it may be observed, in passing (and in reference to allusions made a few lines above), that in whatever degree it is satisfactorily established, that the higher parts of the human brain are the organs through which the human intellect acts, in almost the same degree is the fact that brutes possess, at least, a modification of precisely the same organs, converted into a powerful argument in support of the belief that they too have a mind to act upon and through those organs; a mind, moreover, of the same nature with, and intended to act after, the manner of their great prototype.

But possessing a mind—even though it be but what Sydney Smith terms “fragments of soul and tatters of understanding”—it follows of necessity that they have a will also; not, indeed, a dominant, irresistible* will, such as is met with in the majority of the human species, but still sufficient for the purpose. And here, again, observation steps in, and supplies us with sufficient proof of the soundness of the inference; and this will, like the mind, is quite independent of the brain, as to or for its existence, though, of course, not so as regards its manifestation or exercise.

* Irresistible as compared with that which it is brought to bear on: I am aware that in saying what I do in the text I am advancing an opinion which, at the least, seems to be at variance with that expressed by Dr. Carpenter. “Notwithstanding the evidences of Rationality,” we find him saying, “which many of the lower animals present, and the manifestations which they display of emotions that are similar to our own, there is no ground to believe that they have any of that controlling power, from the will, namely, over their psychical operations, which we possess. On the contrary, all observation leads to the conclusion that they are under complete dominion of the ideas and emotions by which they are for the time possessed, and have no power either of repressing these by a forcible act of will, or of turning the attention by a like voluntary effort into another channel. So that they may, in this respect, be like the dreamer, the somnambule or the insane.” I certainly do think these remarks are not borne out by observation; nay, are indeed contradicted by it. The dog or the cat, which are taught, by thousands and tens of thousands, to retain their urine and their dung until they can obtain egress from the room or the house, surely exercise a measure of will in doing so; particularly as the functions in question are generally believed to be performed by animals without any particular consciousness of the act, if any at all. The trout that rises to the angler’s fly, but rendered suspicious by some unnatural appearance it detects, turns aside without taking it,—perhaps even darts off in evident alarm,—surely does so voluntarily, or by an effort of will. And innumerable other instances of the same sort are available.

Now, neither the weakness or comparative impotency of the will, nor the infinite variety of degrees in mental endowment, are any objection to our theory. We find parallels to both within the limits of the human species. Thus, to speak only of mental endowment: the variety, and the total distance between the first and lowest gradation of mind and the last or highest among men, is neither greater nor more startling than either the variety or the difference observable in passing from the lowest to the highest brute animal. For instance, compare Newton, not as Sir B. Brodie would do, with what he would have been if born an Australian savage, nor even with one of our London Bushmen,—but with many a member of not the lowest or utterly uneducated classes of modern life,—with one of those heavy, soulless, mindless labourers, whose features (caricatured as they are in ‘Punch’) are yet but too easily recognised as the features of a not scanty class among the labouring poor of this country;—and what a huge, almost fathomless, gulf there lies between them! Every one must have seen both children and adults, who seemed incapable of mental culture beyond the merest rudiments; to whom mental effort was intolerably laborious, and, at the upshot and close of it all, bore too strong a resemblance to the *Mons parturiens* of the fable. While, on the other hand, to many, intellectual exertion is a delight and a solace; to a few, here and there, knowledge, discovery, invention, seem to come as if by inspiration. The abyss between these extremes is deep, and beyond measure wide; and yet, on either side of it, stands the same human mind, working through different specimens of the same human brain, and testifying in itself and through itself—it may be with different degrees of energy, but with no other difference—to the being of the human soul. The question, “Why has God made man so?” is one we cannot answer. We cannot even make any real advance in the path towards answering it; any more than we can towards answering this other question, “Why, in such a sensible portion of the whole human race, no mental faculties whatever, or certainly, the closest approximation to none, are accorded or permitted to be exercised? or why, in such a considerable proportion again, the mental faculties actually bestowed at birth, and exercised through a given, perhaps a considerable, portion of life, should be withdrawn, or obscured by lunacy or raving madness?” The facts only are there; and startling, humbling facts they are.

Somewhat similar considerations, moreover, may be advanced with respect to the power of the will in the human race. Some there are of “iron will,” of irresistible powers of volition; others again, even

among civilized people, and in no small proportion either, whose "infirmity of purpose," "feebleness of will," "indecision of character," is so obvious and continually met with, as even to occasion phrases—the very ones I have used among them—to be stereotyped for the common purpose of expressing them; while among the uncivilized and semi-civilized tribes, the instability or infirmity of will is one of the chief hindrances in the way of permitting newly introduced processes and habits of civilization from becoming stable and capable of self-support (Zool. 6205).

Now, it certainly seems to me that the facts connected with the development of mind, and of the volitional faculty, in the several orders of Vertebrates, are rendered much more comprehensible by a recollection of such circumstances as those just mentioned, in connexion with the development of the same faculties among mankind. Taking these facts into dispassionate consideration, the objection that the lower animals can have no mind at all, because the manifestations of mind in their case are so slight, so comparatively imperceptible, when put in contrast with those seen in the dog or the monkey, seems to be almost as forceless and unreasonable as it would be to say that the most stolid clod in the country side, the most stupid dolt at the village school, are not endowed with intellectual faculties because they differ so greatly, in a mental point of view, from some distinguished ornament of the learned professions—so inconceivably from such almost superhuman intellects as Newton.

J. C. ATKINSON.

Danby Parsonage, Grosmont, York,
March, 1859.

Instinct of Birds.—It is quite pleasing to observe the instinct of birds in certain seasons: in December and January the missel thrush, or "storm cook," during the lulls between the storms, was frequently to be seen and heard, delighting us with his beautiful short chant. On the 28th of January,—a fine, calm, mild day,—I heard a lark sing part of his song, and he soared about half his accustomed height on the occasion: this is about a month or six weeks before the usual time, but was a true presage of the long mild weather which followed. Those sagacious birds, the rooks, also began building their nests a full fortnight before the usual time. The hedge accentor has been in full song for two months; and the first blackbird I noted in this neighbourhood opening his beautiful plaintive but chary song, was on Saturday, the 19th of February. Our splendid songster, the thrush, has been in uninterrupted song since the frost in November last.—*H. W. Newman; Cheltenham, March 9, 1859.*

Occurrence of the Great Ash-coloured Shrike (Lanius excubitor) in Banffshire.—A male specimen of the above species entered Drummur Castle about the middle of last

month (February), in an apparently exhausted state: a severe storm raged at the time; it died shortly afterwards, and was brought me for preservation. This is the first instance of the kind, so far as I am aware, in this county.—*Thomas Edward; Banff, March 7, 1859.*

Occurrence of a Variety of the Common Bunting (Emberiza miliaria) in Shetland.—A very beautiful and almost a yellow specimen of the above bird was killed on the island of Bressay, near Lerwick, Shetland, on the 8th of February, by Mr. John Kennedy, of Fisherie: it was seen for some days previously in company with linnets and sparrows. All the feathers of the tail are of a whitish yellow, except the second from each side, which are of the usual colour. There are also a few dark spots on the breast and wings, and one single brownish feather on the very crown of the head. In other respects the bird has all the appearance of a large or monster canary. The bill, legs, feet and claws are likewise yellow.—*Id.; March 10.*

Late Swallows.—On the 13th of November last I saw two swallows flying in this neighbourhood; one was evidently injured in the wing, and flew very awkwardly. The day was rather chill, although the sun shone brightly.—*Arthur Hensman; Spring Hill, Northampton, February 14, 1859.*

Sea Birds found Inland.—I have in my collection a beautiful specimen of Wilson's petrel, which was picked up dead in a meadow near the river Avon, November 2, 1849. A specimen of the common stormy petrel was also picked up dead in a neighbouring parish, about thirty years since. I presume these birds had been driven by storms so far inland, but not being able to obtain their natural food they died of starvation: we are at the least fifty miles from the sea. A labourer had found the specimen of Wilson's petrel, and brought it to his cottage, intending to bring it to me, but his wife persuaded him it was only a swift, and he threw it out in the road: another labourer passing by picked it up and argued to himself that a swift had not webbed feet, and so he brought it down to the Vicarage, and was rewarded for his pains. This anecdote shows how often rare specimens may be missed for lack of knowledge.—*G. S. Marsh; Vicarage, Sutton Benger, Chippenham, Wills.*

Another Sea Serpent.—The 'Amsterdamsche Courant' of October 6, 1858, inserts the following letter from Captain L. Byl, of the Dutch bark 'Hendrik Ido Ambacht,' to the 'Jorn-Bode':—"Sailing in the South Atlantic, in 27° 27' N. lat. and 14° 51' E. long., we perceived on July the 9th, between twelve and one o'clock in the afternoon, a dangerous sea-monster, which during nine days constantly kept alongside of us to 37° 55' S. lat. and 42° 9' E. long. This animal was about 90 feet long and 25 to 30 feet broad, and, most of the time, it struck the ship with such a force as to make it vibrate. The monster blew much water, which spread an unpleasant stench over the deck. The captain, fearing lest the animal might disable the rudder, did his utmost to get rid of his fearful antagonist, but without success. After it had received more than a hundred musket-balls, a harpoon and a long iron bar, blood was seen to flow from various wounds, so that at last, from loss of strength, the monster could swim behind our vessel no longer, and we were delivered of it. By its violent blows against the copper the animal's skin had been damaged in several places."—*J. H. van Lennep; Zeyst.*

The Shower of Fish in the Valley of Aberdare.—Many of your readers might, perhaps, like to see the facts connected with this phenomenon. They will be better understood in the words of the principal witness, as taken down by me on the spot where it happened. This man's name is John Lewis, a sawyer in Messrs. Nixon and Co's yard. His evidence is as follows:—"On Wednesday, February 9, I was getting out a piece of timber for the purpose of setting it for the saw, when I was startled by something falling all over me—down my neck, on my head, and on my back. On putting my hand down my neck I was surprised to find they were little fish. By this time I saw the whole ground covered with them. I took off my hat, the brim of which was full of them. They were jumping all about. They covered the ground in a long strip of about 80 yards by 12, as we measured afterwards. That shed (pointing to a very large workshop) was covered with them, and the shoots were quite full of them. My mates and I might have gathered bucketsful of them, scraping with our hands. We did gather a great many, about a bucketful, and threw them into the rain-pool, where some of them now are. There were two showers, with an interval of about ten minutes, and each shower lasted about two minutes, or thereabouts. The time was 11 A.M. The morning up-train to Aberdare was just then passing. It was not blowing very hard, but uncommon wet; just about the same wind as there is to-day (blowing rather stiff), and it came from this quarter (pointing to the S. of W). They came down with the rain in 'a body like.' " Such is the evidence. I have taken it for the purpose of being laid before Professor Owen, to whom, also, I shall send to-morrow, at the request of a friend of his, eighteen or twenty of the little fish. Three of them are large and very stout, measuring about four inches. The rest are small. There were some—but they are since dead—fully five inches long. They are very lively. *John Griffith; Vicarage, Aberdare, March 8, 1859.*

[The newspapers for the last three weeks have repeated similar statements to this in a variety of forms. Will some of our correspondents enlighten us on the subject? —E. N].

Remarks on Arachnida, taken chiefly in Dorsetshire and Hampshire.

By the Rev. O. PICKARD-CAMBRIDGE, M.A.

I BEG to enclose a list of Arachnida, taken chiefly in the counties of Dorset and Hants, during the last six years. I have not made this order the particular object of search during all that time, but have merely "had my eyes open" for them, in my daily constitutionals, and whilst collecting Lepidoptera and other insects; and the great success I have met with will, I hope, induce others to open their eyes in the same way. The preservation of spiders has been fully detailed in former numbers of the 'Zoologist' by Mr. Meade; I will therefore only add my testimony to the almost complete success of his method of keeping them in corked tubes of spirits of wine, slightly diluted, for the smaller species. The usual plan in collecting spiders is, to put them at once, indiscriminately, into a phial of spirits (carried in the pocket for the purpose) as soon as caught; and this kills them in

a few minutes. But, for myself, I prefer having a pocketful of small pill-boxes, and in these taking home the specimens alive for examination before immersion; for the spirit sometimes gives a different cast to the colours: a drop of chloroform renders the specimen quite quiet for examination with a magnifying glass, and then if wanted for the cabinet it is put into a tube, the tube filled with spirit and corked, and the whole ceremony is done; while, if the specimen is not wanted, it can be set free without any injury to itself. A small phial of spirit should, however, always be carried in the pocket, for spiders come across one at the most unlikely times; and it is very annoying to twist up a rare species in a piece of paper, and then to sit on it accidentally; and very unpleasant to pin the paper cocoon in your hat, and have the "uncanny beastie" get loose and crawl among your hair—both of which occurrences have several times happened to me.

Class ARACHNIDA.

Order ARANEIDEA.—Tribe OCTONOCULINA.

Family MYGALIDÆ.

Atypus Sulzeri. A male adult taken in January, 1857, by my brother, while ferretting in a rabbit's earth at Bloxworth, Dorset; and another by one of my sisters in August, 1857, crossing the high road not far from where the first was taken. Up to this time, the male of this species had never been captured in Great Britain. Long silken tubes, which I believe must be the nests of this species, are very common at Portland, near Pennsylvania Castle; but though I have dug many of them out entire, I could never discover the tenant either at home or abroad.

Family LYCOSIDÆ.

Lycosa agretyca. Lyndhurst, Hants, and Bloxworth.

L. campestris. Freshwater, Isle of Wight; also near Bath, and at Bloxworth.

L. andrenivora. Common on heaths in the south of England generally, and at Bloxworth especially; also at Portland, but not so common.

L. rapax. Lyndhurst, Bloxworth, and Portland.

L. picta. Common on Bloxworth Heath in old gravel pits; less frequent at Lyndhurst; very numerous on Sandy Flat, by Chesil Bank, Portland.

L. saccata. Common at Bloxworth, Lyndhurst, and Hatch Beauchamp, Somerset.

L. lugubris. Lyndhurst and Bloxworth.

L. herbigrada. This species was discovered by myself at Bloxworth and Portland in 1854, and named and described by Mr. Blackwall in the 'Annals of Natural History' in 1857; since then I have found it plentiful, both at Bloxworth and Lyndhurst; and also on the Sand Hills at Southport, Lancashire, in June, 1858.

L. obscura. Bloxworth.

L. exigua. Common at Bloxworth and Lyndhurst; also at Durham.

L. cambrica. This rare species I have taken three times—twice on Bloxworth Heath, and once on Lyndhurst Heath in 1858.

L. piratica. Bloxworth; rare.

Dolomedes mirabilis. Common at Bloxworth, Lyndhurst, and Hatch Beauchamp.

D. ornatus. This species was discovered by myself, in a rushy swamp on Lyndhurst Heath, in September, 1858; and it has been lately named and described in the 'Annals of Natural History' by Mr. Blackwall; all the specimens were immature.

D. fimbriatus. Common in rushy, boggy places on Bloxworth and Lyndhurst Heaths.

Sphasus lineatus. This (both genus and species new to Great Britain) was discovered by myself, in marshy places on Lyndhurst Heath, in August, 1858, but very rare.

Family *SALTICIDÆ*.

Salticus scenicus. Common on walls and posts at Bloxworth and Hatch Beauchamp, and also on the walls of University College, Durham.

S. sparsus. On palings at Lyndhurst; also at Bloxworth, but not common.

S. coronatus. Common at Bloxworth and Lyndhurst, beat from trees and bushes; also under stones at Portland; males are rare; an adult male beat from a fir near Ringwood, Hants, 1858.

S. frontalis. Not uncommon underneath stones near Pennsylvania Castle, Portland.

S. cupreus. Bloxworth and Portland.

Family *THOMISIDÆ*.

Thomisus brevipes. A single specimen on Lyndhurst Heath, in September, 1858.

T. cristatus. This very variable species is common everywhere.

T. sabulosus. This species, (though previously known on the Continent), was discovered by myself on Bloxworth Heath in 1854, and I have since taken it plentifully on Lyndhurst Heath; adults are scarce, especially males. This species is fond of sitting on the bare spots where turf has been cut, and where the small bits of gray mottled stone are strikingly like itself.

T. atomarius. A single specimen under dry cow-dung at Lyndhurst, August, 1858.

T. luctuosus. Bloxworth, August, 1857.

T. bifasciatus. I have taken this handsome species sparingly on Bloxworth Heath in the early spring.

T. Cambridgii. This species (a single adult female) was taken by myself on Bloxworth Heath, in September, 1857, and has been lately described in the 'Annals of Natural History' by Mr. Blackwall; who at the same time paid me the compliment of naming it after me. It is a large and handsome species, and showed very strikingly the habit (common, more or less, to all of this genus) of setting itself back and "showing fight" when the fingers were put near it.

T. citreus. Taken sparingly, at Bloxworth, from the blossoms of the common mullein and golden rod, in which it lies in wait to catch the insects that creep among them to suck the honey. I have known the female of this species overpower and kill a bee.

T. abbreviatus. Of this beautiful and delicately-coloured spider, a very young specimen was discovered by myself in one of my entomological collecting boxes at Bloxworth, in September, 1857; but during the last summer (1858) I have taken it freely on Lyndhurst Heath; previous to 1857, it was only known as an inhabitant of the South of France, Italy, Spain, and Africa. This species is of a singular shape, and sits with its two foremost legs slightly directed forwards, and both close together like one leg, and likewise the two hind legs similarly drawn backwards.

Philodromus dispar. Bloxworth; but rare.

P. pallidus. This species was discovered by myself in 1854, at Morden Park, near Bloxworth—or rather rediscovered, for in an old MS. of about the year 1714, lately lent me by James Salter, M.D., of Montague Street, London, and written by an ancestor of his, there is a very truthful coloured figure and description of this species. I have since taken it on Lyndhurst and Ringwood Heaths plentifully. The MS. referred to contains 145 figures and descriptions of about

100 species of British spiders, and most of the figures are beautifully drawn and coloured.

P. cespiticola. Common at Bloxworth.

P. aureolus. Bloxworth; but rare.

P. elegans. This strikingly marked species was discovered by myself at Lyndhurst, in August, 1858; and has been recently named and described by Mr. Blackwall in the 'Annals.' It appears to be a very local species, and, as far as I could ascertain, entirely confined to one spot on the Heath, where with a little trouble I could always find it.

P. oblongus. Sparingly taken at Lyndhurst, in August, 1858; but very plentifully at the base of grass stems on the sand-hills at Southport, Lancashire, in October, 1858. This species drops to the ground when disturbed, but quickly runs again up a grass mote, and, swinging itself round, sits almost hidden, by stretching its four foremost legs forwards and its four hinder legs backwards, into a straight line, which, with the dull greenish straw-coloured abdomen, makes it look exactly like the grass stem on which it is stretched.

Sparassus smaragdulus. Beaten from among sweetgale bushes at Bloxworth Heath; but scarce.

Family DRASSIDÆ.

Drassus lucifugus. Ringwood Heath, Hants, under pieces of turf, June, 1855; also a specimen under dry cow-dung on Lyndhurst Heath, in August, 1858.

D. ater. Under stones and rocks, near Pennsylvania Castle, Portland; but scarce.

D. sericeus. Bloxworth, but not common.

D. cupreus. Under stones, Bloxworth and Portland.

D. micans. This species was discovered by myself under stones and rocks at Portland, in September, 1857, and has been named and described by Mr. Blackwall during the past year, in the 'Annals.'

D. nitens. Under stones and rocks, Portland, September, 1858.

D. propinquus. Lyndhurst Heath; and Portland, under stones, September, 1858.

Clubiona holosericea. Bloxworth, but not common.

C. amarantha. Bloxworth; common.

C. epimelas. Bloxworth; rare.

C. corticalis. Bloxworth; rare.

C. comta. Near Bradford, Yorkshire; October, 1857.

C. accentuata. Common at Bloxworth; beat from trees.

C. domestica. Underneath stones, Portland, September 1858.

C. erratica. Common at Bloxworth and Lyndhurst among heath, rushes, and furze.

Argyroneta aquatica. From ponds near Durham, April 1857.

Family CRINIFLONIDÆ.

Ciniflo atrox. Bloxworth and Durham.

C. ferox. Common; Bloxworth, Hatch Beauchamp, Durham, and Lyndhurst.

C. mordax. An adult specimen of this species was given me by my friend Mr. F. Bond, who took it by lamplight in a garden at Freshwater, Isle of Wight. From this specimen Mr. Blackwall has lately named and described it in the 'Annals.'

Ergatis benigna. Very common at Bloxworth and Lyndhurst throughout summer and autumn, in swampy places; where every rush-blossom or tip of heath has its tenant snugly domiciled in a small irregular web.

E. pallens. This pretty species was discovered by myself in a wood near Lyndhurst, in July 1858; it was ensconced in a bramble leaf sewn together by its web, and inside the leaf it brooded over three flattish round white sacs, each enclosing several eggs; it has been lately named and described in the 'Annals' by Mr. Blackwall, who, however, is of opinion that the eggs were not those of this species.

E. latens. Bloxworth and Lyndhurst.

Veleda lineata. This spider was discovered by myself on Lyndhurst Heath, in August, 1858; and, belonging to no known genus, Mr. Blackwall has constructed from its peculiarities a new genus, to which he has given the above name; the few specimens of this peculiar and distinctly marked spider, which I obtained with close searching, were all immature.

Family AGELENIDÆ.

Agelena labyrinthica. Common on heaths at Bloxworth and Lyndhurst; and also in every lane side may be seen its large horizontal webs, with a tube in the centre, in which the occupant lies wait.

A. brunnea. Bloxworth; and Southport, Lancashire, but not common.

A. gracilipes. This species was discovered by myself on Lyndhurst Heath, in September, 1858; and has been lately named and described by Mr. Blackwall in the 'Annals.'

Tegenaria domestica. I have received this species from my friend T. W. Huthwaite, Esq., of Bath, taken there and also at High Wycombe, Buckinghamshire.

T. atrica. Hatch Beauchamp, Bloxworth, and Lyndhurst; in carpenter's shops and old dark sheds, but not common; one under a stone at Portland, in 1858.

T. civilis. At Lyndhurst, August, 1858.

Cælotes saxatilis. Taken when out with Mr. Meade, near Bradford, October, 1857.

Textrix lycosina. I have only found this spider common at Portland, where it spins a snare something like a miniature of that spun by *Agelena labyrinthica* (only not so compactly woven) among the cracks and crevices of the dry and crumbling blue-lias cliffs.

Family THERIDIIDÆ.

Theridion lineatum. Common at Bloxworth and Hatch Beauchamp.

T. quadripunctatum. Bloxworth.

T. Sisyphum. Bloxworth and Durham; rare.

T. tepidariorum. In peach houses at the seat of Lord Bridport, in Somersetshire; and in pineries at Leweston House, near Sherborne, Dorset.

T. nervosum. Common everywhere.

T. denticulatum. Bloxworth, Hatch Beauchamp, and Lyndhurst.

T. varians. Bloxworth.

T. pulchellum. Bloxworth.

T. albens. Common on Scotch firs, near Bloxworth.

T. filipes. Near Bradford, October, 1857.

Pholeus phalangioides. Common in corners of ceilings and walls of dwelling and out-houses, Bloxworth, Hatch Beauchamp, and Lyndhurst.

Family LINYPHIIDÆ.

Linyphia montana. Very common everywhere.

L. marginata. Common at Bloxworth.

L. pratensis. Hatch Beauchamp and Bloxworth.

L. fuliginea. Bloxworth and Lyndhurst.

L. rubea. Bloxworth.

L. minuta. Lyndhurst.

L. cauta. Bloxworth.

L. socialis. Lyndhurst.

L. alticeps. Lyndhurst and Southport.

L. tenuis. Common in summer-houses, Bloxworth.

- L. terricola.* Bloxworth.
L. anthracina. Bloxworth.
L. pulla. Bloxworth.
L. alacris. Bloxworth.
L. ericæa. On the sand-hills, Southport, October, 1858.
L. insignis. Bloxworth and Lyndhurst.
Neriene bicolor. Bloxworth, Bradford, and Southport.
N. livida. Bradford.
N. flavipes. Bloxworth.
N. cornuta. Bloxworth.
N. rubens. Bloxworth.
N. longipalpis. In University College Quadrangle, Durham, November, 1857.
N. trilineata. Common everywhere.
N. rubella. Bloxworth.
N. variegata. Lyndhurst and Southport.
N. affinis. Lyndhurst, August, 1858; Mr. Blackwall had never before seen the adult female, but had little doubt of its specific identity.
Walckenaera cuspidata. Beneath a stone, Portland, September, 1858.
Pachygnatha Listeri. Bloxworth; rare.
P. Degerii. Bloxworth, but not common.

Family EPEIRIDÆ.

- Epeira quadrata.* Females very common at Bloxworth and Lyndhurst, though I never obtained but one male.
E. apoclisia. Common everywhere.
E. scalaris. Bloxworth and Lyndhurst, but not common.
E. umbratica. Not uncommon at Bloxworth, Ringwood, and in the New Forest.
E. Agalena. Bloxworth.
E. solers. One of the commonest spiders on the Heath, both at Lyndhurst and Bloxworth.
E. similis. Bloxworth, and in verandahs at Weymouth.
E. calophylla. Very common among furze bushes on Bloxworth Heath.

E. acalypha. This species was discovered by myself on Bloxworth Heath in June, 1853, but was not recorded as a native of Britain until after its capture by Mr. Meade in 1856; it is very abundant on the heath at Bloxworth and Lyndhurst in September and October, and a dozen or more may be seen on one heath plant, as close together as they can

spin their geometric webs, which are placed at all inclinations with the ground, contrary to the usual habit of this genus, which is to place them perpendicularly, except *E. cucurbitina*, whose webs are commonly, though not always, horizontal.

E. cucurbitina. Common at Bloxworth and Lyndhurst.

E. adianta. Two specimens of this beautiful species were discovered by myself on Bloxworth Heath in September, 1857; I have since taken it more freely on Lyndhurst Heath, in 1858; this species was only known before as a continental one.

E. fusca. Bloxworth; and Finchall Abbey, near Durham, but rare.

E. antriada. Bloxworth, and University College, Durham; in out-houses and dark places.

E. inclinata. Common everywhere.

E. diadema. Common everywhere.

E. angulata. A specimen of this spider was found by my friend Mr. F. Bond on a fir tree on Ringwood Heath, one day when we were out entomologising in June, 1854; I have since taken it at Bloxworth, and Mr. Bond has also found it since at Black Park, Bucks; it was previously only recorded as a continental species, but the MS. referred to before (of 1714) contains a description and a well-coloured figure of it.

E. bicornis. Beat occasionally from firs near Bloxworth.

E. conica. Bloxworth; not infrequent on fir trees, and also among flowers in Bloxworth House gardens.

E. tubulosa. This species had not been met with since the time of Lister, until rediscovered by myself near Bloxworth in 1855; I have since met with it freely at Lyndhurst, where it spins and lives in its compact funnel-shaped web among the flowers of rushes, or at the tips of heath shoots.

E. calva. Common on Lyndhurst Heath.

E. Herii. This spider (previously only known as a continental species) was discovered by myself on Lyndhurst Heath, in August, 1858, where it occurs abundantly.

Tetragnatha extensa. Common everywhere.

Tribe ENOCULINA—Family DYSDERIDÆ.

Dysdera erythrina. Common at Portland, under rocks and stones.

D. Hombergii. Bloxworth, under loose bark; and Lyndhurst, running on the ground, but not common.

Segestria senoculata. A single immature specimen under loose bark at Lyndhurst, in August, 1858; common near Bradford, Yorkshire, among the loose stones of walls, &c.

Oonops pulcher. Bloxworth.

In the above list I have only given particulars of time, &c., in respect to those that are considered as yet rare and local, and those which I have discovered myself. Of many of the commonest kinds I have perhaps only myself met with one or two specimens, and in those cases I have omitted any notice of their being common or rare.

It will be seen that out of 134 species which I have met with (all, except two or three in Dorset, Somerset, and Hants) there are seventeen species, and two genera new; of these one genus and nine species are new to Science, and one genus and eight species new to Britain. The greater part of these are far from being among our minute spiders—some of them are of considerable size and great beauty. These results of taking notice of this interesting order, while collecting other orders, will I trust induce some others among our now legion of entomologists to do the same; and I have not the least doubt that the species of *Arachnida* in Britain, especially in the southern counties of England, are not nearly yet exhausted, but that a rich harvest would repay any ordinary search.

I will only now add a few words on the mode of taking spiders, which I have found most successful, and by which most of my novelties have been brought to light. First, among timber trees and brushwood, by beating into a large entomological folding net; next, among long grass, rushes, fern and heath, by sweeping with a very stiff strong sweeping net, taking especial care to scrape as close to the ground as possible; this is hard work, and will soon blister the hands if done properly—but the effect, particularly among heath, has been wonderful. Of course, in this way no knowledge of the ways and habits of spiders can be got—this knowledge must depend entirely on a good eye, great patience, and a habit of observation. Still it is something to ascertain the mere existence of species in any locality; and as yet my chief exertions have been directed to this end: with regard to most of my novelties, everything almost has yet to be discovered, even to the time of their coming to maturity, as most of them were immature when taken. After the lapse of a year or two I look forward to having more leisure to follow up a course of observation on their manners and customs; and meanwhile I hope some of our “butterfly catchers” will take up the study and collecting of this order, which as yet has so very few votaries.

O. PICKARD-CAMBRIDGE.

Southport, Lancashire,
February 10, 1859.

Capture of Deilephila Gali.—In the 'Zoologist' (Zool. 6066), it is stated that a specimen of this insect is in the Taunton Museum: it was presented to the Museum by John Woodland, a gentleman now residing at Bridgwater, who has informed me that it was taken in a garden at Taunton; he has also lately shown me another specimen, which was taken in the same or a neighbouring garden, some time in the last summer.—*Thomas Clark; Halesleigh, March 4, 1859.*

Agrotis Præcox.—Your correspondent "Talpa" (Intel. v. 132) states that he has been unable to find the larva of this insect; as I have had little difficulty in obtaining it in plenty, I will endeavour to enlighten him as to my method of procuring them. Let him visit the sand-hills on the coast some fine warm day about the end of May, when he will not fail to observe the tracks made by the larvæ crawling on the sand at the edges of the patches of dwarf willows; by tracing one of these he will find it abruptly terminate at a small hillock or upheaving of the sand, under which is the larva. Having once become acquainted with them he need not trace the tracks, but, avoiding making too many tracks himself, carefully search for the hillocks or burrows, where he will have no difficulty in procuring as many as he likes. I have taken in this way upwards of eighty in an hour, and there is little difficulty in rearing them; mine fed well on the willow, the perfect insect appearing in August.—*G. A. Almond, 50, Oliver Street, Birkenhead.*—*From the 'Intelligencer.'*

Notes on Xanthia ocellaris.—Having given attention to this reputed British species, and availed myself of all the information I can concerning it, I find that the statement as to its being British is liable to doubt, and as many of the facts connected with it are not generally known I have forwarded you the result of my researches, for the benefit of those who are interested in the question. The first so-called British specimen was, I understand, captured at Brighton in 1856, and was forwarded to Mr. Doubleday for confirmation, but the owner being a dealer in foreign Lepidoptera, and his word not being thought reliable, it was not then admitted into our lists. Last year five specimens, which were asserted to belong to this new species, were taken at Brighton and Deal, but as they do not possess the characteristics, which, according to M. Guenée, they should possess, the question naturally arises, Are not the so-called specimens only varieties of *Xanthia gilvago* mistaken for *X. ocellaris*? In order to investigate this inquiry, I will refer to each of the cases, but before doing so it is advisable to give a description of *X. ocellaris*, so that we may better understand the question at issue; the one I give is extracted from M. Guenée's 'Noctuelites':—"This *Xanthia* is perfectly distinct from *X. gilvago*: it differs in the anterior wings, which are more pointed at the tip, the costal portion of which is hollowed in its veins, which are usually lighter than the ground-colour, in its posterior wings, which are of a pure white, and only dusky by some gray hairs on the border of the abdomen. The black of the reniform stigma is almost always ocellated and the lines more distinct." With the above description as a criterion, I have examined the specimens captured by Mr. H. Pratt, of Brighton, and find that, although it agrees with *X. ocellaris* in some of its details, in others it is totally deficient: it agrees in the upper wings being more pointed at the tip, in the costal portion being slightly hollowed, and in the hind wings being dusky by gray hairs preceeding from the abdomen; but in the black of the reniform stigma being ocellated, in the veins being lighter, or the wings of pure white, it differs much. Mr. Allis and the Members of the Entomological Society to which I belong are of opinion that it is only *X. gilvago*, in which I fully concur.

I forwarded it to Mr. Doubleday, who informs me that he cannot as yet satisfactorily decide upon it. The Rev. H. Burney, in a letter which he kindly wrote to me on the subject, says, "I have seen two specimens of the so-called *X. ocellaris*, both very different, yet each, I think, is only a variety of *X. gilvago*. Mr. Harding sent me the first, which was the best of the two taken by him at Deal; I sent it to Mr. Doubleday, and he returned it as a bright variety of *X. gilvago*. The other, a very light specimen, was sent to me by Mr. Tidy, a pretty looking insect, but in markings I could see no material difference from *X. gilvago*: this I also sent to Mr. Doubleday, who considers it to be the latter species. Mr. Bond and others also saw Mr. Tidy's and Mr. Harding's specimens, and pronounced them to be *X. gilvago*." I am informed by Mr. Pratt that Mr. Tidy's specimen was exhibited at the Entomological Society of London, and that Mr. Tidy was assured that it was *X. ocellaris*, which statement was confirmed by Mr. Newman. It will be perceived that Mr. Tidy's specimen thus acknowledged was the same which Messrs. Doubleday, Bond, Stevens, Burney and others consider only as a variety of *X. gilvago*. Whence this diversity of opinion? According to M. Guenée *X. gilvago* varies, but not so much as *X. ocellaris*. This may in some degree account for the difficulty in recognising *X. ocellaris*, but when there are distinct characteristics in the perfect insect one would believe that it is surmountable, and that the peculiarities could be detected. Had the difference existed only in the larvæ, had *X. gilvago* and *X. ocellaris* been in a similar position to *Acronycta tridens* and *A. Psi* one could have understood the relative position of each, and on the required proofs being given as to the authenticity of the larva, one would accept the insect for what it was represented to be; but when a difference is stated to exist, not only in the larva, but also in the perfect insect, which cannot be found in specimens that have been acknowledged as *X. ocellaris*, I am at a loss at what conclusion to arrive. I have referred to all the recorded specimens asserting a claim to this name, with the exception of one taken by Mr. Turner. Concerning it I do not know more than what I learned from Mr. Allis, who informs me that many think it a variety of *X. gilvago*. Mr. Doubleday tells me that Lederer, in his recent 'Catalogue of Noctuæ,' unites them as varieties of one species, but after the satisfactory accounts given by M. Guenée, proving the distinctions both in the larva and the imago, I shall not enter upon this. In conclusion I hope that before this species is included in our lists it will be fully ascertained that some of the specimens are genuine, and I trust it will not be admitted without proper investigation, to be at a future time erased.—Robert Anderson; Coney Street, York, March 9, 1859.

PS.—Since writing the above, I have received Mr. Doubleday's 'Synonymic List of British Lepidoptera' (second edition), and am glad to observe that he places this insect amongst the reputed British species, which position is, I think, its proper place, and I hope that those authors and compilers of lists who have already included this species will receive the facts connected with it as a lesson, teaching them not to be too zealous in adding new species before they have proper proofs as to the truthfulness and accuracy of their information.—R. A.

Correction of an error.—I am much obliged for your correction of an error of mine in the 'Zoologist' (Zool. 6388), in which I stated that the death's head moth had damaged the combs of a hive of bees; it was the honey moth (*Galleria cerella* of Doubleday's list) as you say, one of the worst enemies the bees can have.—H. W. Newman; Cheltenham, February 14, 1859.

Food-plant of Bryophila perla.—We have a colony of the larvæ of *Bryophila perla* that interests me vastly. As the little fellows have fixed their quarters on the house-side I have not got far to go to observe their operations. During the day they carefully secrete themselves in their sand nests; as they take care to make up the door-way on entering their retreats, there is no chance of catching a glimpse of them then. The early morning is their time of feeding; then old and young are out, but soon after nine they retire for the day. The plant that takes their fancy is the *Lecidea confluens*, a crustaceous lichen that dots over old walls with its cracked and weather-beaten patches. The shields or tubercles of this lichen are the chief attraction; these they gnaw, removing the black crusts and exposing the white under-surface to view. Their depredations are thus readily seen in the morning, as the white tops are very conspicuous in the sunshine. The *Lecideas*, it is well known, abound in tartar, none probably more than *L. confluens*. Soon after 9 o'clock the larvæ withdraw to their nests for the day. It is stated by Westwood that the larvæ of *B. perla* feeds on the lichens, but as there are upwards of sixty *Lecideas*, not to speak of other genera, and many of these affect rocks and old walls, I think you will be interested to learn the species that feeds the caterpillar with us. The stone of which the house is built is granite. I would just add a few words on the larvæ itself: it is, indeed, as you term it, "gaily-coloured;" the dark livery is relieved by the orange-coloured stripe down the back; this stripe is interrupted with dark spots, so as to give it the appearance of a chain-work of little hearts. The tubercles have each a single hair, and are black, glistening like the head. The sides of the little creature are beautifully mottled with slate-colour.—*Peter Inckbald; Storthes Hall, Huddersfield; March 9. 1858.*—'Intelligencer.'

Appeal on behalf of Mr. Jethro Tinker.—Will you permit me to call the attention of your readers to the following extract from a circular, issued by a Committee of the friends of Mr. Jethro Tinker, of Stalybridge, in order that those naturalists who can afford to assist one of Nature's gentlemen in his old age may have the opportunity of giving each his mite? for I feel certain that his case only requires to be known to ensure the support of all thoroughly practised naturalists. Mr. Tinker is the father of a numerous family of naturalists; to his kindness pretty nearly all the Lancashire naturalists are indebted for some part of their knowledge; for fifty years he has worked as none but a pure lover of nature can work, and for information on specimens none ever applied to him in vain. Twenty years ago I thought his collection of Coleoptera and Lepidoptera the result of superhuman labour; they may have fallen behind the present cabinets, yet they were part of the materials out of which our general information was culled. As a botanist he stands second to none in his district, and has always held a leading place amongst muscologists. He is now sick, consequently unable to attend to his work, and being above seventy years of age I think him fairly entitled to any support the liberal-minded naturalists of the present day can afford him. Will you Mr. Editor kindly undertake to receive any gratuities which may be forwarded to you for him? "A number of friends, admirers of Mr. Jethro Tinker, the well-known botanist and entomologist, believing him to be highly deserving of some substantial token of sympathy in his declining years, assembled on the 19th of February last, Mr. John Holden in the chair, when it was unanimously resolved:—1st 'That Mr. Jethro Tinker having for half a century assiduously devoted himself to the interests

and propagation of the sciences of Botany, Entomology and gardening; and who, possessing a knowledge of the beauties of Nature, which he has at all times, with most disinterested willingness, imparted to others, leading many to look from Nature up to Nature's God, this meeting believes him entitled to the admiration of his fellow men, and resolve that a substantial testimony of esteem be awarded to him.' 2nd 'That the following gentlemen be appointed a committee to carry out the above resolution, viz.:—Messrs. G. Smith, T. Hague, J. Miller, J. Holden, M. Wild, J. Hallsworth, J. Knott, G. Winterbottom, J. Castle and G. Chadwick.' 3rd. 'That Mr. Thomas Hague act as Treasurer, and Mr. G. Stelfox Honorary Secretary.' The Committee take this opportunity of intimating that the claims of Mr. Tinker to public sympathy are so universally acknowledged that little need be advanced in their support. His services in the cause of Botanical science, Entomology, &c., have done much towards perfecting many in the study of Nature's works. Mr. Tinker has arrived at the age allotted to man, and a little assistance, at his time of life, will do much towards smoothing life's rugged path in his latter days."—*C. S. Gregson; Fletcher Grove, Stanley, near Liverpool, March 3, 1859.*

[I cannot object to receive any contributions that may be offered, but suggest that the more direct mode would be to transmit to Mr. Hague, the authorized Treasurer.—*E. Newman.*]

Notice of the Various Species of Bovine Animals. By the Editor of the 'Indian Field.'

(Continued from p. 6485.)

THE gayal—*Bos frontalis*, Lambert; *B. gavæus*, Colebrooke; *B. sylhetanus*, F. Cuvier; *Gavæus frontalis*, Gray;* *Gavaya*, Sanskrita; *Gavai* or *Gayál*, Hind.; *Gobay-goru*, Beng.; *Mi'hun* or *Me'hana*, mountains bordering on Assam; *Shiall*, of the Kukis or Lunklas of Chittagong; *Jhongnua*, Mughls (if the latter does not rather apply to the Burmese *Tsoing*, which is identical with the banteng of the Archipelago†).

Another fine Indian bovine, that has been much confounded with the last, which it resembles, in many particulars while in other respects it differs strikingly and conspicuously. The general figure is heavy and recalls to mind the buffalo; spinal ridge much less elevated than the gaour, but still a conspicuous feature of the beast; dewlap tolerably well developed; and the horns curve simply outwards and a little upwards, their points never hooking inwards as in the gaour. Both in a wild and tame state, this species inhabits the hilly regions bor-

* Nobody who knows [has observed] the living gaour and gayal would think of placing them in separate sub-divisions.

† In Orissa, as we have seen, the gaour is designated by the name gayal; both, of course, being but variations of the same root.

dering the valley of the Brahmaputra, as also the Chittagong and Tippera hills ; but we have not been able to trace it further southward on sufficiently reliable evidence—not even in the Ya-ma-doung mountains, which separate Arakan from Pegu, though it is likely enough to occur there, and also to spread far eastward. Helfer, indeed, notices “*Bison guodus*” (evidently a misprint for *gavæus*) as an inhabitant of the Tenasserim provinces ; but he is not sufficient authority, and we cannot learn that his statement has been confirmed. The gayal is everywhere a hill species, and does not thrive in the plains, away from its native forests ; and we have observed that both the gaour and the gayal avoid the sunshine in lower Bengal, even during the height of the cold season. As remarked by Mr. Macrae, the gayal “delights to range about in the thickest forest, where he browses, evening and morning, on the tender shoots and leaves of different shrubs ; seldom feeding on grass when he can get these. To avoid the noon-day heat, he retires to the deepest shade of the forest—preferring the dry acclivity of the hill to repose on, rather than the low swampy ground below ; and never, like the buffalo, wallowing in mud. He is of a dull heavy appearance,” continues that gentleman, “yet of a form that indicates both strength and activity, and which approaches nearly to that of the wild buffalo ; his head is set on like the buffalo’s, and is carried much in the same manner, with the nose projecting forward ; but in the shape of the head he differs considerably from both the buffalo and cow, the head of the gayal being much shorter from the crown to the nose, but much broader between the horns than that of either ; he has a full eye, and as he advances in age often becomes blind ; but it is uncertain whether from disease, or from natural decay. The withers and shoulders of the gayal rise higher in proportion than those of the buffalo or cow, and its tail is shorter, seldom falling lower [*i. e.* its terminal tuft of hair] than the bend of the ham [hock-joint !]. Its colour is in general brown, varying from a light to a deep shade ; it has at times a white forehead and [always ?] white legs, with a white belly and brush. The hair of the belly is invariably of a lighter colour than that of the back and flanks. The gayal calf is of a dull red colour, which gradually changes to a brown as it advances in age.

“The disposition of this animal is gentle ; even when wild in his native hills, he is not considered to be a dangerous beast, never standing the approach of man, much less bearing his attack. The Kukis hunt the wild ones for the sake of their flesh.

“Gayals have been domesticated among the Kukis from time

immemorial; and without any variation in their appearance from the wild stock. No difference whatever is observed in the colour of the wild and tame breeds; brown of different shades being the general colour of both. The wild gayal is about the size of the wild buffalo of India. The tame gayal, among the Kukis, being bred in nearly the same habits of freedom, and on the same food, without ever undergoing any labour, grows to the same size as the wild one.

"He lives to the age of fifteen or twenty years, and when three years old the gayal cow receives the bull; goes eleven months with young, and does not again engender until the following season, after she has brought forth. She thus produces a calf once only in three years, and so long an interval between each birth must tend to make the species rare; the calf sucks his dam for eight or nine months, when he is capable of supporting himself. The Kukis tie up the calf until he is sufficiently strong to do so. The gayal cow gives very little milk, and does not yield it long; but what she gives is of a remarkably rich quality—almost equally so with the cream of other milk, which it resembles in colour. The Kukis make no use whatever of the milk, but rear the gayals entirely for the sake of their flesh and skins; they make their shields of the hide of this animal; the flesh of the gayal is in the highest estimation among the Kukis, so much so that no solemn festival is ever celebrated without slaughtering one or more gayals, according to the importance of the occasion.

"These animals lose their sight as they grow old, and are subject to a disease of the hoof, which often proves fatal at an early age; when the Kuki considers the disease beyond the hope of cure he kills the gayal and eats its flesh, which constitutes his first article of luxury.

"The Kukis train their gayals to no labour, although, from the great strength and gentle disposition of this animal, he must be very competent to every purpose, either of draught or carriage, to which the buffalo or the ox is applicable.*

"The domesticated gayals are allowed by the Kukis to roam at large during the day through the forest, in the neighbourhood of the village; but, as evening approaches, they all return home of their own accord; the young gayal being early taught this habit, by being

* Mr. G. Harris remarks, however, of the gayal cow, that "she is very quiet, is used for all the purposes of the dairy, as also (I have been informed by the natives) for tilling the ground, and is more tractable than the buffalo." We suppose that the bulls rather are used for the latter purpose.

regularly fed every night with salt, of which he is very fond; and from the occasional continuance of this practice, as he grows up, the attachment of the gayal to his native village becomes so strong, that when the Kukis migrate from it they are obliged to set fire to their huts, which they are about to leave, lest their gayals should return thither from their new place of residence before they become equally attached to it as to the former, through the same means.

"The wild gayal sometimes steals out from the forest in the night, and feeds in the rice-fields bordering on the hills. The Kukis give no grain to their cattle. With us the tame gayals feed on calai (*Phaseolus max*);* but, as our hills abound with shrubs, it has not been remarked what particular kind of grass they prefer.†

"The Hindus, in this province, will not kill the gobay, which they hold in equal veneration with the cow. But the 'As'l gayal,' or 'seloi,' [i. e. the gaour], they hunt and kill, as they do the wild buffalo. The animal here alluded to has never been domesticated; and is, in appearance and disposition, very different from the common gayal, which has just been described. The natives call him the 'As'l gayal,' in contra-distinction to the 'gobay.' The Kukis distinguish him by the name of 'seloi,' and the Mughls and Burmans by that of 'phanj;' and they consider him (next to the tiger) the most dangerous and the fiercest animal of their forests." No! this Burmese phanj is the f'hain apud Helfer, more correctly 'tsain,' or 'tsoing,' distinct both from the gaour and gayal, and a particularly timid and inoffensive beast, identical (as we have before mentioned) with the Javanese banteng.

"The gayal," Mr. Elliot writes from Tippera, "is little known to the natives here; it is principally considered as an inhabitant of the Chatgaon (Chittagong) Hills. In conversation with people belonging to the Raja of Tippera, on the subject of this beast, I have understood that it is known in the recesses of the more eastern part of the Tippera Hills, but has never been caught [!] In the past year some of these animals [gaours?] were seen in a herd of elephants, and continued sometime with the herd; but they were alarmed at the noise used in driving the elephants, and escaped being secured in the fenced enclosure. The 'khedda' of that season was nearly five hours' journey from the skirts of the hills.

"This animal is found wild, but is readily domesticated; though,

* *Phaseolus mungo*, L.; *P. max* of Roxburgh.

† They graze readily enough on the ordinary grasses of Lower Bengal, when they have not the opportunity of browsing.

in this state he essentially partakes of wild habits. I have some gayals at Mannamutty; and, from their mode of feeding, I presume that they keep on the skirts of the valleys, where they can browse. They will not touch grass if they can find shrubs.

“While kept at Kamerlah (Comilla) which is situate in a level country, they used to resort to the tanks and eat on the sides; frequently betaking themselves to the water to avoid the heat of the sun. However, they became sickly and emaciated, and their eyes suffered much; but on being sent to the hills they soon recovered, and are now in a healthy condition. They seem fond of the shade; and are observed in the hot weather to take the turn of the hills, so as to be always sheltered from the sun. They do not wallow in the mud like buffalos; but delight in water, and stand in it during the greatest heat of the day, with the front of their heads above the surface.

“Each cow yields from two and a half to about four seers (from five to eight pints) of milk, which is rich, sweet, and almost as thick as cream; it is of high flavour, and makes excellent butter.”

Mr. Dick writes:—“Gayals are not confined to the woods; they are domesticated, but wild gayals are found in the mountains of Butan, &c. They are kept in a tame state by the people who inhabit the Kalanaga Hills, near Sylhet, on the eastern border of the province of Kachar, west of Manipur, and north of a tract dependent on Tippera. The tame gayals, however long they may have been domesticated, do not at all differ from the wild, unless in temper; for the wild are fierce and intractable. The colour of both is the same—namely, that of the antelope, but some are white and others are black; not any spotted or pie-bald [we have seen one much blotched with white]. They graze and range like other cattle; and eat rice, mustard, chiches, and any cultivated produce, as also chaff and chopped straw.”

Buchanan Hamilton's description is still more elaborate, and very excellent. “The Gayal,” he remarks, “generally carries its head with the mouth projecting forward like that of a buffalo. The head at the upper part is very broad and flat, and is contracted suddenly towards the nose, which is naked like that of the common cow. From the upper angles of the forehead proceed two thick, short, horizontal processes of bone, which are covered with hair; on these are placed the horns, which are smooth, shorter than the head, and lie nearly in the plane of the forehead. They diverge outward, and turn up with a gentle curve: at the base they are very thick, and are slightly compressed, the flat sides being toward the front and the tail. The edge next the ear is rather the thinnest, so that a transverse

section would be somewhat ovate. Towards their tips the horns are rounded, and end in a sharp point. The eyes resemble those of the common [humped] ox; the ears are much larger, broader, and blunter than those of that animal.*

"The neck is very slender near the head; at some distance from which a dewlap commences, but this is not so deep, nor so much undulated, as in the *Bos zebu* or Indian ox.†

"The dewlap is covered with strong longish hair, so as to form a kind of mane on the lower part of the neck; but this is not very conspicuous, especially when the animal is young."‡

If we remember rightly, F. Cuvier's figure (copied from a drawing sent by Duvaucel) represents the dewlap as unusually large. In a carefully executed drawing of a fine bull, which was taken under our immediate superintendence from the living animal, the skin is shown to be a little pendent beneath the lower jaw, but not so at the throat, below which again it descends and forms one obtuse angle in front of the chest, and another between the knees, or rather just anteriorly to the knees and a little above them. In this individual the tail-tuft reached a little below the hocks. Buchanan Hamilton continues:—"The tail is covered with short hair, except near the end, where it has a tuft like that of the common ox; but, in the gayal, the tail descends no lower than the extremity of the tibia.

"The legs, especially the fore ones, are thick and clumsy; the false hoofs are much larger than those of the zebu; the hinder parts are weaker in proportion than the fore hand, and, owing to the contraction of the belly, the hinder legs—although, in fact, the shortest—appear to be the longest.

"In place of the hump, which is situated between the shoulders of the zebu, the gayal has a sharp ridge, which commences on the hinder part of the neck, slopes gradually up till it comes over the shoulder-joint, then runs horizontally almost a third part of the length of the

* But they are not so broad as those of *B. Taurus*. Like those of the gaour, we should term them broadly ovate.

† From the name above given, it is evident that Buchanan Hamilton regarded his *Bos Zebu* as distinct from *B. Taurus*.

‡ With regard to dewlap, it may be remarked that the humped bull has this preposterously developed occasionally, almost reaching to the ground. Such a bull is figured, as we remember, in one of the drawings bequeathed by General Hardwicke to the British Museum; and we have seen others like it. The large up-country cattle have also generally much pendent skin, and, what is curious, not unfrequently a very considerable appearance of præputial skin in the cows; but this nevertheless cannot be truly præputial, for reasons unnecessary to discuss here.

back, where it terminates with a very sudden slope. The height of this ridge makes the neck appear much depressed, and also adds greatly to the clumsiness of the chest, which, although narrow, is very deep. The sternum is covered by a continuation of the dewlap. The belly is protuberant, but in its hinder part is greatly contracted. The rump, or 'os sacrum,' has a more considerable declivity than that of the European ox, but less than that of the zebu.

"The whole body is covered with a thick coat of short hair, which is lengthened out into a mane on the dewlap, and into a pencil-like tuft at the end of the tail. From the summit of the head there diverges, with a whorl, a bunch of rather long coarse hair, which lies flat, is usually lighter coloured than that which is adjacent, and extends towards the horns and over the forehead. The general colour of the animal is brown in various shades, which very often approaches to black, but sometimes is rather light. Some parts, especially about the legs and belly, are usually white; but, in different individuals, these are very differently disposed."

We have seen a bull gayal, which must have stood at least $15\frac{1}{2}$ or 16 hands high at the spinal ridge, and whose horns were about 3 feet from tip to tip; but this is considerably above the average size, and he stood like a giant among his adult companions of both sexes. This was in Barrackpore Park, in the time of Lord Auckland. There were five or six splendid gayals then in the park, which Lord Ellenborough (as we were informed) gave away to whoever would accept of them; and they fell into native hands, and very soon died off and were lost to science. At that time, we believe, not a specimen (either stuffed skin or skeleton, or so much as a frontlet or even a horn) existed in any museum, and the species is still extremely rare in zoological collections. In that of the Asiatic Society, Calcutta, there is now a complete skeleton of a moderately fine adult bull, the skull of a finer bull, with the horn-cores only (not the corneous sheaths), which is believed to be that of a wild individual, and was picked up in one of the hill-jungles bordering on Asam; also the stuffed skin of a young bull, and another of a large calf. The height of the skeleton is 4 ft. 4 in. from the summit of the spinal ridge; and the large skull measures 15 in. across between the bases of the horns anteriorly, $18\frac{1}{2}$ in. in length from frontal ridge to tips of nasal's, and $11\frac{1}{2}$ in. greatest width at the orbits. For figures of a fine gayal skull, with those of the gaour and yak for comparison, vide 'Journal of the Asiatic Society,' vol. x., p. 470.

"The cry of the gayal," remarks Buchanan Hamilton, "has no

resemblance to the grunt of the Indian ox ; but a good deal resembles that of the buffalo. It is a kind of lowing, but shriller, and not nearly so loud as that of the European ox. To this, however, the gyal approaches much nearer than it does to the buffalo." We have tried to describe the voice of the gyal in our notice of the gaour.

Baron Cuvier entertained the strange opinion (expressed both in his '*Règne Animal*' and his '*Ossements Fossiles*') that this species was merely a mixed race between the Indian humped cattle and the buffalo. There have been several instances of its breeding with the former, under peculiar circumstances ; and in one which fell under our own observation, the sire being a gyal, a cow-calf was produced, which, to all appearance, scarcely differed from a cow gyal ; it died when about half grown, and the skull is now in the Calcutta museum.

The sire was the bull whose portrait has been before alluded to ; and, ponderous beast as he looked, he could leap a fence or gate with surprising facility. Mr. G. Harris remarks of the species—"He is naturally very bold, and will defend himself against any of the beasts of prey." All that we have seen, however, were the most gentle and tractable creatures imaginable ; but, as Turner tells us, in the narrative of his '*Embassy to Butan*' (we have not the book at hand), these good-natured animals, fed on stimulating food, are there trained for conflict, and no doubt can be worried into fierceness ;* but it is

* We have since hunted up the passage, which is as follows :—

"Towards the close of the afternoon we were entertained with the exhibition of a bull-fight, between two animals, the strongest and fiercest of the species [genus] I ever beheld. They were of a foreign breed, from a more eastern part of the same range of mountains, and in Bengal are termed gyal. Their heads were small, their necks thick, their chests prodigiously deep, and their fore-legs remarkably short. The carcase lessened towards the loins, which made the hind-legs appear much longer than the fore. Their colour was a dark brown, almost black. They were led to the ground between many Booteas, well secured, with strong ropes fastened to them : they struggled violently, as impatient of restraint, and their prominent eyes rolled with fury, as if they were instructed in the fierce purpose for which they were brought hither. Many men took post round the field of battle, armed with large bludgeons. The bulls were released on opposite sides ; and the moment they felt their liberty, they tore up the turf with their horns, elevated the spines of their backs, and appeared animated with the strongest symptoms of rage. They did not at the first instant rush together, but, turning sideways, eyed each other askance, all the while making a slow circular advance, until a very small distance divided them ; they then turned, opposing a full front, and ran impetuously, their heads meeting together with an astonishing concussion. The horns, which constitute the guard as well as weapons of offence, were now entangled, and they maintained the struggle, like wrestlers, for half an hour, with surprising exertions of strength ; the ground yielding to their heels as they

not their natural disposition; and the remarkable gentleness of this animal is well exemplified by the following narrative of how whole herds of wild gayals are tamed at a fell swoop.

"The Kukis," writes Mr. Macrae, "have a very simple method of training the wild gayals. It is as follows:—On discovering a herd of wild gayals in the jungles, they prepare a number of balls of the size of a man's head, composed of a particular kind of earth, salt, and cotton; they then drive their tame gayals towards the wild ones, when the two soon meet and assimilate into one herd—the males of the one attaching themselves to the females of the other, and *vice versa*. The Kukis now scatter their balls over such parts of the jungle as they think the herd most likely to pass, and watch its motions. The gayals, on meeting these balls as they go along, are attracted by their appearance and smell, and begin to lick them with their tongues; and relishing the taste of the salt, and the particular earth composing them, they never quit the place until all the balls are destroyed. The Kukis having observed the gayals to have once tasted their balls, prepare what they consider a sufficient supply of them to answer the intended purpose, and as the gayals lick them up they throw down more; and to prevent their being so readily destroyed, they mix the cotton with the earth and salt. This process generally goes on for three changes of the moon, or for a month and a half; during which time the tame and wild gayals are always together licking the decoy-balls; and the Kuki, after the first day or two of their being so, makes his appearance at such a distance as not to alarm the wild ones. By degrees he approaches nearer and nearer, until at length the sight of him has become so familiar that he can advance to stroke his tame gayals on the back and neck without frightening away the wild ones. He next extends his hand to them, and caresses them also, at the same time giving them plenty of his decoy-balls to lick; and thus in the short space of time mentioned he is able to drive them along with

pressed their brows, and alternately retreated and pushed forwards in the conflict. At length, as their strength diminished, and when victory stood on the point of turning to the most powerful, they were parted. The weakest was driven away by the Booteas armed with bludgeons; the other, hampered with ropes, was conducted to his stall highly indignant and full of wrath. In this manner commonly the battle ends; for, if they can prevent it, they never suffer the strongest bull to pursue his advantage, which would terminate in the certain destruction of his antagonist, who is also exposed to the greatest danger, if he should happen to be thrown down in the conflict. As they are trained for this particular purpose, the Booteas exert their utmost endeavours to preserve them for future sport."

his tame ones to his parrah or village, without the least exertion of force or compulsion, and so attached do the gayals become to the parrah, that when the Kukis migrate from one place to another they always find it necessary to set fire to the huts they are about to abandon, lest the gayals should return to them from the new grounds, were they left standing. Experience has taught the Kuki the necessity of thus destroying his huts.

“It is a fact worthy of remark, that the new and full moon are the periods at which the Kukis generally commence their operation of catching the wild gayals, from having observed that at these changes the two sexes are most inclined to associate. The same observation has been often made to me by the elephant catchers.”

The taming of the wild elephant is truly an astonishing feat to be performed by the class of people who engage in it; and this wholesale domestication of the gayal is most instructive, and reminds us that the subjugation of almost every domestic animal was achieved, so far as we know, by people in a similar primeval state of existence, where little real transition of mode of life was required on the part of the creatures who were won over to servitude and not forced into subjection. Civilized men exterminate, but do not domesticate—have not hitherto done so, at least; nor is a cultivated country adapted for the kind of procedure detailed.

On looking over this account, we find that the gayal cow is scarcely described; but little more need be said than that she is altogether of a slighter build than the bull, with the forehead less broad, and the horns shorter and not so thick. We have borrowed largely from the seventh volume of the ‘Transactions of the Linnean Society,’ and from the eighth volume of the ‘Asiatic Researches;’ compiling a tolerably complete description of the beast under notice, by no means however unassisted by familiar personal observation of the domestic animal.

The banteng (*Bos sondaicus*, Müller; *B. bentinger*, Temminck; *B. leucopræmnus*, Quoy and Gaimard; * *Banteng* of Europeans in Java; *Sapi leweng*, *Lembo wono* and *Sampi halas* of Javanese—all names signifying “wild cow;” *Rompo* of Dyaks, in Borneo; *Poung*, *P'hain*, *Tsain* or *Tsoing* of Burmese). After careful comparison of the

* According to Professor Van der Hoeven, this name is founded on the hybrid race often raised in Java and Bâli, a figure of one of which we remember seeing among the Hardwicke drawings in the British Museum. If we mistake not, this mixed race, rather than the true banteng, is known by the appellation of “Bâli cattle” at Singapore.

skull of an old (though not large) bull from Pegu, the horn of another from the Arakan side of the mountains which separate the two provinces, with the admirable figures of the skulls of both sexes, at different ages, of the Javanese banteng, published by Dr. Salomon Müller, as also with two superb frontlets of bulls from Java, we can come to no other conclusion than that they are one and the same species, and upon present evidence we doubt if they can even be ranged as distinguishable varieties. It is true that in the specimens before us, the continental have more slender horns than the insular; but the peculiar flexure is absolutely the same, and we can discern no difference whatever in the configuration of the skulls. The truth is, as we suspect, that our continental specimens are ordinary, whilst the insular are extraordinarily fine.* It has indeed been suggested to us, that the horns of the banteng are more approximated at base; but an appearance of this in one of the Japanese frontlets under examination is found to be deceptive on inspection. One very remarkable feature in an old bull banteng is the excessive development of bony substance on the forehead, rising up into coral-like asperities three-fourths of an inch above the plane of the frontal bones, above which the cuticle is enormously thickened into a rugged horn-like mass, which is hard and solid enough to turn a musket-ball. This is well shown in the finer of two frontlets before us; while in the other a portion of the same thickened cuticle, continuous with the base of each horn, has not been detached from the latter, which nevertheless is sufficiently well marked,—and hence the deceptive appearance of the horns being more approximated at base. In the Peguan skull before us, the horns are remarkably pale (even whitish), with black tips; and it is worthy of remark that Pennant in his 'Hindustan' notices the existence of white-horned wild cattle in the Indo-Chinese territories; but the Arakan horn under examination is darker, being much the same in hue as the larger Javanese pair. The frontal bones in our Peguan skull are smooth, and they are equally so in the smaller Javanese frontlet before us; though both are heads of old animals, with the frontal suture nearly obliterated: nevertheless,

* In a skull from the "Keddah" or Quedda Coast, referred to in our notice of the gaour as being in the United Service Museum, London, and which is divested of the horns, it can nevertheless be seen that the latter must have been of full dimensions.—*Vide* figures in 'Journal of the Asiatic Society,' vol. xi. p. 470. In the same plate is figured the smaller Javanese frontlet hereinafter described, with portions of the indurated skin of the forehead continuous with the horns, occasioning the latter to appear more approximated at base than is truly the case, as noticed above. We have seen, indeed, much greater difference of size in old bull gaour-skulls.

the skin was indurated over the forehead of the latter, and we have never heard of this occurring in the Burmese animal, but have little doubt that it does so. One remarkable fact strikes us upon examining these horns, which is, that the flattening of them at base does not appear until they are fully half-grown; which may well account for the reports of Burmese wild cattle with cylindrical horns! The bison-tine-looking horn, however, from the Shán country, has not the peculiar flexure of the present species, and most assuredly cannot be referred to it.*

The banteng, as beautifully figured by Dr. S. Müller (who gives coloured portraits of the bull and cow, and of calves young and half-grown), has much more the aspect of the European *Bos Taurus* than has either the gaour or gayal; and its less flattened horns present a further approximation. There is nothing exaggerated about its figure; the spinal ridge is not more elevated than in *B. Taurus* and the tail-tuft descends considerably below the hock-joint. There is a good deal of the gayal in its general aspect; but it has longer limbs, and is less heavy and bubaline in its proportions. Indeed, we have heard it compared to a Devonshire ox; but it has nevertheless all the general features of the present group, and is true to the particular colouring—showing the white *stockings*, and having also a great white patch on the buttocks (whence the name *leucoprymnus* bestowed by MM. Quoy and Gaimard). The shoulder is a little high, with some appearance of the dorsal ridge between the scapulæ, but this slopes off and gradually disappears behind. The rump is also nearly as much squared as in European cattle. Dewlap moderate, with a different outline from that of the gayal, more as in the *B. Taurus*. Colour of the calf bright chestnut, with a black tail-tuft, and also a black dorsal line commencing from where the ridge should terminate behind;† the white *stockings* having much rufous intermixture at this age. The cows are deeper-

* Here it may be remarked that the curious small fossil frontlet from Kentucky, with narrow forehead and thick horn-cores, and which we examined in a dealer's shop in London, we now identify for certain as the *Boötherium cavifrons* of Dr. Leidy, figured and described in the fifth volume of the 'Smithsonian Contributions to Knowledge,' Washington, 1853. It is the same as the *Ovibos Pallantis*, *De Blainville*, and should therefore now stand as *Boötherium Pallantis*. A second species existed in the *Bos bombifrons* of Harlan, also figured by Dr. Leidy, together with *Bison latifrons*, and another which he terms *B. antiquus*. *Boötherium* is evidently a good genus, intermediate between the musk cattle and the bisons.

† The skin of a young calf from Mergui, in the Calcutta Museum, corresponds with that figured by Dr. S. Müller. The same dorsal line occurs in some individuals of the humped cattle.

coloured, being of a rich light bay, and the old bulls are blackish,—both, however, relieved with the white on the legs, buttocks, lips and hair lining the ears, which last are scarcely so large as in the gaour and gayal, but of similar shape. Sir Stamford Raffles mentions, that “a remarkable change takes place in the appearance of this animal after castration, the colour in a few months becoming invariably red ;” * *i. e.*, light bay, as in the female. The general figure, however, is still much more that of the gayal than of European cattle ; but (as before remarked) the legs are conspicuously longer than in that animal, the body is much less ponderous, the tail longer, and the head also is much less broad at the forehead. The horns again are very different.

In form of skull the banteng more resembles the gaour, with the characteristics of that species subdued, only that the frontal ridge does not turn up at all, as it slightly tends to do also in the gayal, occasioning a perceptible hollowness of the broad forehead of that species in a fine bull-skull before us. The horns of the banteng are thrown off at the same angle from the head as in the gayal, or with less of a slant backward than in the gaour, are continued out almost in a line with each other, gradually curving upwards and uncinating inwards, with a less considerable slant backwards at their tips. Such is the usual flexure in the bull, but occasionally the tips incline less inwards : in the cow the horns are small, and tend much backwards. Towards the base they are generally very rugous in old bulls ; and the full-grown horn flattens gradually from about the middle to the base ; the section of the base being oval and flattened on the lower surface. Colour pale glaucous-green with black tips, and commonly more or less black or blackish noticeable elsewhere.

* ‘History of Java,’ vol. i. p. 3. Probably the same would be observed in the nil-gai ; and certainly in a black buck of the Indian antelope, in which the colour goes and comes with the “rut.” There is a head of an emasculated nil-gai in the Calcutta Museum, which is coloured as in the female, and has small and slender horns, the female being hornless, also a fine stuffed specimen of the castrated antelope, which is likewise coloured as in a female, and has horns similar to those which the doe antelope very rarely puts forth, but we are acquainted with three instances of the fact. *Vide* ‘India Sporting Review,’ new series, Nos. IV. p. 94, VI. p. 239, and XI. p. 191 ; and for figure of the horns of a female antelope, *vide* ‘Bengal Sporting Magazine,’ new series, vol. ii. p. 478 (1845). They resemble those of a castrated buck, but are more slender, their curvature being an open arch and not a twist. Not improbably these horned doe antelopes are barren : a doe fallow deer with one horn was found to have the ovarium of the same side schirrous, analogous to barren hen pheasants with more or less complete masculine attire, &c., &c.

Height of bull at the shoulder about 16 hands. Length of a fine skull, from vertex to tips of intermaxillaries, $20\frac{1}{2}$ inches; breadth apart at orbits posteriorly, 9 inches; bases of horns apart anteriorly, $12\frac{1}{2}$ inches. The horns of our largest specimen measure 2 feet 8 inches round the curvature outside; circumference at base 18 inches; breadth across at base, measuring above, $6\frac{1}{2}$ inches; greatest width apart, 3 feet 5 inches; and the tips 2 feet $5\frac{1}{2}$ inches asunder.

The existence of a "wild ox" in Borneo was noticed by Beckman, as cited by Pennant, who also recorded the occurrence of such an animal in Java, and had likewise (as we have seen) obtained intelligence of one "with white horns" in the Indo-Chinese countries. In Java, according to Sir Stamford Raffles, "it is found chiefly in the forests eastward of Pásuran, and in Báli, though it also occurs in other parts of Java." Dr. S. Müller remarks that the banteng is found in Java in territories which are seldom visited by man, as well in the forests of the plains and of the coast, as in those of the mountains up to 4000 feet, where it is tolerably common. * We have likewise seen traces of it," he adds, "in Borneo, and have even received a calf from the Dyáks about a month old. According to Raffles it is found in Báli; but in Sumatra it does not appear to exist."* In Moor's 'Notices of the Indian Archipelago,' p. 2, we read that—"The ox, under the name of tambadao,† is a native of the forests of Borneo:" and at p. 95, it is

* Most likely, however, it will be eventually found there, if not also another wild species, the aboriginal stock of the tame cattle described by Raffles. The elephant of Sumatra was considered by the late Prince of Canino to be a peculiar species, and was recognised as such by the late Professor Temminck. The rhinoceros of Sumatra is the Asiatic two-horned species (*Rhinoceros sumatrensis*), found also in the Malayan peninsula and Burmese countries, but not in Java, nor (so far as known) in Borneo; the rhinoceros of Java and Borneo (*Rhinoceros sondaicus*) being hitherto unknown in Sumatra, though found in the Tenasserim provinces, according to Helfer: if so, it will probably be more of a mountain species in the provinces and Malayan peninsula than the other. Of wild hogs, according to Dr. S. Müller, the *Sus vittatus* inhabits Sumatra, with Java and Banka; *S. verrucosus* also inhabits Java; *S. barbatus*, Borneo; *S. celebensis*, besides the baba-rusa, Celebes; *S. timoriensis*, Timor and Roti; and *S. papuensis*, New Guinea: a goodly series of wild swine, to which we have lately added the little *S. andamanensis*, which needs comparison most with *S. papuensis*, and with Mr. Hodgson's pigmy hog of the Nipál-sal Forest, which he styles *Porcula salvania*; these last three have only a tubercle in place of tail. The Continental species of wild hog have been less studied. We can hardly expect, from analogy with the neighbouring regions, that the mountain forests of Sumatra will prove destitute of wild bovine inhabitants.

† Compare this name with Tamarao in the Island of Mindoro, one of the Philippines.

stated that "the breed of cattle [in Bálí] is extremely fine, almost every one of these beasts being fat, plump, and good-looking; you seldom, if ever, see a poor cow in Bálí: it is a breed of a much larger size than the common run of cattle in Java, and is obtained from a cross with the wild cow [bull?] with the same animal. They are generally of a red colour, and all of them are white between the hind legs and about the rump, so that I do not remember seeing one that was not white-breeched. The people have no land expressly devoted to grazing; but let their cattle eat their old stubble or fresh grass of the rice-fields, after the crops have been taken off; and while the rice is growing they let the cattle stray into the commons or woods and pick up what they can get by the road-side. The rude plough is drawn by two abreast, which the plougher drives with one hand while he guides the plough with the other." This account pretty clearly indicates domesticated bantengs; intermingled in blood, perhaps, more or less, with the humped cattle; though there is nought to indicate such intermixture in the notice quoted, but rather that—as in the case of the gayal—both wild and tame exist and interbreed occasionally. However, we have the authority of Professor Van der Hoeven that the *Bos leucoprymnus* of Quoy and Gaimard is a hybrid banteng; and we have seen a figure of a cow of this mixed race among the Hardwicke drawings in the British Museum, which—as also in the instance of the hybrid gayal we observed alive—partook much more of the general aspect of what may be termed the jungle parent. Sir Stamford Raffles, indeed, notices, in his 'History of Java,' that "the degenerate domestic cows [of that island] are sometimes driven into the forest to couple with the wild banteng, for the sake of improving the breed."

In the Malayan peninsula, and in suitable districts of the extensive region known as Indo-China, there is much reason to suspect that the gaour, gayal and banteng are alike found. Thus Captain (since General) Low, in his 'Dissertation on Penang and Province Wellesley,' mentions "two species of the wild ox, or bison;" and again, he elsewhere notifies, as inhabiting the same region, in addition to the "bison" or gaour, "the wild ox, of the size of a large buffalo [probably the gayal]; and also a species [the banteng?] resembling in every respect the domestic ox,"—besides the buffalo. Again, Helfer, in his crude notes on the Zoology of the Tenasserim provinces says,—“Of the ox kind, the *Bubalus arni* and *domesticus* are both in a wild state [we do not concede these to be two species]; and of the bisons, the great gaurus is rather rare, but *Bison guodus* [a misprint for *garæus*]* very common;

* The words may be written to look very much alike.

besides another small [?] species of cow, called by the Burmese F'hain, of which I saw foot-prints, but never the living animal ; it remains, therefore, undecided to what species it should be referred."

From what we know of the habits of the three animals, it is probable that the gayal keeps exclusively to the hills, the gaour chiefly to the low or comparatively level country, while the banteng inhabits all elevations, being, if possible, even the very shyest of the three. All accounts seem to agree in this respect. Many years ago, the well known and highly accomplished naturalist, Col. C. Hamilton Smith, addressed the writer on the subject of "a wild ox, inhabiting to the eastward of the Brahmaputra river, and very different from the gaour and gayal. It is simply described," wrote Col. Smith, "as a fine-limbed and deer-like animal, of large size, and of a bright bay colour, exceedingly like a Devonshire ox, very active, fleet, shy, and watchful; living in small herds in the wooded valleys, with watchers on the look out, who utter a shrill warning sound on the least alarm, when the whole dash through the jungle with irresistible impetuosity." These are just the habits of the wild banteng, and pretty much those of its immediate congeners. Another writer, alluding to the Burmese "wild cow, or Sine bar," remarks that "herds of thirty or forty frequent the open forest glades" of the Tenasserim provinces; and our deceased friend, Capt. Gason (formerly of H. M. 32nd Regiment), observed them and killed a bull at a place called Nathongzoo, about 250 miles eastward of Maulmain. They were "excessively timid, and are generally seen feeding in the valleys, often about a large tank. It is a very game-looking animal," remarked Capt. Gason, "with a heavy body, but fine limbs; and stands about $15\frac{1}{2}$ hands high." In no account have we met with any notice of the browsing propensities so conspicuous in the gayal, and infer therefore that it is more of a grazer like the gaour. What its voice may be like we are unaware. Not improbably the wild and domestic cattle of Siam noticed by Crawford (*vide* p. 88 *ante*) are of this species; in which case it would be remarkable that, as he states, the tame should often be hornless—scarcely more so, however, than polled or hornless buffalos which sometimes occur. He states that they are never of the white or pied colour, so prevalent amongst the cattle of Hindustan; but of what colour are they? The invariable white patch on the buttocks of the banteng would go far towards enabling us to recognise that species.

Reason and Instinct. By the REV. J. C. ATKINSON, M.A.

(Concluded from p. 6491.)

I TURN now to the discussion of a somewhat different subject, but still one having a near connection with that branch of our inquiry which has till now occupied our attention.

In an early portion of the present series of papers I observed that the first conscious acts performed by a human infant are unquestionably Instinctive acts, and that weeks of its life must elapse before it can be "decisively pronounced that Intelligence is fully operative,—that the child understands,—that some of its actions are certainly, though still possibly but in a small degree, under the influence of something decidedly higher than Instinct" (Zool. 5457). These are facts patent to every one who has a child of his own, or can obtain admission to a friend's nursery.

Now it would not serve any purpose were I to dwell upon the very remarkable stages of development through which the brain of the human *fœtus* passes, from its first rudimentary appearance up to the time of birth; or the resemblance distinctly traceable between it, in these its successive stages, and the several brains of the different classes of vertebrate animals, as we traverse the scale in the upward direction; but I certainly do desire, in connection with the statements just made relative to the human infant, to draw attention to the fact that at the period of birth the human brain is still imperfectly developed; not perhaps as to all its organs, but as to some two or three only. The cerebellum, for instance, in which is believed to centre the power or function of co-ordinating and regulating the motions of the various members and parts of the body, is still very imperfectly formed; and what is much more to our purpose, so is the cerebrum, and that in several particulars. The two halves of this portion of the brain are not only symmetrical—a most significant token of imperfect or arrested development—but the convolutions are much more simple, possess fewer undulations, and are much less deep and thick in proportion than in adults, and a period of years, to be passed under such circumstances of training and exercise of the faculties as successfully conduce to their due improvement, must elapse before these imperfections give place under a gradual, but unceasing, growth towards complete development.* The cerebellum, however, reaches its perfect development

* One or two minor imperfections of development might be quoted; but it seems scarcely necessary to do so.

of form and structure at a much earlier period than do the cerebral hemispheres. In other words, in our early infancy those portions of our brain through which our higher intellectual faculties are destined to work eventually are just as unfit for their future work as is that portion which is to enable us,—and much earlier,—to walk, to run, to leap, to perform all those complicated and countless movements of limb or member, or portion of member, on which our comfort and well-being so much depend. No wonder, then, that the first actions of the infant are scarcely more than consensual, and the next in order merely Instinctive; and that the dawning of Intelligence should be slow and faint and indecisive; or that its growth and increase, when distinctly produced, should be but gradual and halting, and so much under the influence of the Emotional and Instinctive faculties. But more than a mere passing notice must be given to the results of proper training and favourable circumstances, as assisting in the development of the brain. The cerebral hemispheres of inferior races of mankind, among whom neglect of mental culture and habits approaching those of brutes are found to prevail—influences certainly unfavourable to Intellectual development, and, as it would appear from what follows, to physical development of the organs of Intellect also—present a symmetrical disposition of the convolutions similar to that in the case of the newly born infant, or of the brute animal.

However inexplicable the nature of the connection between mind and nervous matter, it is yet “impossible to explain,” says an able physiological writer, “the great superiority of the human brain, both in organization and absolute quantity of nervous matter which it contains, without admitting its connection with the mind, and the influence exerted upon its nutrition and growth by that immaterial principle. We have many proofs to show that the neglect of mental cultivation may lead to an impaired state of cerebral nutrition. It may readily be understood that mental and physical development should go hand-in-hand together, and mutually assist each other.” “In fact,” writes Tiedemann, “the cerebral convolutions become atrophied, either from continued absence from all cerebral excitement, as well as from any other cause of intellectual weakness.”

And what is especially worthy of notice in this connection is, that any such change as may by these means be wrought upon the configuration or dimensions of the cerebrum, may, under certain circumstances, become—so to speak—stereotyped. Indeed this result is implied in what has been already stated with reference to the symmetrical cerebral hemispheres peculiar to peoples of a low or degraded

type, and to the shape of skull found to prevail among utterly savage and uncivilized tribes. And the following remarks from Dr. Carpenter are doubly interesting, as showing how the very change we are speaking of is taking place under our own observation, and even to a degree already rendered permanent. "But not only," says he, "may the pyramidal and prognathous types be elevated towards the elliptical;"—and we shall notice what he says on this subject presently,—“the elliptical may likewise be degraded towards either of these. Want, Squalor and Ignorance have a special tendency to induce that diminution of the cranial portion of the skull, and that increase of the facial, which characterizes the prognathous type; as cannot but be observed by any one who takes an accurate and candid survey of the condition of the most degraded part of the population of the great towns of this country, but as is seen to be pre-eminently the case with regard to the lowest classes of fresh immigrants. A certain degree of retrogression to the pyramidal type is also to be noticed among the Nomadic tribes, which are to be found in every civilized community. Among these, as has been remarked by a very acute observer, ‘according as they partake more or less of the purely vagabond nature, doing nothing whatsoever for their living, but moving from place to place, preying upon the earnings of the more industrious portion of the community, so will the attributes of the Nomadic races be found, more or less marked in them. And they are all more or less distinguished for their high cheek-bones and protruding jaws,’ thus showing that kind of mixture of the pyramidal with the prognathous type, which is to be seen amongst the lowest of the Indian and Malayo-Polynesian races.”—*Human Phys.* p. 1076.

The converse of this declension from a higher to a lower type is, as already hinted, also to be met with in the human family. Thus, “the Turks at present inhabiting the Persian and Ottoman empires are undoubtedly descended from the same stock with the Nomadic races which are still spread through Central Asia. The former, however, having conquered the countries which they now inhabit eight centuries since, have gradually settled down to the regular habits of the Indo-European race, and have made corresponding advances in civilization; whilst the latter have continued their wandering mode of life, and can scarcely be said to have made any decided advance during the same interval. Now the long-since civilized Turks have undergone a complete transformation into the likeness of Europeans, whilst their Nomadic relatives retain the pyramidal configuration of the skull in a very marked degree. The great mass of the Turkish people

have always intermarried among themselves ; and in Persia, the real Persians or Tajiks still remain quite distinct from their Turkish rulers. In like manner even the Negro head and face may become assimilated to the European by long subjection to similar influences. Thus in some of our older West Indian colonies, it is not uncommon to meet with Negroes, the descendants of those first introduced there, who exhibit a very European physiognomy ; and it has even been asserted that a Negro belonging to Dutch Guiana may be distinguished from another belonging to the British settlements, by the similarity of the features and expression of each to those which peculiarly characterise his master. This effect could not be here produced by the intermixture of bloods, since this would be made apparent by alteration of colour."—Id. 1075.

It will not, I think, detract from the interest of these remarkable statements if I proceed to connect with them the further statement that precisely analogous changes take place in many families of the brute creation, and that too in both directions, namely, from a higher to a lower type of cranial formation, and *vice versa*. And this leads me to the expression of an opinion or conclusion which I am afraid will appear, at first sight, paradoxical, if not worse. What I mean is that the influence of man upon the lower creatures, at least upon such of them as are brought very strongly under his influence by the processes of domestication, is attended with different results in different cases, and those results of the most diametrically opposite natures. In some instances the influence of man raises, elevates, almost ennoble the brute creature ; certainly induces a psychical improvement which, when considered in its positive amount, is simply marvellous. In other instances, and those probably by very much the most numerous, human influence degrades the brute creature intellectually, and positively robs it of some of its natural psychical endowments, without making amends in any one particular. And to such an extent do these two opposite processes go, that a definite, perhaps very marked, and equally permanent alteration in the form of the bones of the cranium takes place. And further still, I have to observe that in case specimens of these deteriorated animals, with skulls fashioned after a permanently degraded type, recover their freedom, Nature asserts her power in gradually, but surely, reversing the effects of man's influence, and remodelling the skull of the now wild animal until it resumes its original size and conformation.

For the purpose of illustrating the former or elevating process ascribed to man's influence I select the dog, as presenting the most

remarkable, as well as much the most common, example of the sort. I need not expend time at this point of our essay, in describing what the dog, under human care and kindness in training, has become intellectually, and—one feels strangely tempted to add—morally. To the question what the dog was antecedently to man's acquisition of power or influence over him, and what the subsequent physiological changes induced in him, we give as an answer the following extract from Dr. Prichard :—"The least domesticated races, and those which have become wild, as the dingo or Australian dog,—the nearest approach to the original type which can be discovered,—differ little in the shape of their skulls and in other characters from the wolf; while the more cultivated breeds, or those which have their faculties most developed, and their habits most changed by domestication, deviate in the same proportion from this form, and in particular exhibit a much more vaulted and arched forehead, and a greater development of the brain. The skull of the Australian dog differs but little from that of a wolf. In both the head is very flat, and the cavity which contains the brain has comparatively very little space. The Danish dog and the mastiff resemble, in the shape of their heads, the Australian dog; and they display as little development of Intellect or Sagacity. In the terrier and hound the skulls are much more arched, and afford a much larger space for the brain. In the shepherd's dog the bones of the skull rise perpendicularly to one half of their vertical extent, and then become arched over the space occupied by the brain. In the spaniel and water-dog the capacity of the cranium is relatively much greater than in the shepherd's dog; and in all these there is a great development of the frontal sinus, which is so considerable as to give the outline of the forehead a direction almost perpendicular to the nasal bones."

As instances of the degrading tendency of man's influence upon brute creatures, both as regards their mental and their psychical, or rather, perhaps, their physiological development, I may quote the horse, the pig, the ox and the sheep. Now I do not mean to assert or to imply that various proofs of the possession of very considerable Intelligence have not been given by many individuals in each of these several families of animals, the sheep perhaps only excepted. But still, generally speaking, the patience of the ox, the stupidity of the pig and the mere docility of the horse are the attributes which are most usually ascribed to these several creatures; and on the whole, I am inclined to suppose it will be conceded that where great Intelligence has been displayed by either horse, ox or pig, it has been in cases

where considerable and continued care and kindness and training had been expended on the individuals in question. The general result of domestication on all three families has not been in the direction of improving their intellectual faculties, but the reverse, and, except in the case of the horse, very much the reverse. With respect to the sheep there can be no doubt that it is so; in fact, we find in the authority last quoted these expressions with respect to the present psychical condition of the animal in question:—"The sheep, always stupid or of the most simple understanding, from its birth timid and inert, follows its dam the same feeble and defenceless animal that it is destined to remain through life."

Now in the case of the pig, the changes which result in the conformation of its skull, in consequence of its being suffered to revert to its original wild habits, are thus described by the same writer:—"Their heads become larger, and the foreheads vaulted at the upper part," of necessity to afford room for a brain of increased dimensions, as in the case of the shepherd's dog, spaniel and water-dog quoted a page or two back. Further,—"The difference in the shape of the head between the wild and domestic hog of America is very remarkable. Blumenbach long ago pointed out the great difference between the cranium of our swine and that of the primitive wild boar. He remarked that this difference is quite equal to that which has been observed between the skull of the Negro and European."

In the case of the horse again, "The heads of the wild horses are larger, and their foreheads are of a round and arched form. Pallas has confirmed this observation by an account of a race descended from horses which have run wild in Eastern Siberia. These animals, which are the remote offspring of domesticated horses, now differ from the Russian breed in having larger heads and more pointed ears. * * * He adds that their principal traits, or those which distinguish them from domestic breeds of the horse kind, and which may be considered as characters acquired by the race since it ran wild in the desert, are as follows: they have larger heads than domestic horses with more vaulted foreheads; the ears longer and bent more forward."

I need not occupy my readers' time and my own by looking at and transcribing similar remarks about the ox. Let it suffice to observe that Nature, when the animals just mentioned are given up to her sole influence, occupies herself in remodelling their skulls until they once again resume their original type; and it would be vain to affect to suppose that there is not a corresponding and commensurate

increase in the volume of the brain beneath the enlarged and more vaulted forehead.

But can we in any degree account for the original change, contrary to Nature, which renders this second change, in conformity with Nature, necessary? I think we can. Let us bear in mind what is the ascertained result to the brain in the human species by neglect, want of appropriate cerebral stimulus, discontinuance of all intellectual exercise, and the like; and not only to the brain, but eventually also to the dimensions and form of the bones of the cranium covering the said brain—diminution in quantity, a lower condition of development, and a degraded type of conformation. And next let us look at the condition of the pig, the ox, the sheep and the horse,—regarding them collectively, I mean, and not at all individually or in the way of exception to what must be conceded to be the general rule. Almost everything is done for them, and they are left to their own resources, whether of Intelligence or Instinct, for the supply of scarcely one of their various wants. Treat a human creature and his descendants after him for generations as pigs, cows and sheep are treated; suffer him to do no more in proportion for himself, nor to have more scope to occupy himself, than they do and have, and what would be the result, however intellectual he might have been to begin with; however noble and elevated the type of his original cranial configuration? Why, that in the third generation, or sooner, his understanding, his brain, his skull, would be those of—in one word—an idiot! No wonder, then, that our stalled horses and cows, with their alternating experience of cow-house and pasture, and nothing besides,—our folded sheep and sty-imprisoned pigs,—are retrograde in their intelligence, their brains, and the fashion and size of their crania.

Talk of the stupidity, the simple understanding of the sheep! I do not believe in it. If it be stupid and a fool, it is because man has made it so,—not God. It is not found stupid in its native dwelling-places, and where the hand of man has not brought its blighting influences to bear upon its mind. They are wary enough there; and difficult as it may be for the sportsman to approach the different species of wild deer, he will not find the task of getting within rifle distance of a wild sheep an easier one—if indeed nearly so easy—in either Asia or America. Such at least is the evidence of Mr. Atkinson, the Siberian traveller, and of Lieut. Ruxton, the traveller in America.

Even among the black-faced or moor sheep, which abound in all directions on the extensive moors surrounding the place in which I am writing, I have many an opportunity of observing what effect a

comparatively wild life—though still such only in a very slight degree—has upon the mind of that species of sheep, as compared with the larger, heavier, more inert and carefully tended Leicester sheep, a few of which are kept here and there on the lowlands. The frequent instances of watchfulness, in the former, speedily detecting the presence of a human or canine intruder, the singular sound, half snort, half hiss, with which they express their alarm and dissatisfaction, the impatient stamp with their fore foot after following close on the strange sharp “Hist!”—as it sounds—all are hints to show what they would soon become, if they were left for a few generations unbullied by sheep-dogs, unshepherded by their owners. But even in them Instinct is made to give place to a sort of Intelligence, superinduced over their natural endowment with that faculty. Once or twice last year I crossed the moor during the lambing season. On one of these occasions my attention was drawn to a lamb that had certainly been dropped during the hour and a half or two hours which had elapsed since my previous passage. The little creature had full use of its limbs; and, at my approach, it bounded off with every symptom of alarm. Here was the instinct of Self-preservation evidently in operation. I whistled; its alarm was increased tenfold, and it hurried far beyond its mother to escape what, its instinct told it, might be danger. The parent ewe in the mean time stood quietly grazing within a few feet of me, taking no further notice than just to raise her head for a moment when I whistled, and emitting a bleat of summons or recall, as she noticed her lamb’s hurried flight from her side.

I may be permitted perhaps further to add, in reference to the changes in size and form of the skulls of the animals above noticed, which had, from a state of domestication, reverted to a condition all whose elements were the same as those of their original wild condition, that the alterations were such as to give scope for an increased volume, and, conceivably at least, advanced development of the higher organs of the brain. And I think the inference fairly is, not only that their wild life required an increase of Intelligence in addition to the exercise of their instinct in all its pristine force, but also and consequently that thus one more support is rendered to our theory of the necessary co-existence and co-operation of Instinct and Reason.

There is one matter—which unquestionably forms a part, and an important part, of the subject of our inquiry—which I have not touched upon, and which I confess I feel myself quite incompetent to handle: I mean the Instinct of Insects. The difficulty arises in the apparent Intelligence, often times great Intelligence, in so many of

them, combined with the nature of their nervous system, which seems to be constructed with entire independence of anything approaching the nature of a brain or even a substitute for one. More refined physiological discoveries may perhaps lessen or remove this difficulty, especially if it ever should be satisfactorily established—as some have suggested—that “a process of nervous matter, not in the form of a ganglion, may possess the elementary functions of nerve and brain combined in one” (Couch, ‘*Ill. Inst.*’ 11). In the mean time Dr. Carpenter disposes of the difficulty in the following manner, though there are several points in his statements as to which I find myself unable to agree with him:—“The whole nervous system of Invertebrated Animals may be regarded as ministering entirely to automatic actions; and its highest development, as in the class of Insects, is connected with the highest manifestations of the instinctive powers, which, when carefully examined, are found to consist entirely in movements of the Excito-motor and Sensori-motor kinds. When we attentively consider the habits of these animals, we find that their actions, though evidently adapted to the attainment of certain ends, are very far from evincing a designed adaptation on the part of the beings which perform them, such as that of which we are ourselves conscious in our own voluntary movements, or which we trace in the operations of the more intelligent Vertebrata.

“The adaptiveness of the instinctive operations of insects lies in the original construction of their nervous system, which causes particular movements to be executed in direct response to certain impressions and sensations.

“The type, then, of psychical perfection among invertebrated animals, which is manifested in the highest degree among the social insects, consists in exclusive development of the automatic powers, in virtue of which each individual performs those actions to which it is directly prompted by the impetus arising out of impressions made upon its afferent nerves, without any self-control or self-direction. So that it must be regarded as entirely a creature of necessity performing its specific part in the economy of nature from no design or will of its own, but in accordance with the plan originally devised by the Creator.”

Our author at this point subjoins the following note:—“We have not perhaps any right to affirm that there is nothing whatever analogous in Invertebrata to the Reasoning powers and Will of higher animals; but if these faculties have any existence among them, they must be regarded as in a rudimentary state, corresponding with the

undeveloped condition of the cerebrum. In none of the Articulata has any trace of this organ been discovered: a rudiment of it, however, has been supposed to exist in the cuttle-fish."

We then find these further remarks in the text:—"The only distinct indication of Intelligence displayed by Invertebrata, is the slight degree of capacity of 'learning by experience' which some of them display: this capacity being limited to the mere formation of associations between mental states called up by different objects of sense, which we observe to be the first stage in the development of mental powers in the human infant. And it is interesting to observe that this educability is less displayed by insects—in which we may consider the automatic tendencies as attaining their greatest development—than it is in spiders, which present in several parts of their conformation an approximation towards the Vertebrated Series."—"Human Physiology," pp. 665—667.

With this quotation I bring the present series of papers to an end.

J. C. ATKINSON.

Danby Parsonage, Grosmont, York,
April, 1859.

Errata.—In the note to this paper, Zool. 6488, for The elephants, two read The elephants too, and, two lines lower down, for set read sit.

Remarks upon the Migration of Birds.

By A. G. MORE, Esq., F.L.S.

It was the apparently exceptional case of a small-billed migrating warbler being found upon our shores in winter that first drew my attention to a movement little noticed, but which, it is believed, will be found to take place regularly in autumn and winter, in a nearly direct line from the East to the West of Europe.

The black redstart is well known to occur every winter at different spots along the channel, as well as in other parts of Great Britain, a country which, for all practical purposes, occupies with regard to Europe a westerly position; yet this redstart scarcely reaches so far North as Scandinavia in its summer migration, though it is common at this season in the more central parts of Europe.

Several herons, as the great egret and buffbacked herons, also the ibis and the little owl, have been seen in England in late autumn or winter, and all these, it is well known, are found during the breeding season to inhabit the eastern and southern more than the northern

parts of the Continent. So has the courser,* a bird of the Mediterranean basin, been shot upon Salisbury Plain in October; and the Dalmatian *Regulus*, from the borders of Asia, was taken in Northumberland at the end of September; White's thrush in January. The little bustard is a still more striking instance of a species indigenous to the East and South of Europe appearing with us during the winter months; and this bird, too, has been observed in the act of migration flying from East to West near the Caspian Sea.

In Devonshire and Cornwall † it is during winter that are found the firecrested *Regulus*, Richard's pipit, alpine accentor, spoonbill and little bustard; and many birds of the highest rarity in Britain have occurred at the Land's End in September and October, yet can hardly be supposed to have been reared in England: the crested and short-toed larks, woodchat, ortolan, pastor, avocet and ibis must have proceeded from the central or even southern countries of Europe. And the abundant flights of migratory birds which are yearly observed in Cornwall at the period of the autumnal movement include many species that nest rather on the eastern side of England, and certainly do not breed in Cornwall,—*e.g.* nightingale, reed wren, lesser whitethroat, &c.; and it is evident that these birds have no intention of crossing the channel at its narrowest point. Other examples of a short journey from East to West will be found in the tree sparrow, stock dove and Norfolk plover that are seen in the West of England in winter only.

Various birds which visit the Land's End in spring, as the Kentish plover, white and gray headed wagtails, purple heron, ‡ &c., do not go far North in England, and so must be advancing in an easterly direction along the south coast, following at this season a reverse course to that of the autumn.

In Ireland the redstart (probably not the black only) and the crested lark have been obtained in winter; and the blackcap and Norfolk plover are better known in the sister island as winter than

* Other birds no doubt come to us in greater numbers in autumn and winter from the East and South of Europe; but it has been thought best to rely upon the rare species, since they cannot have come to us from a northern latitude.

† For Cornwall I have principally relied upon the numerous and valuable communications of Mr. Rodd to the 'Zoologist.' The Irish occurrences are quoted from Thompson's work; and for Great Britain use has been made of Yarrell's birds and of various notices in the 'Zoologist.' The present paper contains but a short abstract from a large collection of facts, and it is intended to invite discussion upon so interesting and difficult a subject.

‡ This bird has also frequently visited England in winter.

summer visitors. I have myself seen a wheatear upon the banks of the Royal Canal in the month of December. The hoopoe has more than once been killed in February, and many of the scarcest occasional visitors to Ireland, as well as Great Britain, have been met with during the autumn and winter months: as examples, the spotted eagle, griffon vulture, spoonbill, avocet, blackwinged stilt, ibis, whiskered and black terns may be quoted; to which perhaps might be added White's thrush and the Sabine snipe (if a good species), and the two African birds, spotted cuckoo and goldvented thrush, both obtained in winter. Nor are the instances in which some of these birds have been noticed in the spring or summer sufficient to invalidate those above quoted, since it is only here wished to prove the occasional occurrence in Great Britain, during late autumn and winter, of species that come from the South-east and East; and we need not be surprised to find birds from any quarter visiting us at either of the periods of the general migratory movement, it being well known that a few species have, both in spring and autumn, wandered to our shores from America * as well as Africa.

But indeed when we consider the differences presented by the remarkable contrast between the climates termed "maritime" and "continental" by geographers, the former being distinguished by its mild temperature in winter, and more favourable from the moisture of its air to a continuance of insect-life at that season,—while the continental is equally rigorous,—why should not birds by instinct be aware of these differences?

The recent occurrence in Sussex of *Sylvia galactotes*, a bird of quite southern distribution on the Continent, sufficiently shows that the line of autumnal migration does not lie at all arbitrarily North and South; but, to a great extent, at right angles to the "Isotherms" of winter temperature, which run in a direction of N.W. and N.N.W. in Central and Western Europe, and migration must therefore take place in a line from the N.E. and E. to W.S.W. and W. With future observation I feel little doubt that the streams of migration may hereafter be laid down in a manner analogous to that of the ocean and air currents; and that the laws which govern those streams will be found to depend upon the nicely balanced influences of—1st, prevailing winds; 2nd, physical features of mountain chains and

* At least eight Incessorial and nine Grallatorial birds have crossed the Atlantic; and, if we may trust all the notices, three species of woodpeckers, which, like the belted kingfisher, are not generally credited with enduring powers of flight.

river systems ; * and 3rd, the distribution of water and land ; as well as by temperature and the all-important consideration of a sufficient supply of food, which are at present thought to be almost the sole cause. It will thus be seen how desirable it becomes, with a view to future generalization, that additional pains should be taken to register exactly all occurrences of our rarest birds. At least the month, and far better the day, are well worth recording where possible, instead of the vague notices of "lately" or "within the last few months," which cannot serve a purpose like the present.

Another point upon which some further information would be very acceptable is with respect to the periods at which the old and young birds move. I believe it is very generally thought that the old males precede the females and young by an interval of several days ; but that this rule does not hold quite absolutely I have had good proof by finding female redstarts and blackcaps, as well as males, among the first flights ; and if the females are less noticed they are also more retiring in their habits. I have certainly shot both male and female godwits from the same flock in May.

And if in most cases "the females and young" are later in advancing to their breeding haunts, is it of males only or of both sexes that are composed those small detachments of old birds only, which, at least in the case of the dunlin, are the earliest to return in autumn? How comes it, too, that when the birds of this family lay but four eggs, so far smaller a proportion is found among the September flocks, unless it be supposed that most of the parent birds have hastened on by themselves at an earlier period. Yet sometimes at least the female is found accompanying the young brood.

May we find some good observers who will try to solve a part of these most interesting problems ! And even if no precise rule can be fixed, why need we despair of discovering something more than is known at present of the general laws ? though Natural History, and especially migration, be not reducible to mathematical exactness.

A. G. MORE.

Bembridge, Isle of Wight,
April 16, 1859.

* It is believed that the course of rivers and the neighbourhood of the coast are both followed in preference by migratory birds.

Curious Fact in the Nidification of Sparrows.—For some time past I have observed that two branches of a lime tree, which stands about twenty yards from my bed-room window, were half denuded of their bark. It struck me as something curious, for the branches were not dead, so I paid a little more attention to them, and at last was rewarded by discovering the bark-strippers in the very act; they proved to be sparrows foraging for materials for their nests, fairly engaged tearing with their strong beaks the bark from the branches. I saw one flying with a piece up to the houses. I ought to mention that the bark seems to be partly diseased, and seems to be readily stripped from the branch.—*Robert H. J. Gilbert; 17, Upper Phillimore Place, Kensington, March, 1859.*

Nidification of Birds: the Common Martin.—By those who maintain that man is governed by reason, and animals by a different principle, which they denominate instinct, it is argued, as a characteristic proof of the nature and influence of the latter, that its actions are invariable, because incapable of improvement by experience. How far such is the case will appear from the following incident. Under the eaves of a house, not so high as to be beyond the reach of any urchin who could procure a rod or sling a stone, a martin had built its nest, which had more than once been destroyed. There is no doubt that under ordinary circumstances these birds would have gone on building their habitation in the same place and manner, if left to themselves and their own resources, although even in such case some important variation in the structure has been known to have occurred. But in the present instance the inhabitants of the cottage were not satisfied to see the labour of their favourites perpetually rendered void, and they set their wits to work, in what manner to secure them from harm. The method adopted was,—to place a small round basket under the eaves, at the place where the nest had been, as a protection from injury below; but it was attended with the inconvenience that the handle prevented it from being pressed into contact with the stone, while the breadth of the basket was so great as to cause the dripping from the eaves to fall within the cavity. It was to obviate this last annoyance that a flat piece of board was laid as a cover on the basket, with the precaution of leaving an opening, not in front, but at the side, for the birds to enter, if they should choose to adopt this new contrivance for their advantage; and they did justice to the kind intentions of their friends by adopting it, and that too in a way of their own contrivance. They began by placing a rim of their usual mortar round the basket, at the border where the covering board rested on it; but in thus rendering it safe and close on every side they observed the caution of leaving a small hole at the side, by which to enter. In this convenient piece of wickerwork, then, they found a cradle in which they were able successfully to rear their brood. But this was not all; another pair of birds had seen the good fortune of their fellows, and they resolved to be sharers in the advantage they were enjoying. The space above the board, and within the arched handle of the basket, was only inferior to the basket itself as a situation for a nest, and there accordingly they proceeded to place it: it was formed of clay, in the usual manner; and here, immediately above their neighbours, they successfully hatched their young. We shall see whether they will adopt the same expedients in another year. The laying hold of a novel, but obvious expediency to secure an important object, is not the least of the operations of the reasoning powers.—*Jonathan Couch; Polperro, March 13, 1859.*

Three British Spotted Woodpeckers.—I have always thought that old Bewick was right in saying there were three distinct British pied woodpeckers; and the note, in the

'Zoologist,' by Mr. Pickard-Cambridge (Zool. 6444), I think proves it. I transcribe a note from my interleaved Yarrell, written some years ago. "I cannot help thinking that there are three different specimens of this bird, as Bewick thought. I have three very different from each other; they are sometimes found in Draycot Wood, where one of these specimens were shot. The largest was killed here; the middle spotted woodpecker in Clarendon Park; the small bird in Amesbury Park: these small birds bred in Draycot Park.—George S. Marsh; Vicarage, Sutton Berger, Chippenham.

[My correspondent does not describe the differences of the three supposed species, a very necessary prelude to their reception as distinct species. I think, moreover, that Bewick cannot be cited as evidence, except as regards the illustrations of the work bearing his name: he did not write the text.—Edward Newman].

Correction of previous Error respecting the Harlequin Duck (Anas histrionica).—I beg leave to correct an error made by me in the 'Zoologist' for 1852 (Zool. 3331) in a note on the "Occurrence of the Harlequin Duck in Banffshire." The specimen therein mentioned was submitted to the inspection of the late Mr. Yarrell, who pronounced it to be a young female harlequin duck, and he has mentioned it as such in the last edition of his work (British Birds, 3rd edition, iii. 366); but I was very sorry to find, shortly after the bird was given to me, that the decision of that illustrious ornithologist was unfortunately wrong, and that it was only a female long-tailed duck (*Anas glacialis*). I may add, that there can be no doubt that the bird in my possession is the identical specimen seen by Mr. Yarrell.—Edward Newton; Elveden Hall, Thetford, March, 1859.

Occurrence of Paget's Pochard (Anas ferinoides), for the second time, in Norfolk.—A male specimen of this rare duck, apparently in adult plumage, was killed on the 24th of February at Little Wareham on the North-East Coast of Norfolk. The only other example known to have been met with in this county, an immature male, was obtained on Rollesby Broad (in the same neighbourhood), on the 27th of February, 1845. This bird was figured and described in the 'Zoologist' (Zool. 1379), by Messrs. Gurney and Fisher, in their 'Birds of Norfolk,' as a hybrid between the common pochard (*A. ferina*) and the white-eyed pochard (*A. nyroca*), having very strong points of resemblance to both these species; and a long and very interesting paper on the same subject by Mr. Fisher will be also found in the 'Zoologist' for 1847 (Zool. 1778). By the latter communication it will be seen that the Rollesby specimen, together with two other ducks of a similar character,—one purchased by Mr. Bartlett in a London market in April, 1847, the other some years before in Leadenhall market, by Mr. H. Doubleday,—were exhibited on the 13th of April, 1847, at the meeting of the Zoological Society, when, after a careful examination and comparison of the three specimens, both as to external appearance and anatomical peculiarities, it was concluded that they all belonged "to a new and hitherto undescribed species." Mr. Bartlett's bird closely resembled in plumage the immature male from Rollesby, but Mr. Doubleday's, also a male, presented every indication of an adult state, and is, in fact, the same bird figured and described in Yarrell's 'British Birds' as the American scaup (*Fuligula mariloides*, Vigors). The scientific name of *F. ferinoides* as applied to these ducks by Mr. Bartlett has been very generally accepted by naturalists, and that of Paget's pochard was likewise added, after the late C. J. Paget, Esq., of Great Yarmouth, a very zealous ornithologist. In 'Naumannia,' for 1852, p. 12, under the name of *F. Homeyeri*, a description, with illustrations, of a pair of ducks killed near Rotterdam, in April, 1850, is given by Herr Bädeler, and on March 28, 1854, these same birds were exhibited by Mr.

Gould at a meeting of the Zoological Society of London. Mr. Bartlett was then present, and expressed himself perfectly satisfied that they were the same species, to which he had given the name of *Fuligula ferinoides*. This fact was the more interesting, inasmuch as no female of this new duck had till then been met with. Whether "*F. ferinoides*" is or is not "a good species," or merely a hybrid, as originally supposed, is still a debateable question with ornithologists, the *pros* and *cons* of which might occupy much time and space. Herr Bädeler is evidently convinced that it is entitled to specific distinction (as *F. Homeyeri*), and I believe Mr. J. H. Gurney, the fortunate possessor of the two Norfolk specimens, has arrived at the same conclusion. I have described this last specimen as an adult male, and I think, from the rich colouring and well-defined markings of its plumage, I am right in so doing; but although in other respects it agrees with the description given of Mr. Doubleday's bird, there is no approach to "jet black" either on the neck or breast, but the latter has somewhat of a purple gloss with a few indistinct dark lines along the tips of the feathers.—*H. Stevenson; Norwich, April, 1859.*

Note on the Occurrence of the Dartford Warbler in Norfolk.—A young male of this species was caught, by a dog, in a furze-bush on Yarmouth Denes, on the 25th of February. This bird was sent to a birdstuffer in this city, together with a stoat killed at the same time, and was intended to be placed in the mouth of the "varmint," when fortunately it was recognised as a rarity. I am aware of but one other specimen of this warbler having been met with in this county, which was also obtained on Yarmouth Denes some years ago.—*Id.*

Occurrence of the Little Crake and Schintz Sandpiper at Hastings.—A beautiful male specimen of the little crake (*Gallinula pusilla*) was caught near this town on Friday, the 15th, and brought to me alive. It was discovered on the bank of a small stream near the sea. I have set up the bird, and it is now in my collection. I do not know whether the capture of a Schintz sandpiper (*Tringa Schintzii*), in this neighbourhood, on the 8th of October, 1857, has been brought under your notice; if not, the following particulars may be interesting to some of your readers. The Schintz sandpiper was in company with a rednecked phalarope (*Phalaropus hyperboreus*), the latter swimming, and the Schintz sandpiper wading in a flooded meadow, about two-hundred yards from the sea, and directly opposite to the village of Bexhill, Sussex. They were not at all shy, and permitted me to approach them within easy gun shot, and to watch their motions for several minutes, when seizing a favourable opportunity I fired and killed them both; they both proved to be male birds. I set them both up, and the Schintz sandpiper is now in the possession of J. H. Gurney, Esq., M.P., of Catton Hall, Norfolk. I find neither Mr. Yarrell nor Mr. Morris mentions more than one instance of the Schintz sandpiper having been taken in this country, and that in Shropshire, and is in the collection of Sir Rowland Hill.—*Robert Kent; St. Leonards-on-Sea, Sussex, April 20, 1859.*

Occurrence of live Toads underneath a Bed of Clay.—In the early part of this month, two live toads were dug out from the bottom of a bed of stiff brick clay, in the neighbourhood of Bridgwater, at the depth of fourteen feet from the surface of the ground; a third was killed by the spade before they were observed. This bed of clay rests on peat, and the toads were found at the junction of the two beds, in a small domed

cavity, about the size of the crown of a man's hat. On being exposed to the air they uttered a squeaking cry, resembling that of a rat, but in about a minute they seemed reconciled to their new destiny, and moved freely about. They were kept in a jar for a few days, and then placed at liberty in a garden, where I suppose they are still living. The living ones were about two inches in length, but narrow in proportion, and of a rather lighter colour than toads usually are; the one which was killed was very much larger. The clay under which they were buried had been gradually dug out from the surface, since about the beginning of the year, but the last five feet of depth was not dug till the day on which they were discovered. After about two feet of the surface, the clay is very close and adhesive, and far too moist to admit of cracks being formed in it, even in the driest summers.—*Thomas Clark; Halesleigh, March 25, 1859.*

[Will my correspondent give the name of any scientific man who was present at this exhumation? I am confident he is too careful a naturalist to accept such a statement except on the highest and most unequivocal testimony; and I look forward with great interest to a correspondence with the actual discoverer.—*Edward Newman*].

Naturalization of the Edible Frog (Rana esculenta, L.) in England.

By ALFRED NEWTON, M.A., F.L.S.

ON the 8th of June, 1853, as my brother Edward and myself were driving along the road between Thetford and Scoulton, in the county of Norfolk, we heard a most singular noise, and one we were unable to attribute to any cause known to us, proceeding from an adjacent field. We stopped, and he, getting out, entered the field,—a small meadow,—presently returning to me with the information that the extraordinary sounds came from a pond, hitherto hidden by the hedge, and that the utterers of them were no other than the edible frogs. Of course I went immediately to satisfy myself, and there, sure enough, were the frogs,—some swimming to-and-fro in the water,—some sitting on the aquatic plants, with which the pond was choked, and these last were exceedingly noisy, puffing out their faucial sacs, like so many dwellers in the cave of *Æolus*. After observing them for a little while, we tried to obtain some specimens, but herein fortune favoured the frogs: we had no aggressive weapons beyond a walking-stick and an umbrella, and they were wary to a degree and exceedingly active. However, by persevering we became possessed of four individuals, three, I regret to say, dead, and one, an indiscreet youth whom we found rambling about the grass, alive. By the time these were obtained our offensive operations had so be-muddied the pool and disturbed the growth of the water-weeds, that the rest of the colony sought safety in its turbid depths, and we could discover no more. We therefore

retired with our spoils: the deceased were decently embalmed, and are now in the Norfolk and Norwich Museum. Our prisoner survived the journey home and lingered for three months in a foot-tub, usually resting on a floating island of cork, from which he would leap into the water whenever a fly was thrown for him on to its surface, and seizing it swim back to his station, when he disposed of it in about two gulps, though, indeed, if it happened to be a large blue-bottle a faint buzzing might be heard for some seconds after it had disappeared from the light of day.

I lost no time in communicating the discovery we had made to Mr. J. H. Gurney, who in reply informed me that some years before Mr. George Berney had imported a great many animals of this species alive, and had liberated them in this country. Here the matter rested until a few days ago, when I received from the gentleman last named an account of his proceedings, and, having his permission to do so, I extract some portions of his letter, written from Morton Hall, Norwich, March 25, 1859, which, I think, will be found interesting. Mr. Berney says:—"I went to Paris in 1837; some letters which I wrote from that place, and which now lie before me, fix the date with certainty: I brought home two hundred edible frogs and a great quantity of spawn. These were deposited in the ditches in the meadows at Morton, in some ponds at Hockering, and some were placed in the fens at Foulden, near Stoke Ferry.

"They did not like the meadows and left them for ponds. I found some in a pond at the top of Honingham Heights, near the old telegraph. I have measured the distance on a map, three chains to an inch, this morning, and find it to be in a straight line $1\frac{1}{2}$ mile and forty yards. In the whole distance there is not one drop of water, not a puddle as big as a hand-bason, to be found between the meadows where they were placed and the pond in which I saw and heard them. It is impossible to mistake their cry or the two bladders that stick out of their heads when they cry.

"In 1841 I imported another lot from Brussels. In 1842 I brought over from St. Omer thirteen hundred in large hampers made like slave-ships, with plenty of tiers; these were moveable and were covered with water-lily leaves stitched on to them, that the frogs might be comfortable and feel at home. These were dispersed about in the above-mentioned places, and many hundreds were put into the fens at Foulden, and in the neighbourhood."

Now the place where we found, in 1853, what were doubtless the descendants of Mr. Berney's importations, is nearly equidistant from the

two districts mentioned by him in the above extracts, being about thirteen miles from each. Should any of the readers of the 'Zoologist' wish to visit the spot, I beg to refer them for further particulars (as I myself shall most likely be abroad most of the summer) to Mr. T. Southwell, of Hempton, near Fakenham, who, I doubt not, will willingly furnish them with the information necessary to re-discover it. If they find it inhabited, I only trust they will be careful not to diminish the number of the colonists too much, and that they will record in the pages of this magazine their observations on the present condition of the settlement, of which I have no knowledge whatever, never having re-visited the locality.

How far the facts above related will serve to answer the inquiry propounded nearly twelve years since by Mr. J. Wolley (Zool. 1821) "Is the Edible Frog a true Native of Britain?" I do not presume to say, but I will merely draw attention to one point, namely, that, as appears from Mr. Berney's letter, upwards of 1500 edible frogs, besides spawn, had been, by him alone, imported into the east of England, some of them six years and all more than a whole year, before Mr. C. Thurnall's discovery of the species, in September, 1843, at Foulmire fen in Cambridgeshire (Zool. 393).

ALFRED NEWTON.

Elveden Hall, Thetford.

April 5, 1859.

A Beautiful Gurnard.—When trawling in the Dee for shrimps, &c., I have frequently taken a small gurnard of very beautiful appearance. It is generally from four to six inches in length, and the body is of a pale reddish colour. When held in the hand there is nothing remarkable to be observed about it, but if placed alive in a tub of water a wonderful change comes over it. The large pectoral fins previously folded up are now spread widely out, and display a border of the most brilliant turquoise blue. There is also a large black patch on the upper surface of the fin which is studded with spots of the same colour. Altogether it reminds one forcibly of a butterfly, more especially of a South American species which is similarly studded with blue spots. Were it not for the spots being blue instead of white, I should almost imagine it to be the little gurnard (*Trigla paciloptera*) of Yarrell, which from his description seems to be taken in the same sort of situations. Perhaps some of your readers may be able to enlighten me on the subject. I may add that it seems to do pretty well in confinement, and I cannot imagine a more beautiful fish for the aquarium. *Alfred O. Walker; Chester, March 29, 1859.*

[Is not this the young of the Sapphirine gurnard, so remarkable for its beautifully blue pectorals?—*Edward Newman*].

The Shower of Fishes.—You ask if some of your correspondents will enlighten you on the subject of "The Shower of Fishes in the Valley of Aberdare:" I have seen the

fish sent as having been taken out of the rain pool referred to ; they are very young minnows. On reading the evidence it appears to me most probably to be only a practical joke of the mates of John Lewis, who seem to have thrown a pailful of water with the fish in it over him, and he appears to have returned them to the pool from which they were originally taken. The fish forwarded are very unlike those taken up in whirlwinds in tropical countries, and we must make allowance for unintentional exaggerations of quantity, &c., in an account given a month after the event had occurred.—*J. E. Gray ; British Museum, April 2, 1860.*

[In a small tank in the Zoological Gardens, Regent's Park, are a few little fishes purporting to be the identical specimens submitted to Professor Owen's inspection: one only of these is a minnow, the rest are the smooth-tailed stickleback (*Gasterosteus leiurus*). Dr. Gray is without doubt correct in attributing the whole affair to some practical joker.—*Edward Newman*].

The Mode by which the Pholas bores.—The mode by which the *Pholas bores* its habitation, even in the hardest rock (?), has long been a subject of ingenious speculation amongst naturalists. None of their theories advanced, however, have been accepted as fully satisfactory ; and no one previous to myself has had, I believe, the satisfaction of seeing the animal in the operation. I have therefore great pleasure in giving a short account of the manner in which I have seen the act performed. The aquarium, one might have supposed, would have afforded an easy means of solving the problem. But here we meet a fresh difficulty from the supposed fact that the *Pholas*, being once dragged from its lone abode, would not take the trouble to excavate another. His theory appeared to me most unnatural and improbable ; and my opinion seemed to be further borne out from the fact that old logs of wood thrown up by the waves were frequently covered with holes of different sizes and depths from one-eighth of an inch to the entire thickness of the log. These holes appeared to me evidently made by *Pholades*, and to have been almost immediately abandoned, either through caprice or necessity. The latter we may frequently suppose to be the case ; when the log, resting quietly at the bottom of the sea, is pitched upon by a houseless *Pholas*, and operations commenced, when the ruthless storm drifts the log on shore and hurls the *Pholas* once more at the mercy of the winds and waves. There is another case, in which the *Pholas* may require a fresh habitation, for procuring which we should suppose Nature had given it the means : it is this. Many of the logs tenanted by *Pholades* are so thin that they would serve the growing mollusk but a short time ; and, moreover, wood and other substances used by them, being of a perishable nature must render a fresh abode frequently necessary. Having, therefore, procured several of these mollusks in pieces of timber, I extracted one and placed it loose in my aquarium, with the vague hope that it would perforate some sandstone, on which I had placed it. It possessed the powers of locomotion, but made no attempt to bore. I then cut a piece of wood from the timber in which it had been found, and placed the *Pholas* in a hole, a little more than a quarter of an inch deep. Its shell being about two inches long, this arrangement left about an inch and three-quarters exposed. After a short time, the animal attached its foot to the bottom of the hole and commenced swaying itself from side to side, until the hole was of sufficient depth to allow it to proceed in the following manner. It inflated itself with water, apparently to its fullest extent, raising its shell

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upwards from the hole; then holding by its muscular foot, it drew its shell gradually down. This would have produced a perpendicular and very inefficient action but for a wise provision of Nature. The edges of the valves are not joined close together, but are connected by a membrane (extension of the mantle), and instead of being joined at the hinge (umbo) like ordinary bivalves, they possess an extra plate, attached to each valve of the shell, which is necessary for the following operation. In boring, this mollusk, having dilated itself with water, draws down its shell within the hole, gradually closing the lower anterior edges until they almost touch. It then raises its shell upwards, gradually opening the lower anterior edges and closing the upper, thus boring both upwards and downwards. The spines are placed in rows, like the teeth of a saw; those towards the lower part of the shell being sharp and pointed, while those above, being now useless, are not renewed. So far for the mode of boring; but how to account for the holes fitting the shape of the animal inhabiting them? I boldly assert that this is only the case when the animal is found in the same rock or wood which it entered when small. This mollusk evidently bores merely to protect its fragile shell, and not from the love of excavating; and in this opinion I am borne out by my own specimens. The young *Pholas*, therefore, having found a substance suitable for its habitation, ceases to bore immediately that it has buried its shell below the surface. It remains quiescent until its increasing growth requires a renewal of its labours. It thus continues working deeper and deeper until the substance fails; when it has nothing for it but to bore through, and seek a fresh place, where it may find a safe retreat. The scrapings, &c., made during the operation of boring are expelled with considerable force from the syphonal tube.—*John Ross; Talacre, Rhyl, North Wales, April 9, 1859.*

Larva of Coremia munitaria.—Last June, Mr. Chapman, of Glasgow, kindly sent me eight eggs of the above. They hatched the day after they reached me. Mr. Chapman did not know their proper food, so I tried dandelion, but they did not like it. I then tempted them with groundsel, which they devoured with avidity. After the first moult, three died, and the remaining five seemed disposed to follow their example. However they continued to eat slowly, without increasing much in size throughout the summer and autumn. In January they began to feed again, rapidly increasing in size. By the beginning of March, they were full fed, and about a fortnight since became pupæ. The following is a description of the larva, when full fed. Length, one inch; ground colour, dull green or brown, very variable; segments pink or flesh-coloured. The body is slightly sprinkled with black dots, with two very distinct blotches on the sixth and seventh segments, the latter being the largest. The caterpillar spins up in moss, and the pupa is brown. I am now breeding lovely specimens (forced) of *Eupithecia assimilaria* from larvæ beaten off black currants. As I do not wish to anticipate my friend Mr. Crewe, I withhold any description of the larva.—*J. Greene; Cubley Rectory, Doveridge, Derby, April 8, 1859.*

On the Solenobia of Lancashire, &c.—Lately the weather has been so changeable here that I kept postponing my journey to the Moors for my *S. triquetrella*, but I went on Friday: the first thing that occurred after my arrival at the locality was nearly two hours rain; I then turned over at least a ton weight of big stones, and found the cases sought were very scarce, and, after all my trouble, the larvæ had in every case already assumed the pupa state, so that all my labour was thrown away, and another year must

elapse before we get the larvæ. My cases of *S. inconspicuella* have been kept out of doors, and the last few days their inmates have been making their appearance. I have also bred a few females from the cases found on beech trees at Dunham Park, but not a single male; this is my fifth year, and no males. The female from these cases is quite distinct from *S. inconspicuella* ♀; though the cases are larger the females are smaller, and the anal tuft is not half the size that it is in *S. inconspicuella*. In May I hope to send you a very distinct species that feeds on the trunks of fruit trees at Bristol; unfortunately these also are all females, and no males as yet. You seem to be in doubt as to the food of these case-bearing insects; it is the fine powdery lichen that is met with on most trees, walls, old palings, &c.; on it I have fed *Taleporia pseudo-bombycella*, *Solenobia triquetrella*, *S. inconspicuella*, *Xymatodoma argentimaculella*, *X. melanella*, &c. Passing the wall where *X. argentimaculella* occurs, I gathered a few of the larvæ in their queerly formed bags.—*R. S. Edleston; Bowdon, near Manchester, April 12, 1859.*—‘*Intelligencer.*’

Habits of Nepticula argyropezella.—Last October and November I met with some yellow larvæ, mining close to the foot-stalk in leaves of *Populus tremula*; from these I have now bred specimens of a bluish black *Nepticula*, with very large silvery cilia, a minute white spot on the outer margin of the anterior wings, and a larger spot on the inner margin, nearer to the tip of the wing; this Mr. Stainton considers *N. argyropezella*, though much blacker than captured specimens. The egg appears to be deposited, not on the leaf, but on one side of the long stem, about a quarter of an inch from its junction with the leaf; the young larva, penetrating the stem, burrows to the leaf, which it enters at the midrib, and mines the upper cuticle, rarely passing through a rib, but completely devouring, as it goes, all the substance between the middle and one side rib, thus forming a wedge-shaped mine, with the excrement irregularly scattered; the larva, when full fed, emerges on the upper side of the leaf, and forms on the ground a flat, pale brown and rather woolly cocoon, from which the pupa is protruded on the escape of the perfect insect. From the mode of mining, it is obvious that, unlike most *Nepticulæ*, only a single larva can be nourished by each leaf, and they may be collected better in the fallen leaves than in those yet on the trees.—*P. H. Vaughan; Redland, Bristol.*—*Id.*

Proceedings of Societies.

ENTOMOLOGICAL SOCIETY.

March 7, 1859—Dr. GRAY, President, in the Chair.

Donations.

The following donations were announced, and thanks ordered to be presented to the donors:—‘The Transactions of the Linnean Society of London,’ Vol. xxii. Pt. 3; presented by the Society. ‘*Koniglīga Svenska Fregatten Eugenias Resa omkring Jorden under Befäl*’ af C. A. Virgin, åren 1851—1853; by the Royal Academy of Sciences of Stockholm. ‘An Accentuated List of British Lepidoptera,’ 3 copies; by the Entomological Societies of Oxford and Cambridge. ‘Journal of the Proceedings of the Linnean Society,’ Supplement to Botany, No. 1; by the Society. ‘Proceedings of the

Royal Society,' Vol. ix. No. 33; by the Society. 'The Journal of the Royal Agricultural Society of England,' Vol. xix, Part 2; by the Society. 'Tijdschrift voor Entomologie uitgegeven door de Nederlandsche Entomologische Vereeniging,' Vol. ii., Parts 2 and 3; by the Netherlands Entomological Society. 'Insecta Caffrariæ,' Part ii.; by the Author, Professor C. H. Boheman. 'The Zoologist' for March; by the Editor. 'The Athenæum' for February; by the Editor. 'The Literary Gazette' for February; by the Editor. 'The Journal of the Society of Arts' for February; by the Society. 'A Manual of British Butterflies and Moths,' No. 26; 'The Entomologist's Weekly Intelligencer,' Nos. 124—127; by H. T. Stainton, Esq. 'Linnæa Entomologica,' Vol. xiii; by the Entomological Society of Stettin. 'Description of New Species of Phytophagous Beetles'; by the Author, J. S. Baly, Esq. 'A Catalogue of British Coleoptera,' Part 2; by the Author, G. R. Waterhouse, Esq.

Election of a Member and Subscriber.

The Rev. Evan Lewis, B.A., of Rothwell, Northamptonshire, was balloted for, and elected a Member, and W. B. Tegetmeier, Esq., of Muswell Hill, a Subscriber to the Society.

Exhibitions.

Mr. Stevens exhibited two specimens of *Petasia nubeculosa*, which had that morning emerged from the pupæ: he had reared the larvæ from eggs received from Perthshire, and the insects had passed two winters in the pupa state.

Mr. Stevens also exhibited some butterflies, chiefly Pieridæ, sent from Siam by M. Mouhot, and some beautiful Micro-Lepidoptera, taken by Mr. Diggles at Moreton Bay.

Mr. Douglas exhibited a box containing 1300 specimens of Coleoptera, taken during the last month, chiefly in the neighbourhood of Lee, but a few were from Hammersmith Marshes and Darenth Wood, amongst them were the following:—

<i>Stenus solutus.</i>	<i>Stenolophus exiguus</i>	} Found in nests of Formica rufa.
" <i>pubescens</i>	<i>Gyrophæna lucidula</i>	
<i>Sunius intermedius</i>	<i>Euryusa laticollis</i>	
<i>Calodera æthiops</i>	<i>Homalota flavipes</i>	
" <i>nigrita</i>	<i>Thiasophila angulata</i>	
" <i>riparia</i>	<i>Quedius brevis</i>	
<i>Phlæopora reptans</i>	<i>Saprinus piceus</i>	
<i>Sericoderus lateralis</i>	<i>Dendrophilus pygmæus</i>	
<i>Oxypoda n. sp.?</i>		

Mr. Douglas also exhibited a monstrous species of *Pulex* found in grass at the margin of a pond, and some larvæ, supposed to be those of *Trinodes hirtus*, found under loose bark of oak, also a specimen of *Rhyzophagus politus*, *Hellw., Fab.*, a species new to Britain, taken by sweeping in a ditch at Lee, in June.

Mr. Westwood exhibited a drawing of the larva of a species of the Dipterous Genus *Thereva*, remarkable for the anomalous development of the abdominal segments which were comparatively of so large a size, each being also transversely divided by an impression that there appeared to be double the usual number of joints, which added to the head, three thoracic segments (of the usual size) and the anal segment give the appearance of twenty-one segments, being eight more than the usual number; the eight abdominal segments being as it were duplicated, the alternate ones presenting a minute lobe on each side; the head is extremely small

and dark-coloured, and the whole insect has the appearance of an elongated wire-worm. He had received it from Mr. Mitford, who had found it to be carnivorous feeding on the pupæ of *Aleucia pictaria*. It has also been found to have destroyed several pupæ of the *Sphinx Ligustri*. No previous indication of its carnivorous habits had been recorded nor had the peculiar structure of the abdominal segments been previously described.

Mr. Westwood also exhibited three species of insects recently received by him from Mr. Neitner at Ramboddo, in Ceylon, which have been found by that gentleman to be injurious to the coffee plantations. These consist of a species of Coccidæ (*Lecanium Coffea*) the scales of which infest the leaves in immense numbers; a minute moth, which Mr. Stainton thinks is referrible to the genus *Gracilaria*, and distinct from the *Elachista coffeella* of Guérin, which appears to belong to the genus *Bucculatrix*; the larvæ of this little moth mine the leaves of the coffee, as do also the larvæ of the third insect, a minute species of Muscidæ, which Mr. Haliday, to whom it had been referred, regards as belonging to the genus *Agromyza*.

Mr. Westwood also exhibited various insects which had been found to be injurious to books, in the Bodleian Library, where a careful hunt after book-worms is now going on. In addition to small cockroaches and *Lepismæ* (generally dead and crushed) two, if not three species of *Anobium* (*A. striatum* and *A. paniceum*), and their larvæ were more commonly found; the latter gnawing the interior of the bindings as well as perforating the leaves. He considered that the larvæ might be destroyed by placing the infected volumes in a large close box in which a small quantity of benzine collas had been dropped.

He also exhibited an insect which he had received some time previously from Mr. Backhouse, of Gateshead, as a gigantic flea, and which he had exhibited to the Society on the 4th of May, 1857 (without, however, having previously had an opportunity of carefully examining it), and for which he then suggested the name of *Pulex Imperator*. He had, however, recently examined the insect more minutely, and had ascertained that it was a very young larva of a *Blatta*, much distorted by being crushed flat in rather an oblique position, and with most of the limbs broken off. A small portion of the base of one of the multiannular antennæ was visible in such a situation as to seem like a part of the mouth, but on microscopically examining it, as well as the portions of the legs still remaining, it became evident that the insect was not a flea, and on dissecting the mouth, its true character was at once detected.

Captain Cox exhibited some beautiful drawings of the larvæ of *Lepidoptera*, including those of *Carcocapsa saltatans*, *Westw.*, *Phlogophora empyrea*, *Nyssia hispidaria*, &c.

Mr. Stevens exhibited, on behalf of Signor De Tivoli, some larvæ of *Lepidoptera*, spiders and other insects, preserved by having been immersed in a chemical solution which had the effect of hardening them; in some instances the form and colour were well preserved.

Mr. Gorham exhibited a specimen of *Tachyusa concolor*, recently found by him at Chelsea Waterworks.

Mr. Janson called attention to the recently published Catalogue of European *Coleoptera*, by Dr. Schaum, in which were many modifications and alterations, amongst which he might mention the *Strepsiptera* being included in it as a family of *Coleoptera*.

Mr. Adam White mentioned that he had just received an interesting letter from Mr. Gloyne, now a student in Geneva. Mr. Gloyne had been making excursions in the neighbourhood of that Swiss city, and was struck with the occurrence of species of Coleoptera not met with in Great Britain, but associated with species of common occurrence in our islands. He had not himself taken *Omophron limbatum*, but a friend of Mr. Gloyne's found that curious geodephagous beetle in banks, by pouring water on them here and there, when little groups of eight or ten individuals were sometimes met with.

Mr. Adam White remarked that he was glad to see in Dr. Schaum's new 'Catalogue of the European Coleoptera,' that the learned chief compiler of that Catalogue had separated the Brentidæ from the Curculionidæ, and placed them close to the Longicorn Beetles.

Mr. White added that he had, some time back, tried to show at a Meeting of the Linnean Society, where he had exhibited the specimen of the rare *Hypocephalus Desmarestii*, belonging to J. Aspinall Turner, Esq., M.P., that *Hypocephalus* belonged to the Longicorns, and was close to *Dorysthenes*. He had then dwelt on the Brentidæ not being far removed from the Longicorns; some, such as the great *Eutraohelus Temminckii* of Java, showing this affinity most markedly. He alluded to Mr. Curtis's paper on that insect, with its fine drawing. Mr. White expressed himself pleased that in a Catalogue like Schaum's, philosophical arrangement, founded on an extensive study of the Coleoptera of all countries, had led Dr. Schaum to place *Amorphocephalus*, the solitary European representative of the Brentidæ, just before the Longicorns.

The Secretary read a letter from L. Lardner, Esq., accompanying some living larvæ, apparently of a species of *Curculio*, from Calcutta, feeding on poppy seeds, received from Sir Jamsetjee Jejeebhoy.

Mr. Stevens read the following extract from a letter just received, addressed to him by Mr. A. R. Wallace, dated Batchian, Moluccas, October 29th, 1858:—

"As there is now a boat going which may just catch the mail at Ternate, I write a few lines to let you know of my having arrived here safe and commenced operations. I came here in a small hired boat with my own men, luckily it was fine weather, or 100 miles at sea with no means of cooking and only room for one day's water, would have been more than unpleasant. I stopped five days at the Kaiod Islands, just half way, and got a nice collection of beetles, a fair number of new species, and some curious varieties of those before found at Ternate and Gilolo. I have only been here five days, but from what I have already done, and the nature of the country, I am inclined to think it may prove one of the best localities I have yet visited; I have already twenty species of Longicorns new to me, nothing very grand, but many pretty and very interesting; the most remarkable is one of the Bornean genus, *Triammat*, also several species of the elegant little genus *Serixia*, which have been very scarce or absent since I left Sarawak; I have also an elegant new *Pachyrhynchus*, a fine *Ips*, a small new *Cicindela*, and a small new species of *Therates*. In butterflies I have taken an imperfect specimen of a glorious new species very like *Papilio Ulysses*, but distinct, and even handsomer! I have also seen a female of a grand new *Ornithoptera*, but cannot say what the male will prove to be. I have several times seen what I think is a new species allied to *Papilio Codrus*, but they are too wild to catch: the

Papilio allied to *P. Sarpedon*, which I found at Macassar, is also here, and two or three other species which I have not yet been able to capture."

Part I. of the fifth volume of the new series of the Society's 'Transactions' was announced as published.—*E. S.*

Notice of the Various Species of Bovine Animals. By the Editor of the 'Indian Field.'

(Continued from p. 6421.)

The excessive vagueness of most notices of wild or little known cattle is extremely perplexing to the naturalist, who would endeavour to make some meaning out of them. Thus it is difficult to comprehend what animal can be meant by the "gyall" of Bishop Heber's 'Journal,' briefly noticed, and very rudely figured as having been seen by that prelate in the Governor's park in Ceylon; and equally difficult is it to understand what the following passage alludes to, in Mrs. Graham's work:—At the Governor's house in Ceylon, this lady "saw, feeding by himself, an animal no less beautiful than terrible—the wild bull, whose milk-white hide is adorned with a black flowing mane!" Can there be such a creature?

"In the 'Journal of the Asiatic Society,' vol. xvi., p. 706, Mr. B. H. Hodgson thus notifies the gaour—"Bos Gaurus, *vel* ? *cavifrons*. The Gaur or Gauri gau. Cæsar's wild bull of Europe [the urus!], and Aristotle's of Persia, are two other species of Bibos or of Gavæus," which, could we test them, might be respectively called 'classicus et Aristotelis.' [The urus is surely sufficiently made out!] The gaur," he adds, "inhabit the primitive forests of India generally, under the great ranges of mountains, such as the sub-Himalayas, the Vindhias, the Sathpuras, the Ghats eastern and western, and their links with the Vindhias, and with the Nilgiris. Beyond the Brahmaputra Bibos is replaced by Gavæus [quite a mistake, even if the types could be accepted as sufficiently different, in which case the banteng must needs be acknowledged as a third type, about as well marked as either of the others, or at least it certainly cannot be ranged with one rather than with the other!], of which there would seem to be two species in the Indo-Chinese countries, one of them extending to Ceylon, if the Lanka wild ox be not rather a Bibos; I suspect," continues Mr. Hodgson, "there will prove to be at least two species of Bibos, as of Rusa, inhabitants of India, between the Cape (Comorin) and the sub-Himalayas, or B. Gaurus and B. cavifrons."

We respectfully submit that the gaour is one and the same species, without appreciable difference, alike in northern and southern India, formerly in Ceylon, and still numerous in the Burmese countries and Malayan peninsula; also that nearly throughout this great range of territory there is only one species of *Rusa* or Sambur deer, however individuals may vary.* The gaour is the only existing indigenous wild taurine in cis-Brahmaputran India; for it is very doubtful if the wild humped cattle be indigenous to this country. The humped may yet prove to be the proper African type of taurines.

Of his genus *Gavæus*, as apart from *Bibos*, Mr. Hodgson remarks—
 “The Gavi or Gabi—habitat trans-Brahmaputran, the forests under the ranges extending from Asam to the sea. The Senbar vel P'hain may probably be a second species; and *B. sondaicus*, or the banteng, a third and the insular species; but these want testing. The first is more than half reduced from the wild state, like the yak of Tibet. The others are entirely wild.”

Not so: we credit Mr. Barbe's statement, founded on personal observation, that the gaour, in addition to the gayal, is domesticated in the interior of the Tippera Hills; and we have long known that the banteng was partially domesticated in the Archipelago. The Rev. J. Mason also remarks of this animal (as we believe, in the Tenasserim provinces), that “occasionally a young wild ox is domesticated, and brought under the yoke.” We identify, with scarcely a trace of hesitation, upon the strength of the evidence now before us, the T'sain or T'scing of Burma with the banteng of the Archipelago; thus reducing the number of known flat-horned taurines to three, all of which (we have much reason to conclude) are found together, or within the same district, in the Indo-Chinese region, if not also in the Malayan peninsula. What the Sumatran domestic cattle, observed

* The Sambur of the Malayan peninsula, Sumatra and Borneo, or *Rusa equina*, would appear to be a smaller and lighter-built species, with longer and finer limbs, than that of all India, *R. Aristotelis*; the horns also being proportionally thicker, but less elongated. That of Java, *R. hippelaphus* apud Gray, is very distinct, and has invariably the inner prong of the terminal fork of each horn much longer than the outer prong, being the reverse of what occurs in the spotted Axis. The Javanese *Rusa* is also smaller than the Malayan; but the difference of size, as represented by Dr. S. Müller's figures of skulls (drawn on the same scale), is conspicuously much less than the difference of size of fine adult skulls from India and Java now under examination. How far northward the *R. equina* extends, we have been unable to ascertain; but *R. Aristotelis* is certainly that inhabiting Arakan. The Javanese species has long been naturalised in the Mauritius.

and insufficiently described by Sir Stamford Raffles, may be, remains still to be ascertained.

A further notice of the gaour may yet be quoted from the pen of Mr. Hodgson :—"The gaurs rut in winter and procreate in autumn, producing usually but one young at a birth. The period of gestation was in Nepaul always stated to me to exceed that of the common ox ; but Mr. Elliot will not allow this.* The herds are ordinarily rather numerous, twenty, thirty, forty, and sometimes even double these numbers, being found together ; but in the breeding-season, not above ten or fifteen cows, with a single mature vigorous bull, who jealously expels every young and old male from his harem. The sub-Himalayan species entirely avoids the open tarai on the one hand, and the hills on the other, adhering to the most solitary parts of the sal-forest, close to and between the salient spurs of the hills, where the periodical firing of the under-growth of the forest never reaches. In the Dukhun these animals are said to penetrate into the hills in the hot weather—very partially, I fancy, or else they must then lack cover on the plain, for they are not a mountain race at all. They feed early and late in the more open glades of the forest, posting sentinels the while, and manifesting in their whole demeanour a degree of shyness unparalleled among the bovines [unless by *B. sondaicus*]. They never venture, even in the rains, when there is abundance of most rank vegetation to cover their approaches, into the open tarai to depredate on the crops, as the wild buffaloes constantly do ; nor do they ever associate or interbreed with the tame cattle, though immense numbers of the latter every spring are driven into their retreats to feed, and remain there in a half-wild condition for three or four months, when the wild buffaloes frequently interbreed with the tame ones of their kind, of which, likewise, vast numbers are depastured there. Old males of the gaur are often found solitarily wandering the forests they frequent, especially in winter ; but these have probably been recently expelled the herds by their more vigorous juniors, and re-unite themselves with some herd after the season of contention has passed. It is exceedingly difficult to rear the Gauri Gau in confinement : nor did I ever know a successful experiment, though the attempt has been, for fifty years past, constantly made by the Court of Nepaul, which finds no difficulty in rearing wild buffaloes and causing them to breed in confinement with the domestic species, which is thus greatly improved in size and other qualities.

* There would seem to be some mistake about the excessively slow breeding of the gayal, one calf in three years only !

I have remarked on the excessive shyness of the gaurs; and it follows that, when approached, they will retreat so long as they can; but if compelled to stand and defend themselves, they do so with a courage and determination not to be surpassed. Their beef is unequalled for flavour and tenderness [we have been told this likewise of the banteng]; but to the aborigines only it is illicit food, and not to all tribes of them, nor are any of them allowed to kill the gaur in Hindu kingdoms. The gaur stands from 6 to 6½ feet high at the shoulder, and is either of a ruddy brown *alias* tan, or of a black colour, the forehead and limbs below the mid-flexures being pale, and the forehead and knees [moderately] tufted. Captain Tickell, a good observer, believes that there are two species of Bibos in the Chota Nagpore territories alone! Doubtless close investigation will reveal many new species in the Bovinæ.

Not any more in cis-Brahmaputran India, we suspect; and we regard the identification of the continental Tsoing with the insular banteng as an important step gained. Strange indeed that such a question, referring to animals of such magnitude and interest to the sportsman, should not long ago have been settled, as all such questions require to be, by actual comparison of specimens; and still more strange that educated sporting gentlemen should feel so little interest in their decision,—that twenty years should have elapsed since Helfer, for example, called attention to the different species of bovines that inhabit the Tenasserim provinces, and that even yet they are not determined—the gayal for instance—with absolute certainty, and the banteng only now with a very near approach to certainty! Let us hope that these notices will awaken some attention to the subject.

The third primary division of the bovine animals is the bubaline, or that of the buffaloes, properly so called. We have treated of the bison-tine, which comprises—*first*, Ovibos, or the musk cattle of Arctic regions; *secondly*, Bootherium, extinct; *thirdly*, Bison, the true shaggy bison of the north temperate zone; and *fourthly*, Poephagus, or the yak of high Central Asia. Also of the taurine, in which we recognise three principal types,—*first*, Bos or Taurus, exemplified by the domestic cattle of Europe and Northern Asia; *secondly*, Zebus, or the humped cattle of the tropical regions of the anciently known continents; and, *thirdly*, Gavæus, or the flat-horned group peculiar to tropical and juxta-tropical Asia. We now arrive at the bubaline series, or that of the true buffaloes.

These animals are peculiar to the warmer regions of the eastern hemisphere, and are at once recognised and distinguished from other

bovines by their hog-like aspect and wallowing habits,* and their relative thick and thinly clad hide, the hairs of which are inserted vertically; in short by their pachydermatous exterior, superadded to the ordinary characters of the group. Their horns are flattened and mostly directed downwards and outwards, with a greater or less inclination backwards, then uncinating or gradually curving upwards to the extremity. They carry the nose horizontally, being much guided by the sense of smell; and it is a position in which they pass hours in the water, having little more than the nostrils above the surface. Their proportions are heavy, indicative of this aquatic propensity. Though inhabitants of hot climates, no animal is more impatient of heat; and nothing can prevent the domesticated races from plunging or wallowing whensoever an opportunity offers, at least when weary or over-heated, —which of course unfits them for being laden with any article to which moisture is injurious. They float, and commonly sleep in the water, and cross the broadest rivers with little effort; the females, when danger from crocodiles or other foes may be apprehended (like hippopotami), carrying their young upon the back.† They can also run swiftly up to their bellies in the stream. Hills are naturally avoided by them (albeit they thrive in hilly districts), though they scramble up steep acclivities with surprising ease, where horses cannot follow; and they prefer the coarse plants of the forest, and such as grow in swampy districts, to those of open plains. It is even stated that during the inundations of the great tropical rivers these animals frequently dive, and employ their horns to draw aquatic plants to the surface, where they feed on them, while drifting with the stream.‡ Their habits are, for the most part, gregarious (as with the bovines generally), the leader of a herd expelling the younger males as they acquire prowess to cope with him; and such banished individuals (like *san* elephants, &c.), are particularly savage and dangerous to encounter. Their voice is a low rumbling moan. In their combats they strike and butt with the forehead (like all other bovines), endeavour to lift the opponent on their horns, and when thrown, to crush him with their knees: they trample upon the body; and their vindictive fury is so lasting that they will return again and again to glut their vengeance on the same inanimate corpse. The Cape species tosses like a common bull, as the flexure

* The American bison, however, is a good deal of a wallower.—*Vide* Catlin's work and its illustrations.

† Marsden's 'History of Sumatra,' p. 95.

‡ Pennant's 'Hindustan,' vol. i. p. 115.

of its horns would intimate; but the long-horned Indian buffaloes attack a man or tiger by goring, which, notwithstanding the backward curvature of their horns, they effect by bringing the head close under the breast (much in the manner of an oryx), and charging with the point of one horn directed forwards and almost touching the ground; the action is, however, the same in both cases. "Upon an attack or alarm," writes Marsden, "these animals flee to a short distance, and then suddenly face about and draw up in battle array, with surprising quickness and regularity; their horns being laid back, and their muzzles projecting. Upon the nearer approach of the danger that threatens them, they make a second flight, and again halt and form; and this excellent mode of retreat they continue till they have gained a neighbouring wood." They manifest the same antipathy to glaring colours, and particularly red, as the rest of the group, and likewise as the gnus (*Catoblepas*), of which sundry anecdotes have been recorded; but, as in other cattle, habituation to the sight of such colours renders them indifferent to them, as Sonnini remarked of the domestic buffaloes of Egypt, where the inhabitants, besides their red turban, wear also (in general) a shawl of the same colour enveloping the neck and chest. The flesh of buffaloes is extremely coarse and cellular, like that of the elephant, rarely fat, and of rank unpleasant flavour; but the milk of the female, though not so sweet as that of the cow, is good, and given in great quantity.* the hide, also, is very substantial, and, when well tanned, proves equal to every purpose to which stont leather is applied. Lichtenstein remarks, of the Cape species, that its ribs are extraordinarily broad, leaving scarcely any intervals between them; which is perhaps a character of the buffaloes generally, though something very like it may be seen in ordinary "ribs of beef." The young (both of the African and Asiatic species) are born of a whitish colour, which is succeeded by yellowish buff hair, when the animal is a third grown. Those of Asia and Africa form two natural sub-divisions; the horns of the Asiatic being more widely separated at base, though the *Bubalus brachyceros* of middle Africa is intermediate in this respect. The African have also rounder ears, which in *B. brachyceros* are extraordinarily large; the Asiatic buffaloes having a more lanceolate form of ear,—like the humped taurine cattle, as opposed to the European type

* Mr. Paget, in his work on Hungary and Transylvania (vol ii. p. 227), states that it is richer than that of the cow; but we suspect the quality varies much in the different races. Buffalo's milk is, indeed, particularly esteemed in the Dukhun and north-west of India.

of taurines. So far as known, all bubalines have, normally, thirteen pairs only of ribs, like the taurines; not fourteen or fifteen pairs, as normally (so far as known) in the bisontines.

The Indian buffalo—(*Bos Bubalus*, L.; *Bubalus buffelus*, Gray; *B. Arna*, H. Smith—at least in part; *B. speiroceros* and *B. macroceros*, Hodgson). Domestic buffaloes are so familiarly known in this country, that an elaborate description of the appearance of the animal is unnecessary. They are ungainly and clumsy-looking creatures, but useful in their way, from their great strength and fair amount of docility combined with their adaptation to marshy localities and wet and heavy soil. Emphatically, they are the beasts for tilling the ground in ordinary rice cultivation, which is mainly conducted by their aid; and they are the only domestic cattle over extensive regions of the Malayan Peninsula and Archipelago, the south of China, and much of Indo-China, and have long been introduced into Lower Egypt, Italy and Hungary, the marshy tracks bordering on the Black and Caspian Seas, and latterly on the shores of the Gulf of Carpentaria, in Northern Australia, by the Malays; and in all these different countries many have returned to wildness, not excepting in Australia. In America it does not appear that the domestic buffalo has ever been introduced, and its name is there usurped by the bison.* There is considerable difference, however, between some of the races of domestic buffaloes, and to this we shall advert in the sequel.

As an Indian animal, Mr. Hodgson thus describes the common buffalo:—"Habitat of the tame, universal; of the wild, also everywhere that adequate cover and swamp exist. The haunts of the Arna or wild buffalo are the margins rather than the interior or primeval forests. They never ascend the mountains, and adhere, like rhinoceroses, to the most swampy sites of the districts they frequent. There is no animal upon which ages of domestication have made so small an impression as upon the buffalo,† the tame species being still most clearly referrible to the wild ones at present frequenting all the great swampy jungles of India. But in those wildernesses, as in the cow-houses, a marked distinction may be observed between the long-horned and curve-horned buffaloes—or the *B. macroceros* and *B. speiroceros* of my catalogue—which, whether they be separate species or merely

* A correspondent of the 'St. Louis Republican' states, in a late number, that "the Utah mail encountered myriads of 'buffaloes' feeding upon the luxuriant grasses of the plains, blocking up the highways, so as to delay it, while deer and antelopes were more numerous than ever seen before."

† We think the donkey might bear comparison.

varieties, I shall not venture to decide, but I incline to regard them as species. The length of the horns of *B. macroceros* are sometimes truly enormous, or $6\frac{1}{2}$ feet each.

“There is such a pair in the British Museum, and another pair I saw in Tirhoot. The Arna ruts in autumn, and the females produce one or two young in summer after a gestation of ten months. The herds are usually numerous, and sometimes exceedingly so, though at the season of love the most lusty males lead off and appropriate several females, with which they form small herds for the time. This noble species is, in the sal-forest and tarai, a truly stupendous animal, as tall as the gaour, and longer considerably, and of such power and vigour as by his charge frequently to prostrate a well-sized elephant! The wild animals are fully a third larger than the largest tame breed,* and measure from snout to vent $10\frac{1}{2}$ feet, and 6 to $6\frac{1}{2}$ feet high at the shoulder. The wild buffalo is remarkable for the uniform shortness of its tail, which extends not lower than the hock; for the tufts which cover his forehead and knees; and, lastly, for the great size of his horns and the uniform high condition of the animal, so unlike the leanness and angularity of the domestic buffalo's figure, even at its best.”

This difference in the development of the wild and tame buffalo is equally observable where the two frequent the same pastures and commonly interbreed; and we believe the main reason of it to be, that the tame calves are deprived of their due supply of milk.† The importance of an ample supply of suitable nourishment in early life, as bearing on the future development of any animal, cannot be over-estimated. It occasionally happens, during great inundations, that many wild buffalo-calves are noosed while swimming about and added to the domestic herds.

Still, it is remarkable that this swamp-frequenting animal thrives particularly in hilly districts. The domestic are particularly fine

* In like manner, the sub-fossil urus is fully one-third larger than the largest breeds of domestic taurines of the same type. This remarkable analogy of the wild and tame buffalos should be borne in mind.

† Since the above was in type, a friend who has just returned from Maulmein has confirmed us in this opinion. He remarks that he never had an idea of what a fine buffalo was, till he saw those of Burma. They are there much larger than in Bengal, with splendid horns, and altogether a vastly superior animal,—in fact, resembling the wild buffalo. The Burmese never milk them; having the same strange prejudice to milk which the Chinese have, though otherwise both people are nearly omnivorous.

towards the sources of the Nerbudda ; and Mr. Harkness, in his work on the aborigines of the Nilgiris, remarks that the tame buffaloes there are "fine large animals, monsters in comparison to those of the low country,"—and again, "the buffalo of the Nilgiris is of a much better description than that of the low country, and the milk they yield is of a flavour and richness superior to any of the kind I have met with. The climate seems better adapted to them than that of the plains. They are not tormented by the innumerable flies and other insects that in the latter force them to plunge into water, or, as the case may be, into some muddy pool, remaining there for the greater part of the day with just their foreheads and nostrils above the surface ; but here they quietly range over the downs, in herds often from 100 or 150 to 200, unmolested and unannoyed, feeding on a rich and luxuriant herbage, more adapted to their taste than the finer kinds of grass." Few sights surprise a novice more in India than to see a herd of these huge brutes emerge from a small muddy tank, where the presence of so many great animals was previously unsuspected.

In western Malasia generally, and especially in Sumatra, as about Bencoolen, albino buffaloes are very prevalent, having the same disagreeable leprous look as the white elephant. Those of the Philippines and China are uniformly small, but robust, and this seems to be the race figured by Dr. Salomon Müller.* They are finer, however,

* Tame buffaloes seem to be co-extensive in range with the Malayan race of mankind in the Archipelago ; but we do not hear of that race having transported them to Madagascar. There is much rice cultivation, however, in that island, where the ground would appear to be tilled by a superior race of the humped cattle. With regard to the humpless wild race of cattle in Madagascar, hitherto undescribed, it seems that these animals are very numerous in the province of Mena-bé, which occupies much of the western portion of the island. In Mr. J. A. Lloyd's 'Memoir on Madagascar,' published in the 20th volume of the 'Royal Geographical Society's Journal,' we read (p. 63) that "the northern part of Mena-bé contains great numbers of wild cattle. Radama and his officers, in one of their warlike expeditions amongst the Sakalami, passing through this country, killed upwards of 340 oxen in one day for the use of his army, and two days afterwards 431 more were killed by the soldiers." All that we can as yet learn of this race (or probably species) is, that it is humpless, and with longer limbs than the cattle of Europe.

There are "wild cattle" of some sort in Albania ! (*Vide* Count Karacssay's "Geographical Account of Albania," published in the 'Royal Geographical Society's Journal,' vol. xii. p. 57). Are these bisons, or a primitive taurine stock, or tame cattle gone wild ?

We have not thought it worth while to note down every locality where European cattle have returned to wildness ; as in the Sandwich Islands, where poor Douglas, the botanical collector, met his fate in a pit-fall with a wild bull, and even in Rodriguez!—*Vide* 'Journal Royal Geographical Society,' vol. xix. p. 19.

towards the north, as in the Chusan Archipelago.* Those of Lower Egypt are quite similar to the ordinary tame buffaloes of Lower Bengal; and Ruppel remarks that they are now found also in the wild state in the marshes of the Egyptian Delta, where termed *Gamus*. We have remarked that they have likewise gone wild on the north coast of Australia, where introduced by the Malays.† Chesney tells us that they are found in a wild state towards the shores of the Black Sea. The tame are numerous in Armenia, Persia, Kerdistan, Mesopotamia, and in all suitable districts of Arabia; in which last-named peninsula Chesney remarks that—"Next to the camels, in point of number, are buffaloes, which are to be found in most places where water is abundant [no prevalent feature of Araby the Unblest!]; their milk is rich and tolerably good, although inferior to that of the goat or cow."‡ From these countries they spread westward as far as Hungary and the valley of the Nile; and are now also on the island of Zanzibar, on the east

* "In its productions, Chusan does not materially differ from the adjacent mainland of Ning-po. The sleek and small cattle and the buffaloes, larger than those in the South, are used exclusively for the plough, and never slaughtered for the use of the Chinese, so near to the head-quarters of Buddhism in the neighbouring island of Pooto."—Sir J. F. Davis, in '*Journal Royal Geographical Society*,' vol. xxiii. p. 248.

"In Kambodia the buffalo lives amongst mud and ditches, and is a very powerful animal: further north its fierceness much decreases. The bullock is of a very small breed."—Gutzlaff, in '*Journal Royal Geographical Society*,' vol. xix. p. 104. Here "all that comes from the cow is held in abhorrence!"

† Dr. Leichardt, in 1845, remarked that buffaloes were "very numerous at Baki-Baki's Creek, which joins Mountnorris Bay. They are equally abundant between Raffles Bay and the harbour: the whole country, particularly round Baki-Baki's Bay, and on the neck, being as closely covered with buffalo-tracks as a well-stocked cattle-run of New South Wales could be."—'*Journal Royal Geographical Society*,' vol. xvi. p. 237.

‡ It may here be remarked that the humped cattle of Arabia generally are "of a very small and poor race, and are never, but with the greatest reluctance, killed for food." (Wallin, in '*Journal Royal Geographical Society*,' vol. xxiv. p. 148). Chesney remarks of them, that "bulls and cows take the next place to the buffalo, and like those of India, they bear a hump, and are of small size; some bullocks purchased at Suweideyah, produced each only about 224 pounds of meat." Again, in his 'Appendix' (vol. i. p. 279), he enumerates, among the domestic animals of Arabia and Mesopotamia, "both the common bull and cow, and the bull and cow with hunch." In the province of Kerman, in Persia, Mr. Keith C. Abbott remarks that "the oxen in this part of the country are of a small humped kind, and are commonly used as beasts of burden; people also ride on them, seated on a soft pad, and a rope is passed through the nostril, by which they are guided."—'*Journal Royal Geographical Society*,' vol. xxv. p. 43.

coast of Africa.* Those of Circassia, as we were informed by the late J. Stanislaus Bell, "agree with the Italian in their highly-bombed forehead and ponderous conformation, as also in the abundance of excellent milk afforded by the cow (often for two years, as I was assured); but the horns—especially those of the female—are very long, incline backwards, and are much curved, annulated and serrated: attitude that of the Indian buffalo; the tail with its terminal tuft not reaching above half-way to the ground. The young are of a dusky brown; but the full-grown are almost invariably black, without a single spot of white; and their stature exceeds considerably that of the largest European [taurine] cattle." We recognise in this description an animal similar to the tame buffalo of the Nilgiris.

According to a writer in the 'Bengal Sporting Magazine,' "there is a wide difference observable between the buffaloes in and about Behar, and those found near Titiláya: the former have invariably very thick but short horns, the latter (as invariably) remarkably large spreading ones;" and another writer in the same work portrays the horns of the wild buffalo of Asám, as contrasted with that of the Sunderbans.† These races are the *B. macroceros* and *B. speiroceros* of Mr. Hodgson. In the former the horns proceed out almost straightly, with a somewhat abrupt hook inward towards the end; in the latter they curve uniformly throughout, or very nearly so, to form a flat semicircle, with the usual slight tendency backward at the extreme tip. The horns of the fossil buffalo of the Nerbudda deposits (*Bos palæindicus* of Cautley and Falconer) have again another flexure, inclining backwards, outwards, and somewhat upwards, in a sweeping curve. In all, the cow-horns are more slender, and not unfrequently much longer, than in the bull.*

* "Bullocks, cows, and water-buffaloes are to be had at Zanzibar, but are seldom or never killed for food; they are used to carry loads (but not for draught), and are as dear as 50 dollars each."—'Journal Royal Geographical Society,' vol. xxiii. p. 107.

† 'Bengal Sporting Magazine' for September, 1836, p. 203, and *ibid.* October, p. 231.

‡ Of abnormal horns of the Indian buffalo, we have a drawing of a pair of cow-horns (attached to the skull) from Southern India, the flexure of which is nearly that proper to the horns of the Caffrarian taurine cattle, with the tips pointing outwards! Distance apart from tip to tip 9 feet 5 inches.

The late Mr. R. W. G. Frith, who was a very close observer, considered that there are "two races of wild buffaloes in India, both of which are likewise found domesticated. One, the Kaohar bhainse, is distinguished by its greater height, having longer limbs, by the general absence of hair at all seasons, and by its longer and slighter horns, which vary in form considerably more than those of the other. The

The Italian buffalo is a very different-looking beast from that of India, at least from the ordinary tame buffalo of Bengal. His carriage is different—less emphatically bubaline; he is better clad, and has a remarkably convex or bombed forehead, and short horns, that curve much down, then out and up, with the usual slant backward, which, however, is but slight. The tail, too, with its tuft, descends quite to the fetlocks. He is commonly more or less splashed with white; but this we have observed of many Indian buffaloes, especially in Oude.* If our information can be relied upon, the same race is found in Sindh. Hornless individuals occur sometimes; and skulls of this race, both horned and hornless, are figured in the ‘Ossements Fossiles’ of Cuvier. The buffalo is stated to have been introduced into Lombardy from India by King Agilulf, who reigned from 591 to 616,* and has now gone wild, as usual, in the Pontine marshes. It was first described as the “Arachosian ox” by Aristotle; the site of the ancient city of Arachosia being near the modern Kandahar, as determined by Rawlinson in 1841.

The Anoa buffalo—(*Bubalus depressicornis*; *Anoa depressicornis*, C. H. Smith). This is a very curious little animal, from the mountains of Celebes, of which there is now a stuffed specimen in the British Museum; but we are unaware that aught has been added to its history since the time of Pennant! We have seen several frontlets, and one entire skull (minus the lower jaw), of which we possess drawings. Pennant remarks, in his ‘History of Quadrupeds,’ that the Anoa is a

calf, however, is densely clad with slaty white hair, having constantly a medial white mark on the fore neck and chest, crossed by another on the fore part of the neck. This is the more valuable of the two to the herdsmen, on account of its giving more milk. The other stands lower on the legs, is altogether a thicker-made animal, and much more hairy; the horns are much thicker, and very rugous or deeply furrowed in the males; the calf has no white cross on the breast, and is of a more rufous colour than that of the other. This race is called the Bhángar. Both occur in the same herd, but the former are less numerous; and they breed freely together, the offspring of the first, second and third crosses being readily distinguished by the herdsmen; nevertheless, characteristic specimens of both are generally to be found in every herd.” We should be glad if any reader could verify and further carry out these observations.

* Black, white and pied, or rather black splashed with white. We have seen no intermediate shades of coloring, except in the calf.

† “Tunc primum caballi sylvatici et Bubali in Italiâ delatis, Italiæ populis miraculo fuerant.”—Wærnefridi, ‘De gestis Longobardorum,’ Lib., vol. iv. c. 2; Misson’s ‘Voyage,’ vol. iv. p. 395, as quoted by Pennant.

very small species of buffalo, of the size of a middling sheep. They are wild in small herds, in the mountains of Celebes, which are full of caverns. They are taken with great difficulty, and even in confinement are so fierce that Mr. Soten lost in one night fourteen stags [*Rusa* ? — ?], which were kept in the same paddock, whose bellies they ripped up."

In an excellent treatise on the generic sub-division of the hollow-horned ruminants, by R. N. Turner, jun., published in the 'Proceedings of the Zoological Society' for 1851, it is remarked that—"Although Colonel C. H. Smith was deceived as to the affinities of the Anoa, later as well as earlier naturalists have assigned it to its true place, and a glance at the stuffed specimen in the British Museum leaves the matter beyond a doubt. I have examined the skull in the Museum of the Royal College of Surgeons, and cannot see that it has even a title to generic distinction. Naturalists seem at all times to have been prone to assign generic rank to whatever was mysterious or difficult to classify, and I can in no other way account for this species being made a genus."

Mr. Turner does not carry the sub-division of the bovines beyond *Bison*, *Bos* and *Bubalus*; but he admits *Ovibos*, and remarks of it:—"This animal, which derives its name from its general aspect being intermediate to that of the ox and that of the sheep, has generally been placed among the bovine forms. Taking the aggregate of its characters it appears to me to be at least as nearly, if not more, allied to the sheep, but should most properly stand alone." To us it appears to be immediately connected with the bisons by the intervention of the fossil genus *Bootherium*. Mr. Hodgson, on the contrary, would separate the African buffaloes from the Indian; admitting which separation, the Anoa should be likewise so distinguished.*

The Anoa has straight, flat, bubaline horns, continued back nearly in a line with the forehead, as in the Cape or Abyssinian oryx, or as in the eland; they are shorter than the head, smooth, and very sharp-pointed, and are depressed below the plane of the visage; they scarcely diverge in their exterior outline, but sharpen off from about the middle

* Of the *Budorcas taxicolor* of Mr. Hodgson, Mr. Turner remarks that "a glance at the representations of the skull indicates very plainly that it is closely allied to *Næmorrhædus* [in which we think he is altogether wrong in associating the goral with the surrows], to which Mr. Hodgson admits certain resemblances, and that it has no relationship with the gnus or the musk ox." This quite coincides with our own opinion.

in their interior outline.* In our drawings, made carefully on the scale of an inch to a foot, the total length of skull, from vertex to tips of intermaxillaries, should be $13\frac{1}{2}$ inches; greatest breadth posterior to orbits, 6 inches; length of horns, 9 inches; width apart at base, $1\frac{1}{2}$ inch; at tips $4\frac{1}{2}$ inches; width apart at base, measuring from the outside, about $4\frac{1}{4}$ inches. The dagger-like shape of the horns indicates them to be extremely formidable weapons. We can hardly think that this very small animal can be the "wild cow" of Celebes. It is the *Bos bubalus*, var. B, of Pennant; and some other species, unknown to modern science, he has certainly indicated by his var. A, which he has very rudely figured, and describes as follows:—

"Naked: a small sort, exhibited in London some years ago, under the name of Bonassus; of the size of a runt: hair on the body bristly, and very thin, so that the skin appeared; the rump and thighs quite bare, the first marked on each side with two dusky stripes; horns compressed sideways, taper, sharp at the point.—East Indies."† Can this have been one of the "wild cattle of Timor Laut," noticed by Mr. Earl, but said to have "upright horns?" Pennant's figure would seem to represent an animal nearly akin to the Anoa of Celebes, with depressed horns curving a little inwards. He represents two dark bars on the naked rump, and two others across the thigh; the neck and body anterior to the haunch being clad with longish hairs.

(To be continued.)

Buff-coloured Rabbits.—In a former number of the 'Zoologist' I sent some account of several varieties of white and variegated birds, pheasants, blackbirds, and a thrush met with here, and also of sixteen or eighteen buff or straw-coloured rabbits, which had lately appeared amongst the other common rabbits; the former being of different broods and sizes and in different covers distinct from each other, so that they could not have come from the same parents or stock, but were unquestionably bred

* Not a few of the humped taurine cattle have straight horns, more or less resembling in direction those of the Anoa buffalo. Such are of tolerably frequent occurrence among the large ordnance bullocks of this country. That the same type prevails in Central Africa may be inferred from one or two of Dr. Barth's plates.

† The humped cattle of Algawf, it is elsewhere stated, "are, as generally in Arabia, of a very small and poor race, and are never, but with the greatest reluctance, killed for food."

from the common coloured rabbits in different places and of different ages, and were to be seen daily, and grew and thrived well, until within the last three or four months, when they gradually disappeared, and now there is not a single rabbit out of all the sixteen buff-coloured ones to be seen, though plenty of the common brown rabbits, both old and young, are to be seen in every direction as before. As the winter was so remarkably mild, with scarcely a day's snow and but very little frost, and as it is perfectly certain that these buff-coloured rabbits have not migrated, I am utterly at a loss to account from what cause the singular and sudden disappearance of all these buff rabbits is to be attributed to. It is impossible that the foxes or vermin can have selected them in preference to the other kinds; nor can the severity of the winter have caused their death. But from what can it have arisen? — *W. H. Slaney; Hatton Hall, near Shrewsbury, May 6, 1859.*

Occurrence of the Golden Oriole (Oriolus galbula) near the Land's End.—A male specimen of the golden oriole, in its full brilliant plumage, came into my possession yesterday: it was captured in a sequestered valley about four miles westward of this place, flying from hedgerow to hedgerow, very much in the style of the missel thrush (*Turdus muscivorus*). The bird was in a state of emaciation and feebleness, but probably it had not been long so, for the whole plumage is in a state of unsullied purity. — *Edward Hearle Rodd; Penzance, May 2, 1859.*

Kite, Hoopoe and Golden Oriole shot near Scarborough.—I had the following rare birds brought in last week: — a male kite (*Falco milvus*), in fine feather, trapped near this town; a hoopoe (*Upupa epops*), and a second very beautiful specimen, shot near Oliver's Mount; a male golden oriole (*Oriolus galbula*), in the finest adult plumage, shot at Hunmanby, on Rear-Admiral Mitford's estate. — *Alfred Roberts; King Street, Scarborough, May, 1859.*

Curious Situation for a Dipper's Nest.—A curious fact in the nidification of the dipper (*Cinclus aquaticus*) having just come under my notice, a fact, so far as I am aware, quite unprecedented, I make no apology for laying the occurrences before your readers. This nest was situated at the extreme end of a sand martin's old hole, formed in a sand-bank overhanging a small brook, and nearly two feet in depth. The old bird was caught on the nest by the finder, and with some difficulty drawn out of the hole, the aperture being barely sufficient to allow the introduction of his arm. Five fresh eggs were taken from the nest, which was subsequently dug out, and a good deal resembled in shape that of the blackbird, but, as usual, was composed of moss thickly lined with oak-leaves, the dome, however, being entirely wanting. I have seen many dozens of dippers' nests, but never either saw myself or read of one built in a situation at all resembling the above, and, believing the circumstance to be unique, I have lost no time in communicating it to you. — *Henry Smurthwaite; Richmond, Yorkshire, May 16, 1859.*

Occurrence of the Hoopoe near Shrewsbury.—On the first of May a fine specimen of that rare bird, the hoopoe, was seen at Walford Manor, near Shrewsbury, the seat of R. A. Slaney, Esq., M.P. It was feeding in a turnip field near a farmhouse and outbuildings, and was very tame, running from place to place in pursuit of worms, and allowed Mr. Slaney and his brother to come within about twenty yards of it, so as to

be distinctly observed. It had a pendant crest falling back, and not erected like the one described in the Plate of the hoopoe in Bewick's 'British Birds.' The white markings on the wings and body were very vivid, there seemed but little black between the white bars, but a dull fawn or reddish brown colour prevailed. After some little time the bird flew to a hedge, and there meeting with a blackbird a fight ensued, the former driving the hoopoe away, who again came and lit where it had before been feeding, and, eventually, went close to the farmhouse and buildings, and then flew off. A similar looking bird, as described by the keeper, had been seen about a month before near a small village about a mile distant, which was probably the same bird as that before mentioned. — *W. H. Slaney; Hatton Hall, near Shrewsbury, May 6, 1859.*

Occurrence of the Hoopoe near Cambridge.—The other day a labouring man informed me that he saw a gamekeeper shoot, near Foulmire, Cambridgeshire, a curious bird, at the same time asking me to show him a book on Natural History, which I willingly did; he instantly pointed me out the hoopoe (*Upupa Epops*), which, upon seeing the bird, proved to be accurate. The same man saw, not many fields off, one of the same birds sitting upon a hedge; doubtless they were male and female; the former one when shot was feeding in a ploughed field, and, he says, was very active in its movements. I have since had one procured near Bottisham, Cambridgeshire, April 28th, 1859.—*S. P. Saville, Jun., 93, Castle Street, Cambridge, May 6, 1859.*

Occurrence of the Hoopoe at Dulwich.—A female specimen of the hoopoe (*Upupa epops*) was shot in this neighbourhood by J. Willis, gardener to Mr. Barclay, of Dulwich Common, in his garden, on the 26th of last month, and brought to me for the name.—*C. Wood; May 10, 1859.*

Extraordinary Situation for a Cuckoo's Egg.—The vestry of my church is a lean-to, the roof running up under the eave of the chancel; but, as the two roofs are differently inclined, a kind of wedge-shaped space is formed by the eave and wall of the chancel and the coping of the vestry. In this space, on the coping, a pair of pied wagtails (*Motacilla alba*) last year built their nest, which when discovered contained only an unledged cuckoo. As a projecting rafter closed this space on one side of the coping, and the distance of the eave from the coping was barely $1\frac{1}{2}$ inch, there seemed no room for a cuckoo to enter; but, on examination, I found it might do so on the other side of the coping, which did not extend quite to the next projecting rafter; still it must have been a very confined and inconvenient situation for a cuckoo to deposit its egg in the ordinary way; and the question mooted in the 'Zoologist' (Zool. 1774), "Does the cuckoo carry its eggs?" may fairly be repeated.—*William Turner; Barkholme Vicarage, Stainford, May 3, 1859.*

Woodcock's Nest in Norfolk.—A woodcock is at the present time sitting on four eggs in a wood in Runton, near Cromer, on the coast of Norfolk: the nest is among a very few dead ferns, in an otherwise bare spot, under some trees.—*T. Fowell Buxton; Cromer, April 30, 1859.*

Occurrence of the Little Bittern near Cardiff.—A female specimen of the little bittern (*Ardea minuta*) was run down and captured by some harriers on the moors west of this town, in February last. During its short and miserable captivity, at which period I could not gain possession of it, it was remarkably fierce, darting its beak with extraordinary activity, virulence and pertinacity at anything brought within reach. By its unamiable disposition and refusal to take food (which, however, was of

an unnatural kind), it soon gained the dislike and ill will of its master, became neglected and was starved to death. The ovaries were considerably developed, but it had not assumed its fully adult plumage, if I am correct in supposing that the breast should have lost its brown markings, and that the shoulder, instead of being rusty brown, and the feathers slightly edged with buff, should in the adult be shining bluish black, as are the top, the head, occiput and tail-feathers of this specimen. Again, the back of the neck of this bird is bare, and the feathers on the base of neck in front are elongated as in the adult, but the outer web of the first quill-feather is buff-coloured, and the wing-coverts are rich deep brown.—*R. Drane; Cardiff, May 18, 1859.*

Dates of the Arrival of Migratory Birds.—The swallows appeared partially here about the 7th of April, a very hot day, but disappeared in a couple of days, as if fancying they had made a mistake, on the change of temperature, with bitter cold north-east winds; these birds reappeared on the 29th and 30th of April. I have not yet seen a swift. On the 7th of April I heard the chiffchaff. On the 24th the blackcap (*Sylvia atricapilla*) chanted his short but melodious song. On Sunday, the 1st of May, I heard the nightingale, but as it was a cold evening, with strong north-east winds, he only gave out three times "sweet jug!" and then closed; it was about 5 P.M., in a small covert near the turnpike on the Gloucester road. The cuckoo appeared and was heard first here on the 26th of April, and was not heard again until this morning, when I heard two in different directions at the same time; this day being 9° Fahr., milder than yesterday, with a fine warm sun.—*H. W. Newman; Lansdown, Cheltenham, May 6, 1859.*

Inquiry respecting a Bird's Nest.—I am rather perplexed by a nest with three eggs which was brought to me three days since. I had employed a person to get a few eggs for me, and the result of his first expedition was two nests; one, which I had no doubt about, a ring ouzel's; the other he pronounced to be a missel thrush's. I disputed the fact; but he said that he had seen the old bird fly off, and it was a "May thrush." The nest was in the fork of a stunted Scotch fir growing on the moor, was composed of coarse grass externally, twined about with dry rushes and flexible roots and longer pieces of grass; inside, lined with finer grasses, and between a walling of clay. The second nest had a good deal of ling and moss among its materials, was taken from the ground, and was twice as heavy, with clay, as the former, and altogether unlike it in colour, compactness, general neatness and finish, independently of dissimilarity of material. This, an undoubted ring ouzel's nest, contained four eggs; two of which resembled, in a degree, the missel thrush's egg, as to shade and markings; the other two might rank with Mr. Hewitson's original. They were all equally "hardsat," and I had some trouble in getting three out of the four safely blown. The eggs in the other nest were, all three, perfectly fresh, showing there had been no accidental confusion of eggs; but their markings were not at all like those of any missel thrush's eggs I have ever seen, and, besides, they were all much less than the eggs in the ring ouzel's nest, very distinctly less. Two out of the three precisely resembled, in colour and markings, the two darker ring ouzel's eggs; the other was slightly lighter in shade. My question is, what nest and eggs are these? They are not blackbirds', certainly; they are not, I feel certain, a missel thrush's; and, I think, the position of the nest, its nature and materials, preclude the idea of its being a ring ouzel's. The man who brought me them is a character in his way; very keen to accompany me on any shooting expedition; a

good fisherman, and, though not of strong intellect, is a very shrewd fellow in such things as I have named, and others like them. Had the bird which flew off the nest been a blackbird or a ring ouzel, he would certainly have identified it. I think he has mistaken in pronouncing it to be a missel thrush; and my own doubt is whether or no it may not have been a redwing. There have been many more of those birds here than usual during the winter: I think I never observed half so many, or even nearly half so many, on any former occasion; and it is at least conceivable, that storm-stayed by the late continued inclement weather—bitter indeed on our moors—a pair (or more) of them have stayed to nest here. I have also met with another not very usual circumstance in relation to birds' nests this year: I observed a bird leave her nest in a hedge as I passed, rather near; on looking in I saw a blackbird's nest, but with four thrush's eggs in it—I mean that the nest was lined with fine dry grass, &c., in precise resemblance to a blackbird; the eggs, however, being such as to preclude the idea that they were laid by a bird of that species,—or any idea, save that they belonged to a thrush.

	Length.	Breadth.
1. Ring ouzel's egg	1 $\frac{1}{4}$	$\frac{1}{8}$
2. Blackbird's egg	1 $\frac{1}{4}$	$\frac{1}{8}$
3. Blackbird's egg out of different nest	1 $\frac{1}{4}$	$\frac{1}{8}$
4. Thrush's egg	1 $\frac{1}{4}$	$\frac{1}{8}$
5. Doubtful egg	1 $\frac{1}{4}$	$\frac{1}{8}$

These are the comparative lengths and widths of five eggs, the last of which is the egg I am puzzled with; 2, is a long narrow egg; 3, a round one, and, though shorter, considerably heavier than 2; the proportions of 5 are much those of 2; of 4, much those of 3. As for the markings of 5, they are much larger or more blotchy than in 1, 2 or 3, and a redder or more chestnut-brown. The figures show the lengths, &c. in inches and "thirty-seconds" of inches.—*J. C. Atkinson; Danby, Gosmont, York, May, 1859.*

The Shower of Fishes.—Some remarks in the 'Zoologist' (Zool. 6541) seem to indicate the conviction that the "shower of fish" in the Aberdare Valley was simply a hoax. I think actual fact will nevertheless excuse the otherwise apparently unbecoming assumption in me, of opposing such high authority by a contrary opinion, for, from information obtained from many sources and very careful and minute inquiry, I am quite convinced that a great number of fish did actually descend with rain over a considerable tract of country. The specimens I obtained from three individuals, resident some distance from each other, were of two species, the common minnow and three-spined stickleback; the former most abundant and mostly very small, though some had attained their full size.—*Robert Drane; Cardiff, May 18, 1859.*

A Monster Pike.—The Rev. W. Barham, of Lolworth, Cambridgeshire, had the good fortune to land a jack weighing 26 pounds, and measuring from tip to tip 3 feet 7 inches, across 8 $\frac{1}{2}$ inches, in the River Ouze, near Swavesey, Cambridgeshire; this gentleman succeeded, after five hours, in landing his prize.—*S. P. Saville; Cambridge, May 6, 1859.*

The Toads in Clay.—To the notice, in the 'Zoologist' (Zool. 6537), of the occurrence of live toads underneath a bed of clay, a note is subjoined by the Editor, asking the name of any scientific man who was present at the exhumation. I am unable to give such a name, further than as the intelligent foreman of the brickyard, Thomas Duddridge (who witnessed the exhumation by one of the labourers of the yard), may be entitled to the appellation; but no one, however high his scientific attainments, could be more careful than he was to give me correct information, or more exact in his statements; and if, after minute inquiry, I had not been fully satisfied of the correctness of his account, I should not have sought to occupy the page of the 'Zoologist' with its recital. On showing him the notice in the 'Zoologist,' he said it was impossible for anything to be more correct; and he added that the little cavity which the toads occupied was quite smooth in every part, apparently by their long-continued movements,—as smooth, to use his own illustration, as the inside of a china bowl.—*Thomas Clark; Halesleigh, May 10, 1858.*

The Edible Frog long a Native of Foulmire Pens.—In reply to Mr. Alfred Newton's query, in the last number of the 'Zoologist,' I have to remark that the fact of the esculent frog being indigenous to this country appears to me to rest on irrefragable testimony. My father, who was a native of Cambridgeshire, has often described to me, as long ago as I can recollect, the peculiarly loud and somewhat musical sound uttered by the frogs of Whaddon and Foulmire, which procured for them the name of 'Whaddon Organs.' My father was always of opinion that they were of a different species from the common frog, and this opinion of his, formed nearly a century ago, was confirmed by Mr. Thurnall's discovery that the frogs of Foulmire are of the species *Rana esculenta*.—*Thomas Bell; Broad Street, May 1, 1859.*

On Squilla Desmarestii. By P. H. GOSSE, Esq., F.R.S.

FOR the last six weeks I have had a living specimen of that pretty and rare Crustacean, *Squilla Desmarestii* (Risso). It was taken by means of the dredge from deep water, off Torquay, about the middle of April, and has lived in one of my aquariums until yesterday morning, when I found it dead.

This individual agreed accurately with Professor Bell's diagnosis (Brit. St.-Eyed Crust. 354) and figure. It measured, from the front of the eyes to the spines of the last abdominal segment, exactly two inches. Its colour while alive was a pellucid white, freckled all over with wood-brown or pale sepia; these frecklings or cloudings under a lens resolved themselves into groups (constellations, so to speak), more or less dense and more or less extensive, of very minute stars; the whole bearing a close resemblance to the colouring of *Crangon vulgaris*. The hands were white (ivory-like, but scarcely so opaque) without freckles. The yellowish hue (a warm buff) of the body, and the rose tint of the edge of the hand and of some other

parts, which Mr. Bell mentions, appeared only after immersion in alcohol.

Though this animal lived so long with me, and was manifestly in health, — for I have a strong suspicion that it died, at last, not of disease, but of the sly pinch of a wicked *Gonoplax angulata*, that for a much longer time has tenanted the same tank, — I have less to record concerning its habits than I hoped to learn when I first rejoiced in the possession of so great a prize. The mere acquisition of a preserved specimen seems to me a very poor object of ambition; when I get hold of a rarity it is with the hope of adding something to its Natural History.

The tank in which my *Squilla* resided is large, long-established, well-peopled, and furnished with abundant means of retirement. Of these last it availed itself to such an extent that, for many days at a time, I could not with the strictest search find it. Always inert and sluggish, it was yet much more active by night than by day. It never manifested the slightest disposition to burrow, but a favourite position was stretched upon the gravel, between two pieces of rock just sufficiently wide apart to allow it freedom. It had one most singular action, which it so frequently repeated as to be quite characteristic. When annoyed by being touched with a stick, it would suddenly bend its tail forward under the body, and throw a complete somersault, relapsing immediately into stillness again. The action was performed with the most beautiful liteness and ease, and in the smallest possible space, reminding me strongly of the feat of a professed tumbler. The perfect flexibility of the long depressed body was thus well displayed.

I fed it occasionally with small fragments of raw flesh, which it seized and held with its foot-jaws, but without any special manifestation of eagerness, and without bringing into operation (as I had hoped) those sabre-like weapons with which it is armed. I wished much to see the action of these, but was disappointed. I observed that they were always carried in a different position from that figured by Mr. Bell, in both *S. Mantis* and *S. Desmarestii*, though I perceive that the limbs are capable of being put into the position depicted. The terminal blade-like joint I always saw closed upon the haft-like penult, and the united weapon was so carried that the opening of the former would have been perpendicularly downwards, so that the stroke or sabre-like cut which the blade makes would seem to be an upward cut, contrary to what I had imagined. Yet, as I never saw the animal take a living prey, it may be that, when

engaged in active warfare, the arm is so far erected that the stroke of the blade shall be horizontally inward, as represented.

On one or two occasions, indeed, I saw it show fight with these weapons. When I teased it with a long rod of wood, bringing the annoyance close to its head, it would suddenly throw forward its two arms together, and strike the stick with them. But with such lightning-like rapidity was the double blow given, that the eye could not determine with accuracy the relative positions of the parts. It certainly appeared to me, however, that it was a perpendicular upward stroke, and not a lateral one. The great force employed was shown by these two facts,—that the vibration of the blow was distinctly felt by my fingers that held the rod, and the clicking sound produced by the contact was plainly audible through a foot of water.

The eyes did not reflect the light of a candle in a concentrated glare, as do those of the prawn, and (in a less degree) those of some crabs; and I saw no trace of luminosity from any part of the body.

It ordinarily carried the body fully extended; never swam, so far as I saw, but was always on the ground.

P. H. GOSSE.

Torquay, May 2, 1859.

The Crab and its Allies.

By C. SPENCE BATE, Esq., F.L.S., &c.

THE sun was burning in the sky, the air was teeming full of heat; the horizon was shut out from view by the hot mist which steamed up from the surface of the earth and sea. All Nature seemed at rest, and basking in enjoyment; not a breath of air beyond the occasional "catspaw" that slowly glided along the surface of the sea, and as it swept our boat fluttered the small flag at the mast-head, and passed on in its waving course.

It was on such a morning as this, early in the beautiful and merry month of May, that, being in a yacht and drifting with the tide, we steered our path across the Plymouth Sound. Our course was slow; to gain advantage of the opportunity we threw overboard a towing-net, and let it drift astern for some half-hour, and then hauled it in. There is an interest in the hunt; the searching after little things that are trapped in the small meshes of the gauze.

To the unaccustomed eye the net often comes up empty, whereas to one who knows how to search there will be seen little patches of

unshapen substances here and there. Several of these were in the net the first time we drew it in; these were carefully transferred to a tumbler full of clear sea-water collected to receive them. Scarcely had the seemingly shapeless masses been placed in the small prison than they dashed away in the full gambol of life's enjoyment, and exhibited several forms that were formerly known to naturalists by the name of Zöe. These were at one time thought to be mature animals, adults of their kind, and described and named as such; but a zealous and close-observing naturalist, in this same month, a few years ago, on his homeward course, after an unsuccessful day of search, entangled a solitary specimen: he took it home, and carefully tended his new acquaintance, supplied it with food and fresh water, and daily watched its habits; but all his care could not reproduce in the little prison the conditions of the free and open ocean, and the poor thing, after a few days, died. Had it been a starling or a man, we should say the poor thing pined because it could "not get out;" as it was but a Zöe, we think it had no sorrow or joy, no knowledge of the freedom it had lost, no hope to desire its removal; yet the free-swimming Zöe, that outlives the lashing of the surges of the storm, that skims the surface of the water when warm with the sun's rays, will not outlive a week of the greatest care the naturalist can bestow upon it in confinement.

Mr. Thomson's Zöe died within a week, but in dying told its history. The Zöe was but a young crab. Here was a discovery: it startled men of science all over the Continent. In Germany Rathke took up the challenge, and traced the history of the development of the Crustacea, as found in the freshwater crayfish (*Astacus fluviatilis*), and declared that Thomson was wrong. The Academy of Paris requested a deputation to investigate the subject, and sent MM. Audouin and Milne-Edwards to the Island of Rhé, where they remained some time in search of the truth, and declared that Mr. Thomson was wrong. In our own country the discovery was not left to pass unquestioned: Mr. Westwood investigated the so-called metamorphosis in the development of the land-crabs of Jamaica, and Dr. Kirby, in his 'Bridge-water Treatise,' refused to admit the correctness of Mr. Thomson's observation. But while all these investigators were at work, Mr. Thomson was still pursuing his course of observations, and found that another genus of Crustacea, that which Dr. Leach had named Megalopa, was also a young form of the common crab, and singularly enough the same volume of the 'Philosophical Transactions' which contains Mr. Westwood's refutation of the possibility of the Zöe being the young of a crab contains also Mr. Thomson's discovery that the Zöe

is the first stage and Megalopa the second, and both are the young of the same animal.

That which was received with so much caution is now a well-known fact, nor was the scepticism with which it was received devoid of advantage; it led to a more extended investigation of the subject, and it has since been proved that the Zöe form of larva belongs only to one order of marine Crustacea; those which are freshwater or land carry their young until they have arrived to a form closely approximating that of the parent. But the Zöe that we take in the open water has much altered, both in form and size, from that of the larva as it quits the egg of the parent. As we see them first they are scarcely a line in length, and closed up within a membrane that conforms to each member and confines every hair, as shown in fig. 1. This tunic is thrown off within a few hours, and then the animal assumes the grotesque form of the recognised Zöe; it has one horn upon its back, and another projecting forwards in front of the head: these were confined down within the previous tunic, but became extended as soon as they were freed. The tail also, instead of being truncated and short, terminates in two long styliform processes; these were previously contracted within themselves, similarly to the horns upon the back and head,—that is, folded as a telescope is drawn within itself. These extend when the tunic is thrown off. All the hairs are liberated, and the animal appears to have more control over its motions. Previously it appeared, when in the water, to progress spirally; its big head led the way, but the tail was curved beneath with little power of action, and thus steered the young creature round and round in the direction of its progress. But when the larva is liberated from the embryonic tunic it immediately increases in size, and exhibits a more energetic character; it advances with a jerking motion, and always swims towards the light, keeping near the surface of the water; probably in the free state this is the case only in fine weather; when storms prevail and the winds tear up the waters, they sink to rest in the quiet depths of the ocean, where most of them become the prey of fish and other hungry Carnivora. We say most of them, for we can hardly believe but that if all that were hatched were permitted to grow



FIG. 1.—Zöe, as it appears when just free from the egg.

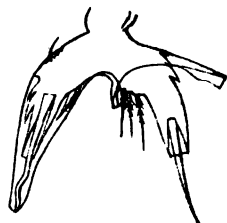


FIG. 2.—Telson, one half in the other partially freed from tunic.

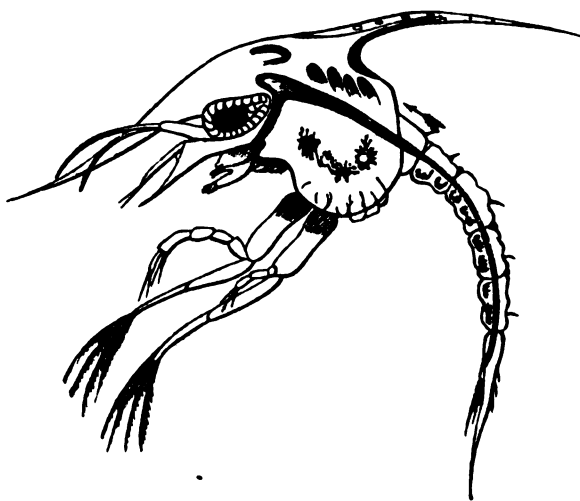


FIG. 3.—Zoe free from embryonic tunic.

to be adults, the seas would be swarming and running over with crabs, so great are the number born. Attached to a common edible crab, and that of very moderate dimensions, we calculated two millions of ova, and when we consider that they are capable and probably do have two or more broods in a year, we cannot but consider that the

enormous creation of young animal life is designed as food to older and stronger creatures.

The egg is wrapped within a strong circular case, and this is attached to the parent, and carried by her beneath her tail, or curtain, or flap (the pleon). There is a mystery in the attachment of the ova to the parent: how they get there, and how they are attached we know not; they are suspended every one by a thread, and that thread to another, and so on, each thread suspending an ovum; thus, like a bunch of grapes, thousands hang in a mass, and each mass is suspended from the hairs which are attached to the swimming feet (*pleopoda*).

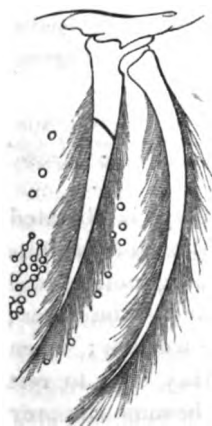


FIG. 4.—One of the pleopoda, or false feet, with a few ova attached.

These organs (the pleopoda) vary, in the female, from those of the male; in fact, they are mostly absent in the male crab (*Brachyura*), and are short, broad, double plates in the lobster (*Macroura*). In the female they consist each of two long appendages, the inner one straight, the outer slightly curved, and both fringed with hairs: it is the inner one to which the ova are suspended. When the egg is first deposited it probably is covered by gelatinous secretion, which forms the protection over each, and hardens into the thread by which it is suspended; but why they are suspended to the hairs upon the one branch

and not upon the other is a question yet to be solved. For some few weeks the ova are carried about by the parent, during which time the embryo within developes itself and progresses in growth until it has arrived at the form which is known as the Zöe. By some instinctive consciousness, the parent now liberates the young from the ovicel: this it does by rupturing the outer case, sometimes by means of its feet, sometimes by pulling with its claws or nipper-formed hands. The young baby is thus early and unprotected cast upon its own resources in the wide world of waters, and soon no doubt large numbers fall a prey to hungry enemies; but a protecting Providence watches over a favoured remnant, which grow, and thrive, and people the ocean.

Within a few hours the young Zöe throws off its first tunic, or as a little child who saw an older specimen remarked, "pulls off its clothes;" this is repeated in the earlier period of existence, something about every week or ten days, but in confinement we have never been able to get it to pass beyond the second moult. We have taken them so frequently at different sizes that we think we are enabled to trace its growth with but a small, or perhaps no, hiatus in its history: with each moult the animal increases in size, then strengthens in its structure and developes its new growth, until it again throws off the exuviae, and increases in dimensions; but with each progressive step a change of form is visible: when it is born it has but two or three swimming legs and a long tail; behind these swimming legs small sac-like appendages are apparent; these gradually increase in size, and become the strong claws and walking legs of the animal, while those which are first the swimming legs decrease in their relative importance, and fold themselves up as protecting and supplying organs of the mouth.

These things are small, and the close observation of the microscope is required to observe the facts. The growth of every part is progressive, and, curious to tell, all those members and appendages conspicuous in the young lose their importance and become either obsolete or of secondary value in the adult. In its youngest stage it is always swimming and knows no rest,—its paddle-like organs never cease in their vibration,—weeks pass away and there seems no wearying; but the time comes when, casting off the tunic once again, the soft and fleshy legs have progressed to a size sufficient to bear the weight of the animal; the skin then becomes impregnated with lime, and the structure sufficiently strong for use.

The animal now is changed; it is less a swimming creature, but

when it does swim its organs of progression are not those of its younger days. In its first infancy the tail had no appendages; now it has five pairs of plates fringed with hairs; these are the small oars with which at this time it navigates its course in its occasional passages through the water; but its more congenial position is in some sheltered nook among the stones and weed at the bottom of the sea. Age is creeping on, so it puts off its youthful Zœe habits and assumes those becoming a grave and sober crab.

We said that in the hot and quiet days in early summer these young Crustacea may be found floating near the surface of the sea; but they know no rest,—they swim by night as well as day, for in the calm nights, when the air is warm and pleasant, the ocean shines with myriads of its own native stars. Break the surface with the dip of the oar, and it drops with a soft, sweet light, and every spark a living atom: among this resplendent glow the living Crustacea form no inconsiderable portion. Dip but a small quantity of the water, and carry home for observation, and small Entomostracan Crustacea in abundance, both living and dead, cast-off skins and broken limbs, testify to the number of the class that are present in the water.

The Zœe has ceased to be one,—it has lost its fantastic shape; the horn upon its back and brow are gone—lost in the greater development of the surrounding parts; the narrow sides of the animal swell out, the eyes are smaller and more in proportion, and the tail ceases to be forked. The creature has now become a Megalopa. This name was given by Dr. Leach to what he believed to be a new genus of Crustacea, which contained two species; but this genus as well as both species that it contains are now known to be but stages in the progressive growth of the same

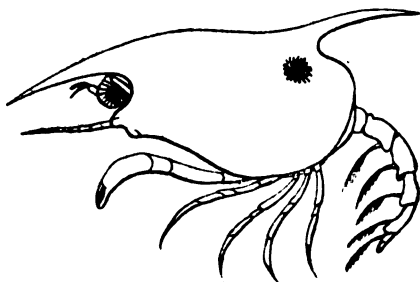


FIG. 5.—Young crab in the intermediate stage.

animal: the first of these that was found was taken by Colonel Montagu amongst corallines on the back of the prickly crab (*Maia Squinado*), on the southern coast of Devon, and named after the finder; the other, which is the younger form of the two, is called *Megalopa armata*, from the great spine upon its back; it was found in a crab-pot in Bigbury Bay, by Mr. C. Prideaux. Both of them are figured in Dr. Leach's work on the British crabs.

When Mr. Thomson first astonished naturalists, the wonder was

created by the statement that the animals underwent a distinct metamorphosis,—that the Zœe changed to a Megalopa and the Megalopa became a crab, just in the same way that a caterpillar becomes a grub and the grub passes into a butterfly; and this idea has been taught by implication ever since in the most important works upon the subject. But observations upon many specimens taken at different ages have proved that these different stages are but mile-stones in the passage, and are arrived at by a series of progressive steps, each one scarcely appreciable from that which has preceded it.

Most young naturalists look for wonders: things that are astonishing are pleasing to the fancy. The Nautilus, when its history was dressed in the poet's fable, was a prettier thing than the poor cheat it has been found out to be. So with the crab, truth is not so pleasant as fiction, and there was something astonishing in these *insects* of the deep fulfilling in their history the conditions similar to their supposed analogues of the land.

Successive moults still bring the animal nearer to the form of the parent: the long projecting rostrum disappears, and the postorbital region, the position in which the liver is developed, increases in proportion, the tail is bent close beneath, and the animal assumes a square form; the continuing growth of the liver region increases the lateral dimensions of the crab, so that the adult is found broader than it is long. But all these alterations are slow, and without any sudden change, any metamorphosis, such as appears to exist in insects.*

The young crab is no longer a swimmer: those who wish to find it now must search the rocky pools upon the sea-shore, and turn the stones and weed, and seek beneath their sheltering protection, where, half-buried in the soil, it hides from the presence of its enemies, and watches for prey.

Although there is no sudden metamorphosis, there is a great change of form between the early larva and the adult Crustacea, and the same law of development appears to be persistent, as in animals of the higher types. The progressive growth of the creature passes through many stages, which have their types in adult forms: these would seem to suggest that each may be but an arrest in the development of the more perfect animal. The entomostracous form is that which it most resembles at first, both in its general appearance and in its movements and habits; with its growth it assimilates to those of a higher

* The development of the butterfly, &c. is quite as gradual, but it is hidden by the external forms of the caterpillar and grub.

type, but passes not through all the inferior forms. The higher forms, such as the short-tailed crabs, skip over those of the stomapod type, and put on more early their own peculiar features, whereas the young of the Macroura, or long-tailed genera, enter more decidedly into the forms that are beneath them; and at a certain stage the larva of the prawn and shrimp can scarcely be detected from that of the adult opossum shrimp. Great outcries are made against those philosophers who endeavour to support the doctrines of the unity of animal creation; but there appears to us nothing outrageous in the idea that supposes the adult form which resembles the intermediate stage in the development of one of a higher type to have been the result of an arrest in the progress of that particular species. We know that an arrest in growth may take place under certain conditions for an indefinite length of time, and that during that period they even propagate their kind, but when those conditions are removed animals proceed to a higher degree of development, and complete the history of their lives. This has been shown to be true of the Tenoid worms, which remain unchanged and reproduce their own kind while inhabitants of one animal will, upon being devoured by another, pass on to the adult condition. If this be true for a period, we have only to suppose the conditions fixed, to make the arrest permanent, when it must take its place as a separate species among the rank of animals.

In the development of the common shrimp, the progress of the animal is so nearly through the form of Mysis, that an arrest of development of the animal at that particular stage would place it in the genus. Now, whether the power to change the conditions, more or less favourable to the animal, or the actual creation of a new creature is the more consistent in the great plan of creation, there is at present not sufficient evidence for us to come to correct conclusions.

We know that altered circumstances induce a variety in form and size. The Crustacea that are large and spinous in the Arctic regions dwindle in dimensions and become less spinous in the temperate zones: these changes made constant appear the only separation between the variety and the species.

When the crab first becomes a walking animal, it bears no very distant resemblance to one of the triangular species, narrow in the front and broad towards the posterior extremity of the carapax. The spider-crabs, as they are nicknamed, from a general resemblance they are supposed to bear to a spider, have been placed as the highest forms in this class, but observation demonstrates that in the course of

development, the Portunidæ assimilate in form very closely to the triangular group, and it appears but just that we should consider—if any adult form be passed in the production of a species—that that form must be less perfect than that at which the undeveloped creature finally arrives.

This seemingly fair inference appears to receive considerable force from a study of the habits of the animals. If we descend to the bottom of the sea, there amidst the tangled branches of the zoophytes, squatting beneath some stones or beside a mass of weed is the long-legged spider-crab. Here the lazy creature, with nothing of the habits of the active little being of the land whose name he has appropriated, sits and sits, and continues to sit on for weeks, perhaps months and years, without desire to change more than to snap up some bit of offal that has come as food to him. His great long legs seem to be misappropriated, and appear as stilts that raise him up so high that he is afraid to use them. Afraid, did I say?—I mean he does not know how to use them! Drive him from his lair where he has been so long that plants have taken root and grown upon his back; his limbs are a resting-place for sponges to fix themselves and thrive; zoophytes spring up and look like trees; and the calcareous coral takes its stony hold upon its back: amidst this forest the worm is seen to creep about the roots and take up its abode, and many other creatures fix upon the spot and think they have established their home upon a rock; and here they dwell, and would bury this fakir of the ocean in their increasing growth, had not a fixed law in Nature come to his relief. He sheds his skin, and breaks at “one fell swoop” the hopes of all that rested on it. I said before, he knows not how to use his legs. And one is almost startled to think that in creation, so perfect in all its adaptations of the means to the end, that any organs should appear so useless to the possessor. The long sprawling members, generally incommoded by the attachment of weed, seem too long for use, and, to raise them over imperfect substances, they lift them up so high that it makes one almost think that once up they are never intended to come down again. Thus straddling on, he moves fearful of every thing he sees—timid, sluggish, and defenceless. The species fall a prey by hundreds to the ground-feeding fish.

Not so the depurators, the so-called cleansers of the ocean, under an assumption that they dine on decomposing offal,—but which is an error, for no marine animal is more particular in its feeding than the crab; I have seen them perish rather than devour tainted food.

Although, no doubt, they considerably assist in getting rid of animal refuse from the sea, yet it is all eaten by them before decomposition has commenced; and, therefore, the swimming crabs, no more than other species, have a right to be considered foul feeders. If among Crustacea such are to be found, they exist among the long-tailed genera (*Macroura*); the lobster and the shrimp with their near allies. The fisherman, if he wishes to catch a lobster, baits his trap with stinking meat, but when he hopes to take a crab, he always sets it with fresh; and we know upon the sea-shore that a drowned dog or cat is soon reduced to a skeleton under the devouring powers of a flock of shrimps. Those who wish to have a skeleton of a bird or other animal perfectly cleaned, will often thrust it into a nest of ants; but should they find it more convenient, they may procure the same results by mooring it in the sea where a number of shrimps are known to congregate. The knowledge of this fact was made available by the naturalists of the Arctic Expeditions; they placed specimens, of which they wished to have the skeletons preserved, beneath the ice, where they were rapidly reduced to that state by the myriads of small Crustacea living there.

These depurators, or swimming crabs, are active, lively creatures that seem conscious of existence, and endeavour to enjoy it to the full extent of their capability. They are called swimming crabs, because they manage to swim a little: they can, by a great deal of kicking with the legs, the two hind ones of which are flattened out to an oar-shape, progress in a diagonal line, but they must crawl up again, and this is called swimming. It puts me in mind of the flight of a young domestic goose, which through a hard day's labour has climbed to the top of a neighbouring hill, will, at sun-down, lift himself upon the wing and drop, to the astonishment of his old mother, in the valley below; but not to save his feathers could he perform the feat back again.

And at the bottom, the so-called swimming crab alights upon his feet, and then he feels at home: ever on his guard, watching, ready to run or quick to attack, as the case may require, to further his own protection; but it appears that where escape is impossible, and that an enemy is too powerful, the creature will fold his legs together and pretend that he is dead, trusting that where he expected no mercy when alive, he may at least find pity or neglect when dead. This trick is more common with the young edible crabs than any other; they will often throw themselves upon their backs and remain with their legs curled up and motionless for a considerable period, until

they imagine the danger has passed away, and then, cautiously resuming their natural position, they steal slowly away to the nearest place of security.

The edible crab, when it has put on this trick, cannot be awakened out of it by any amount of annoyance. But the swimming crab, if touched, will soon throw off the cheat and run away, raising high and opening wide the two great biting-claws, and hasten to a place of safety, where once arrived it will bury itself in the soil beneath and permit only its dark back to appear on a level with the surface, that it may be overlooked, in its general resemblance to the half-buried stones upon the beach. But it is not asleep, no, nor like the foolish ostrich think that if it denies itself the power to see, that therefore it is safe; the eyes are raised and watchfully keep guard. In the common shrimps upon our shores this process of hiding is very prettily performed. In the little pools among the stones, where the shore is sandy, if you surprise a small shoal of these Crustacea, they spring with a simple flap of the tail to a considerable distance, where, resting upon the sand at the bottom of the pool, they gently disturb it with their feet and by their own gravity sink into the hollow; but when they have buried themselves to the level of the surface, they keep the sand upon their backs by the aid of the long filamentary extremities of the lower antennæ. These brush up, in small quantities at a time, the particles of sand; and when the labour is complete, I question if the sharpest eye could detect the spots where they lie concealed, unless they were seen to hide, and the black shining eyes and the antennæ alone be exposed. And there they lie at peace, secure in their concealment, let the danger continue ever so long. The slight jerking movement of the inner and the waving motion of the outer are all that tells of animal life beneath; and, since these are organs of hearing and smell, we may fairly infer that with the eyes they assist to watch and intimate when danger is near and the animal may securely come from its retreat.

But some are not so satisfied, and will not rest until they are considerably beneath the sand. This is the case with *Portunus variegatus*, a pretty little shield-back mottled species of crab. Timid to excess, it almost lives beneath the sand, but this may arise partly from the circumstance of its habitat being between the tides, so that when the water has receded it buries itself to find moisture. At Swansea, where I have found them in considerable numbers, I had to dig for them with a trowel, but it was not difficult to find their resting-

places; a little observation showed their track in the scratches that their feet had made, and where these ceased the animal was sure to be some six or ten inches below the surface. Another burrower is the masked crab (*Corystes Cassivilaunus*), so named from the imprint of the human face being distinctly marked upon its back. I took one once and kept it for some time to the amusement of many, so striking was the resemblance to the portraits of Mr. Peckeniff; and I only regretted that the animal already had received a name, and that I could not associate it with that eminent sneak.



FIG. 6.—Carapace of the Masked Crab, to which eyes have been painted in.

These are active creatures, all of them, and much too nimble to allow weeds and animals to fix an abode and grow upon their surfaces. Then is it unreasonable for us to assume that, coupling their active character and general intelligence with the previously recognised statement that in their growth they pass through the triangular form, they stand as animals higher in their class than their more sluggish congeners, the spider-crabs. In the study of the lower forms we may make use of our own experience in the human temperament. The most perfectly developed nervous system is also the most active in its muscular action.

It is but just, since the triangular crabs have been recognised by the leading carcinologists as the highest of the class, that the reasons on which their opinions are based should be clearly understood, since they rest strictly upon anatomical evidence. It is on the fact of the consolidation of the nervous ganglia into a mass, and which, therefore, has been considered by carcinologists in general, and Professor Dana in particular, to be an increase of nervous power, and to approach the animal nearer to those which possess a true brain; to use his own words, "a centralization of the nervous ganglia is a true cephalization."

(To be continued.)

Remarkable Earth-worm.—I shall be very glad if some reader of the 'Zoologist' can assist me with information in the following matter. How many species of earth-worm (*Lumbricus*) have we in Britain? and have we one species whose movements

are exactly like those of a serpent? I am led to ask these questions from having seen in the fernery of a friend a remarkable worm, which, in outward appearance, differed little from the ordinary earth-worm, but whose motions were essentially different, being far more lively and serpentine in character. There was a slight steel-blue metallic colour about the anterior segments, but not more, I think, than in the ordinary worm. I may mention that it is quite possible that the worm in question may be a foreigner, for it was at first noticed in earth which came with some exotic ferns from Belgium. It has now become very plentiful in the fernery. Possibly I may be describing a species well known and common; if so, I must confess my ignorance, for I certainly never before noticed a worm with such lively and snake-like movements.—*George Norman; Hull, May 9, 1859.*

Description of the Larva of Eupithecia assimilata.—During the last two years I have paid considerable attention to the larvæ of the genus *Eupithecia*, and, through my own exertions and the kindness of friends, I have become acquainted with between twenty and thirty species of many of these. I have taken descriptions, and, as the *Eupithecia* family is one with which the majority of entomologists are but little acquainted, I propose each month, as I may be able, to give an accurate description of some one species. Having, in each instance, kept the larva separate and bred the perfect insect, I can speak with a certainty. My friend, Mr. Greene, having mentioned my name in connexion with *E. assimilata* (Zool. 6542), I will begin with that species. Last October, 1858, I happened to be staying here with my father, and the thought struck me that there was no reason why *E. assimilata* should not be a Derbyshire insect. I had never seen the larva, but had heard that it fed on black currant, so out I turned into the kitchen-garden and set to work among the bushes; I had not been there more than half an hour when the dinner-bell rang, but I had bagged sixteen, which number in two days was increased to nearly forty. The majority of these, however, were, as usual, ichneumonised. The larva is slender and tapering slightly towards the head, and about three-quarters of an inch in length. The ground-colour yellowish green. Segments of rings yellow; the central dorsal line dark green; the two side ones of the same colour, but very indistinct; these latter studded, in some instances, at intervals with black dots. The whole body thickly sprinkled with small yellowish green tubercles, and very sparingly strewed with short whitish hairs. It strongly resembles a young larva of *E. cervinaria*. It turns pinkish when ready to spin up. The pupa is greenish brown, and enclosed in an earthen cocoon. The larva feeds, towards the middle of October, on the under side of the leaves of the black currant; mine were taken October 13—15. I am inclined to think it is double-brooded. It eats oblong holes in the leaves, by which its presence may be generally detected. In repose it mostly lies along the mid-rib of the leaf.—*H. Harpur Crewe; Breadsall Rectory, Derby, May 6, 1859.*

Entomological Puzzle.—In January last, while in Surrey, I noticed a fine Norway spruce that had apparently been blown down by the wind; the bole was snapped asunder about three feet from the ground. On a closer inspection, however, the wood at the place of the fracture was found mined in all directions by some wood-boring larva, probably a *Sirex*; thus the primary cause of the fall of the tree was evident.

But each of the bores contained one or two flies; these were, it seems, *Sarcophaga carnaria*, *Musca vomitoria*, *Musca meridiana* and *Sargus cupreus*: these flies were closely imbedded in the detritus of the wood. There were some hundreds so imbedded. Now the question arises, How did these flies become tenants of the bores? It is preposterous to suppose that they were "drawn into the bores by a spider, to be preyed on at leisure!" Why, when the juices were extracted, were the flies not ejected, as is usual under similar circumstances? Yet, strange to say, one of our leading entomologists favours such an idea, but of what genus and species the spider is, of course he cannot say! And so he leaves the matter. I am induced to ask you to insert these particulars in the pages of your serial, in the hope of eliciting a more satisfactory explanation. The bores were isolated, and apparently unconnected with one another, and in some instances they seemed to have no connection with the outer air.—*Peter Inghald; Storthes Hall, Huddersfield, May 17, 1859.*—'*Intelligencer*.'

[Mr. Inghald most obligingly sent me the specimens of perforated wood before he published the foregoing account: and be it known unto all men, that I am the "preposterous" entomologist who suggested that the borings were those of a *Sirex* larva, who gave Mr. Inghald the names of the four flies, and who expressed the opinion that they were "drawn into the bores by a spider, to be preyed on at leisure."—*Edward Newman*.]

Dinarda Maerkelii and *Heterius sesquicornis*.—Dr. Power headed a ravaging party to the Hogsback, near Guildford, on or about the birthday of Gracious Majesty: his myrmidons were S. Stevens, J. W. Douglas and E. Shepherd. Fifty *D. Maerkelii* were brought home. A few days previously fifteen beautiful specimens of *Heterius sesquicornis* were taken at Hampstead by S. Stevens & Co. What is our friend Janson about? Here is a theme for his indignant pen!—*Ed. Zool*.

On the Transfer of Adamsia palliata from Shell to Shell.

By P. H. Gosse, Esq. F.R.S.

It has often been an interesting speculation with me,—In what manner is the due relation of size maintained between *Adamsia palliata* and its supporting shell, in the progressive growth of the former? We find, almost without exception, the *Adamsia* adhering around the mouth of an univalve shell, which is tenanted by the hermit crab (*Pagurus Prideauxii*). There is, moreover, a certain proportion of dimensions between the zoophyte and the shell; the young *Adamsia* occupying a small shell, such as that of a *Littorina* or *Trochus*, the full-grown individual a large one, such as that of a *Natica* or *Buccinum*. The crab is able to shift from a smaller to a larger shell when he needs enlarged accommodation, and since we know that his congener, *P. Bernhardus* does this habitually, we naturally conclude that such is the habit of *P. Prideauxii*.

Presuming then that this is the case, what becomes of the *Adamsia*? If the crab shifts his quarters and leaves the *Adamsia* behind, the association is broken, and we should certainly find *Paguri* without *Adamsiæ*, and *Adamsiæ* without *Paguri*. But we find neither the one nor the other.

On the other hand, if *Adamsia* is able to shift its quarters also, how does it proceed in its search for a new shell? If it forsakes the old tenement at the same time as the crab, and together with it takes possession of the new one, by what means is unity of will and action secured? What communication of thought takes place from the one to the other? As the *Adamsia* does not adhere to the crab, but to the shell, that is as they are independent of each other's movements, who takes the initiative? Who goes to seek the lodging? And at what point of the transaction does the other come in? All these questions I had mused on with interest; and at length have received some light towards their solution.

On the 10th of last January I obtained, by dredging in Torbay, a specimen of *Adamsia palliata* about half-grown, on a rather small shell of *Natica monilifera*, tenanted by a *Pagurus Prideauxii*, which seemed already too big for his habitation. Having put them into a well-established tank of large dimensions, the contents of which were in excellent condition, I succeeded in doing what I had never done before, domiciliating both crab and *Adamsia*. Both continued in the highest health, and became quite at home.

For about a fortnight last past, however, I have noticed that the *Adamsia* has not looked so well. One side or wing has gradually loosed its hold of the shell-lip, so that it hung loosely down beneath the breast of the crab. Yet in other respects the zoophyte seemed healthy. Latterly, too, the crab manifested symptoms of uncomfortable straitness, in the great extrusion of his fore-parts, so great, indeed, as to expose even the front of the soft abdomen. Yet I felt reluctant to present to the crab a larger shell, fearing that he would, in availing himself of it, desert his zoophyte friend, which would then die, and I should lose the specimen.

At length the desire to solve a problem in science prevailed over this feeling. A fact is better than a specimen. And so this morning (April 21st) I selected from my cabinet a full-grown *Natica* shell, and placed it on the tank-floor, not far from the disconsolate trio.

The *Pagurus* presently found the new shell, and immediately began to overhaul it. He did not do, however, as his brother Bernhard

would have done, at once shift into the new house. Having turned it mouth upward, he took hold of the outer and inner lip each with a claw, and began to drag it about the tank. Occasionally he relinquished the hold of one claw, and probed the interior in the usual manner, and then resumed his march. I watched the proceeding for an hour or more, when, having other work to do, I left him alone.

The thought did occur to me,— Can this delay be intended to make the *Adamsia* cognizant of what is in contemplation, and to prepare it for the change? But I dismissed it as unlikely.

After about an hour's absence I returned to the examination. The *Pagurus* was comfortably lodged in his new abode, and the old one, which now looked small indeed, lay deserted at some little distance. I eagerly turned the latter over, to see what was the condition of *Adamsia*. Lo! no *Adamsia* was there; and the *Pagurus*, presently approaching the front of the tank, I saw, to my great gratification, that the old association was unbroken. There was the *Adamsia*, with one wing adhering to the lip of the new shell, and apparently the opposite wing also; but from the position of the group, this I could not be quite certain of. The situation of the zoophyte was quite normal,— the centre immediately below the breast of the crab, and in contact with the inner lip of the shell, while that wing which I could clearly see was creeping round upon the outer lip.

Examining now more closely the condition of things, with a lens, I saw that the central part of the *Adamsia*'s base was adherent by a small point of its surface to the under thorax of the crab, between the bases of the legs.

Now this adhesion to the crab is a circumstance which, so far as I know, never takes place in the ordinary relations of the animals; and therefore I cannot but think it an extraordinary and temporary provision for the removal of the *Adamsia* from the old to the new shell, and for the correct adjustment of its position on the latter.

How then can we avoid the conclusion, that as soon as the crab had found the new shell to be suitable for exchange, the *Adamsia* also was made cognizant of the same fact; and that during the two hours which followed, the latter loosened its adhesion to the old shell, and, laying hold of the bosom of its protector, was by him carried to the new house, where immediately it began to secure the like hold to that which it had just relinquished?

But what a series of instincts does this series of facts open to us! The knowledge by the crab of the qualities of the new shell; the

delay of his own satisfaction till his associate is ready ; the power of communicating the fact to her ; the power in her of apprehending the communication ; her immediate obedience to the intimation ; her relinquishment of her wonted hold, which for months at least had never been interrupted ; her simultaneous taking of a new, unwonted hold where alone it could have been of any use ; the concerted action of both ; the removal ; her relinquishment of the transitory adhesion as soon as its purpose was accomplished ; her simultaneous grasp of the new shell in the proper places ;—all these are wonderful to contemplate, wonderful considered singly, far more wonderful in their cumulation. Is there not here much more than what our modern physiologists are prone to call automatic movements, the results of reflex sensorial action ? The more I study the lower animals, the more firmly am I persuaded of the existence in them of psychical faculties, such as consciousness, intelligence, will and choice ! and that even in those forms in which as yet no nervous centres have been detected.

P. H. GOSSE.

Torquay, April 21, 1859.

Additional notes on the above.

May 2. Eleven days have elapsed since the above observations were made, and I have now another interesting fact to record, bearing on this strange association. The *Adamsia* has not looked well since the change of residence ; its adhesion to the shell has been but partial at the best, some days more, some days less, extensive ; but for the most part a considerable portion of the zoophyte was hanging down from the shell. The crab, on the other hand, was evidently in clover, and showed no inclination to go back to his old lodging.

This morning I found the *Adamsia* detached, and lying helplessly on the bottom of the tank, beneath the crab, who, when disturbed, walked off, leaving his companion behind. I thought now it was a gone case, and that it was all up with my elegant protégée.

An hour or two afterwards, however, how great was my surprise to see the *Adamsia* fairly established again, adhering to the shell by a good broad base, and looking more healthy than I had seen her for many a day ! Strangely enough, she was adhering in a false position, having taken hold on the outer lip of the shell, instead of the inner, as usual. Here was a fresh proof of intelligence somewhere ; and I at once sat myself to find where.

Carefully taking up the shell with the aquarium tongs, and bringing it close to the surface, but not out of water, I gently dislodged the *Adamsia* with my fingers, and allowed it to fall prone to the bottom. I then released the shell and its tenant, and drove the latter towards the spot where the zoophyte lay.

No sooner did the crab touch the *Adamsia* than he took hold of it with his claws, first with one, then with both, and I saw in an instant what he was going to do. In the most orderly and expert manner he proceeded to apply the *Adamsia* to the shell. He found it lying base upward, and therefore the first thing was to turn it quite round. With the alternate grasps of the two pincers, nipping up the flesh of the *Adamsia* rudely enough, as it seemed, he got hold of it so that he could press the base against the proper part of the shell, — the inner lip. Then he remained quite still, holding it firmly appressed, for about ten minutes; at the end of which time he cautiously drew away first one claw, and then the other; and, beginning to walk away, I had the pleasure to see that the *Adamsia* was once more fairly adhering, and now in the right place.

May 4. The *Adamsia* is again lost. On searching I discovered it lying in a crevice, whence I plucked it, and laid it on the bottom. Here again the crab found it, and immediately went through the same process as last described, and again made it adhere. But I fear that the *Adamsia* is unhealthy, for it seems to have but an enfeebled power of retaining its hold. The manifestation of the mode in which the instinctive actings of the two creatures occur, is, however, I think sufficiently clear. The crab is certainly the more active promoter of the partnership: it is abundantly evident that he values the company of his elegant but very heterogeneous associate. These last observations have suggested a suspicion that the claws of the crab may have been employed in the transference of the cloaklet from shell to shell.

The subject is one which will abundantly repay further investigation; and I commend it to the notice of those zoologists who have access to the west coast of Scotland, where these animals appear to be most common.

P. H. GOSSE.

Torquay.

Reason and Instinct. By THOMAS BOYD, Esq.

THE author of the paper on Reason and Instinct has evidently studied the subject far more than I have had the opportunity of doing, and yet, if you think your readers are not tired of it, I should be glad to make some remarks upon it.

As a proof that animals do exercise powers beyond those included under the term Instinct the paper in question is quite conclusive, but it seems to me to go beyond this, and to hide if not to obliterate the boundary line between man and the brute creation.

The rock on which almost all discussions on Instinct make shipwreck is the attempt to separate the various acts of an animal's life into two distinct classes, *viz.*—those dependent on Instinct, and those to be attributed to Reason: such a separation I believe to be simply impossible; the only one which is possible being one which goes far deeper than this and divides each act into its constituent parts; to take, for example, an "instance of pure simple instinct" (Zool. 6052 and 6054), the return of animals from a distance to their home, often by the use of other means than those supplied by their own limbs; if this be analysed we find first, the desire to return home (this is an impulse about which the animal has no choice), which is a part of his nature and true instinct: there is, secondly, a knowledge where that home is; this also is instinctive; he has not to learn it, he has no choice whether he will learn it or not; but he knows it; and then, in addition to these, there is the adoption of means by which this instinctive impulse, thus made possible by instinctive power, is carried out into actual life; and here there is choice—there is the deliberate adapting of means to the end in view, and this is Reason.

There is thus a radical distinction in the ideas included under the common term Instinct; and this seems to be borne out by the definition given (Zool. 6043). It is there called a "certain power or disposition of mind by which" animals do certain things; now, are "power" and "disposition" synonymous terms? and if not how is it that they are both used, and are both suitable here unless it be as I have suggested?

The classification of the principal forms of instinctive action (Zool. 6082, 6083) does not seem to me satisfactory, partly from being so much founded on the outward act, partly from the absence of the distinction pointed out above, and partly from the absence of several important forms. I should propose in its stead something of this kind:—

First, as the three main divisions of instinctive impulse, those which impel an animal

1. To self-preservation.
2. To the preservation of its species,
3. To submission to man.

(This last is entirely omitted but seems to me as truly instinctive as either of the others, and, as a motive to action, quite as important ; it is universal in the animal world, and shows itself unmistakeably where the human soul is obscured by idiocy or madness).

Secondly, as subordinate to these, the various passions, as love, fear, revenge, &c.

And lastly, those separate impulses from which arise all the varieties of habit and mode of life, as swimming in the duck and herding in the buffalo.

This seems to include all cases of instinctive impulse, and then there is instinctive knowledge which consists in a power to do, without previous experience and without instruction, whatever in the ordinary course of nature each animal is called to.

And these two forms of instinct, combined with a rational use and choice of means to the ends so supplied and a power of learning, seem to me to embrace the whole range of animal life. We have seen their application to one of the simpler forms of instinctive action ; let us look now at one of the more difficult, for instance at that quoted from Coleridge (Zool. 6050), of dogs preserving the lives and avenging the deaths of their masters : here, if submission to human authority and the subordinate passions of love and hatred be instinctive, they supply the motive of the various acts without any choice on the part of the dog ; there is in this case just as much as in his return home from a distance, an end set before him which he is obliged by the laws of his nature to endeavour to carry out.

There do occur cases (Zool. 6489 and note) in which there appears a choice between the end actually carried out and some other, but I believe it will always be found that both ends are supplied by instinct ; and consequently that it is not a question of choice, but merely presents this appearance on account of the nearly-balanced strength of the instinctive impulses : take, for instance, the case of a horse impelled on the one hand by the fear of some unknown object to run away, and on the other by his obedience to his rider to go forward ; his conduct will waver just as either of these motives acquires ascendancy : he will be induced to go forward either by being allowed to assure himself of the harmlessness of the source of his fear, i. e. by the weakening of

his impulse to run away ; or by the application of the spur, *i. e.* by an addition to the impulse to obey his rider.

Similar to this is the moral character which sometimes appears on the face of the actions of certain animals ; it arises, I believe, entirely from the moral character of the instinctive impulse, and is quite independent of the animal's will ; and as the fundamental idea of morality is choice, animals having no choice have no moral character. The form of righteous retribution, which the revenge of a dog sometimes takes, is no proof of the individual excellence of the animal ; though it is a proof, and no insignificant one, of the excellence of that instinctive impulse from which it springs, and which thus shows its connexion both in origin and object with those higher manifestations which it simulates.

If this be so, the line of demarcation between man and the brute comes out clear and distinct, for, in addition to this instinctive impulse and much of this instinctive power, in addition to far higher exercises of the rational faculty of adapting means to a given end than are found in the most intelligent animals, man has yet another power totally distinct from either of these—he has the power of conceiving and of deliberately choosing for his own an end or object of which he has had no experience, and which he may adopt or not according to his own free will. This it is which forms the great gulf between man and the brute ; this it is which is the source of all moral action properly so called, and is, therefore, the foundation of all religion ; this constitutes his claim to be “ of kin ” to God, and is uttered forth in those wondrous words “ The Lord God formed man out of the dust of the ground, and breathed into his nostrils the breath of life ; and man became a living soul.”

THOMAS BOYD.

Clapton Square, May 27, 1859.

Notes on the Bats and Birds of Jamaica.

By W. OSBURN, Esq.*

“ Freeman's Hall, Trelawny, Jamaica,
May 7, 1859.

“ My dear Sir,—It was only on my return here from a journey of unexpected duration in some of the southern parishes that I found your welcome letter awaiting me. It was a great pleasure to me to

learn that you thought the information contained in my last important enough for more general diffusion, and I shall be extremely glad if the contents of this or any succeeding letters are considered worthy of a place in the pages of the 'Zoologist.'

"Let me first answer the queries in your letter. I am well acquainted with your 'Naturalist's Sojourn,' and have gained from it all I know about the Bats of Jamaica, independent of my own observations. My list already amounts to ten species, and I have evidently many not included among yours. The little *Chilonycteris grisea* is very common hereabouts: the boys knock them down and bring them in. This was one of five species I procured in an immense cave in the limestone of Manchester. Besides this there is another so like it that I conclude it to be a *Chilonycteris* also, but much larger and with other well-marked distinctions. A species with the tongue protrudible an inch or more beyond the muzzle, furnished with reversed bristles towards the tip, much interested me: the lengthened jaws and round ears, which give it a remarkable likeness to a pig, render it very distinct from any of our other species I am acquainted with. From dissections I have made, especially with specimens taken early in the day, I am inclined to think the pulp of fruits is their nourishment. They are very robust and vivacious, bear confinement extremely well, and are to be found in great numbers in most of the limestone caves of this range of mountains, so that I have had unusual facilities for observing them. They lap water readily with the long tongue, and lick and clean their faces with it up to the ears, and when the first alarm at their position is over, lick the juice from oranges I have given them, but not greedily enough to make me feel satisfied it is their regular food. *Artibeus jamaicensis* I have never found in any cave, and, from the instances that have occurred to me, I believe it always reposes under the shade of some thicket: the negroes constantly tell me of them in their yams. But *A. carpolegus* is very abundant in a large cave near Mahogany Hall, the noise of their wings, when disturbed by the approaching light, sounding like the murmur of a distant sea: this large bat brings into its domicile incredible quantities of the kernels and fragments of large fruits, on which it feeds; the droppings and these remains of their feasts mixed gradually form deposits of great extent and many feet in thickness, on the floors of the caves. I have seen them extend completely through a cave, which could not be less than half a mile in extent, and at intervals in caves of much greater length. This deposit is formed of many species of fruits with which I am yet unacquainted, one especially about three times the size of an ordinary

bullet; but the kernels of the mamee are extremely common, and the negroes gather the fresh-dropped bread-nuts from the surface, sometimes in great quantities. A sickly crop of young blanched plants struggle upwards in the darkness, and vast numbers of a large wingless Orthopterous insect with very large antennæ, apparently feed on the decaying matter, and large spiders with formidable jaws, very like the claws of a scorpion, creep slowly along the walls, and doubtless prey on these last. I remark that I have often met with these deposits of fruit where my captures seem to indicate only the presence of insectivorous bats, or bats of very small size. Is it possible that the large species migrate? But it would seem that these animals perform a very important part in the great scheme of nature, by sowing broadcast over the country the seeds of large fruits whose bulk precludes their transport by birds, and whose universal occurrence and rapid appearance in cleared spaces we should not otherwise be easily able to account for. A friend gave me a skin of a very large species he had recently shot, supposing at first it was a pea-dove; it seems about twenty-four inches in expanse, and is remarkable for a very distinct pale streak down the mesial line of the back; but it is, I believe, insectivorous. I think your collection contains at least four species I am unacquainted with, which would make the total number fourteen, instead of eleven, as the Society of Arts announce. But I have already entered more fully into the subject than I intended, as I hope when my specimens are sent to England to learn something of their names, &c., which here I have no opportunity of getting at.

"I spent a couple of days at the summit of the Dolphin,* and would gladly have spent as many months; but it is extremely inaccessible, except in the dry weather, and no accommodation near it, except the house of an old Scotchman, whose hearty hospitality sheltered me during my short stay. I did not remark anything unusual in birds, but the plants were most tempting. I have seldom left a place with more regret. The view of the sea on both sides of the island is indescribably fine. It is certainly higher than Bluefields, as the view extends over the ridge to the Santa Cruz and Manchester hills beyond. This latter (Bluefields), I am sorry to say, I never visited whilst in the neighbourhood. I know the turning from the high road towards the mountain extremely well, having often passed it on my way from Grand Vale to Savanna la Mar; but I can vouch for the accuracy of your sketch of the beautiful Cave Bay, along which I have often ridden.

* A lofty peak in Lucea parish.—P. H. G.

"I have not met with the blue partridge yet, but, from what I hear, it is an eastern bird which does not come so far to the leeward as this. During the journey I have alluded to, I devoted the greater part of my time and attention to Ornithology, and it will perhaps be as well to conclude this letter with a few notes of observations I then made, and reserve these mountains for a future letter. My first day was across a forest district of the Black Grounds, partially cleared and known as Hector's River. As my first stage was to Oxford, I took the opportunity of making some further inquiries respecting the great macaw; there were several of Mr. White's old servants still on the estate, but I was unable to allay the suspicion and astonishment so strange a subject excited with the negroes, and anything they said was evidently quite worthless; but I have in other quarters been constantly on the alert for information: I have never seen anything of them myself, and they appear equally unknown to the negro sportsmen. A gentleman who has property, and has long resided in this district, however, told me he had *constantly* seen them: at my request, he was kind enough to enumerate the occasions he could distinctly remember; and it seemed about four or five times in twenty-five years, and then they were always flying at a great height. I think we may conclude from this that they certainly are not common in these lofty forests, but are to be placed in the list of 'occasional wanderers' to the island. The other three species are extremely abundant.

"The only bird of particular interest which occurred to me in the swamps of St. Elizabeth's was the beautiful *Ortygometra Carolina*; I shot it, after watching it some time, at the edge of a pool, busily feeding on what proved to be a leaf of some water-plant partially macerated, exactly in the state a botanical investigator would like it if he wished to examine the structure, the cellular portion easily separating from the fibrous. It is in this state I observe that water-plants afford nutriment to great numbers of these birds, of many allied species. The Santa Cruz mountains yielded me nothing of note but a *male* specimen of your *Ephialtes grammicus*; the colours rather brighter and size smaller than the females. Whilst exploring a large cave near Peru, another flew out of a recess: I could find no nest, but they do not seem uncommon in the Santa Cruz range. I have never, however, seen or heard of them on the north side, where the brown owl always refers to *Nyctibius*. At the foot of the same mountains I procured a beautiful little falcon, whose blue back and slenderer form make it very distinct from *Falco columbarius*. Vere is a most peculiar district as to the features of the country,—a plain of dark mud, which reminded me of the Nile Valley, and covered, where active cul-

tivation does not keep them down, with an interminable thicket of cashaws. The Ornithology is peculiar also, chiefly from the immense numbers of *Icterus leucopteryx*, *Centurus radiolatus* and lowland *Columbadæ* which inhabit these last. The Banana birds especially abound: the nests, in the topmost branches of the logwood generally, were the most familiar objects of every morning's ride. All those I examined were evidently old and deserted, as the time for building had not arrived. There were often two or three in the same tree; this was, I presume, not because these birds build in companies, but from the same pair frequenting the same tree, and each year constructing a new nest. I would remark that there is certainly a distinction in the colouring of the quills and tail-feathers; in some they are black, in others olive-green: as far as I have observed, this did not seem to be sexual. Did you observe it?

"It may perhaps be as well here to mention the few particulars of an unknown bird I met with in this district, though the evidence I have to offer is not so satisfactory as I could wish. A friend had sometime before asked me if I knew there were two species of nightingale* (*Mimus*) in the island, but, as he was not sure whether the one we then saw devouring bird-peppers in the garden was the larger or smaller of the two, I did not think much of the remark; but in crossing a dreary region, half swamp and covered with the shrubs that flourish on tracts occasionally submerged, a bird flew across the track, which I at first thought was one of the cuckoos, from its size, and then saw was a nightingale, but at the moment, intent on other objects, the difference did not strike me. The next day I was again shooting over the same locality, a waste of great extent, which unites the Portland ridge with the main land, when I again saw the same bird. It was evidently a nightingale, but wanted the conspicuous white feathers in the expanded wings, and I think also in the tail. It flew to the topmost bough of a mangrove, and gave me ample proof of its vigorous powers of song: I watched it with the greatest interest for some time. During the song it every now and then rose perpendicularly about three feet, alighting in the same place, but without interrupting the song. I fired at it; it immediately dropped into the centre of the thicket beneath, but afterwards I had the mortification of seeing it glide off low over the ground; I pursued it without success. After much fatigue I caught sight of another, which I likewise missed, and then was obliged from fatigue to give up, for the day was already at meridian heat. I soon after met a negro with a gun, who seemed to

* The mocking-bird, provincially called "nightingale."—P. H. G. le

know the species perfectly, and told me the larger, which were shy compared to the other species, were called "Spanish nightingales." I mentioned the circumstances to one or two planters in the neighbourhood, who seemed quite aware of the distinction. My visit in the neighbourhood terminated without affording me the opportunity I was so anxious for, of putting the question beyond doubt by procuring a specimen; but I wrote expressly to a gentleman living in the neighbourhood to procure me one, and am still in hopes of being able again to visit the locality myself. At all events my attention is awakened to the point, and I may fall in with it elsewhere: it seemed about half as large again as the ordinary species.

"It was during my visit to Vere that, at a friend's house, I for the first time fell in with your beautiful plates of Jamaica birds. I had only time for a hurried inspection, but perhaps you may like to have a few remarks on some of the species, as they occurred to me.

"*Trochilus Maria* I have never seen, probably from not having hitherto been sufficiently alive to the distinction between this gay little bird and its congener.

"*Elania Cotta* was a great puzzle when I first met with it near Savanna la Mar, on the 28th of August, last year. I did not again see it till I came to the mountains of Trelawny, where, during the winter, I saw it four or five times. I shot one in the pastures of Vere on the 9th of April last, and on my return here saw it a few days ago (on the 23rd of April) by the road-side. This still leaves it plenty of time to migrate. So far as my observations of its habits go, it is an extremely sluggish little bird; it will move only a few yards at the report of a gun. Like the Tyrants, or rather *Myiobii*, it sits apparently absorbed on a bare twig, and then suddenly begins hunting after an insect among the neighbouring leaves, but never, that I have noticed, makes a regular swoop after a flying insect, like *Myiobius*; but they are too rare for me to feel well acquainted with them.

"A large pear tree (*Persea*), near the house at Long Hill Pen, St. Elizabeth's, was during my visit in blossom: the insects attracted brought numerous little birds after them, which were toying in dozens among the branches: it was too high to distinguish them, but I shot several, only one of which was unknown to me. A friend suggested it was *Sylvicola discolor* in summer attire, and it certainly did look like it. Fortunately I preserved the skin, and your plate immediately put me right; it was *Certhiola maritima*. As the tongue was left in, an inspection put me beyond doubt. I much regret I did not know this at the time, as my impression is that there were more.

"None of my specimens of *Sylvicola eoa* (if I am right in their identity) have the rust-colour so suffused over the breast as in your plate. This colour is confined to the centres of many of the feathers of the under parts, so as to give the mottled appearance so common among birds. I first saw it very early in July last year among the mangroves that surround Savanna la Mar. On the 21st of the same month I shot three, all very deeply in the moult. On the 2nd of August I shot two; they were still moulting, so I did not procure more. They are very common round the town. The negro boys, from their colour, call them 'canaries.' I never saw them, except in or near mangrove swamps. On my arrival on the north side a pair were constantly in a tree close to a room I inhabited in Falmouth during a short period. I again fell in with them in the maritime district of the Ridge of Portland before alluded to, but now in much brighter plumage. I think it more than probable it will prove that this is a Jamaica species which does not leave the island. I postpone my notes on *S. pharetra* and *S. pannosa* (both very accurate plates) to another letter.

"*Erismatura ortygoides*? I transcribe a note I made on shooting one of these ducks:—

"Camp Savanna, May 28, 1858. The bird mentioned by Mr. Gosse (p. 406) must, I think, be a young example of this species. This, a male in full breeding plumage, has no white on the secondaries, and the head, instead of being 'dappled black and ochry white' has a jet-black crown, with almost a pure patch of yellowish white on each cheek. This little duck is very common on all the ponds near here, feeding among water-lilies and other floating weeds. On alarm they leave the edges, and remain watching the intruders from the centre of the sheet of water. They dive constantly and with the greatest facility. The female is browner, without the patches on the cheeks. Mr. Hill's remark as to the mode of using the tail to clear the water from weeds, besides the worn state of the tail-feathers, receives further probability from the powerful muscles which move them."

"I have since seen them at Long Pond Estate, in this parish, and again on a sheet of water on a very elevated plateau on the summit of the range which divides Clarendon from St. Ann's. In all cases the white patch on the cheeks is extremely conspicuous, much more so than the beautiful cobalt-blue bill, which is only distinguishable at a much nearer view than these wary little ducks are disposed voluntarily to permit. This distinctive mark makes your correspondent's choice of '*ortygoides*' as the trivial name still more appropriate.

"I may mention that on the same elevated sheet of water (3000 feet above the sea) I was surprised to find great numbers of *Fulica Americana*. They were much tamer in this lonely place than usual: I shot one, and its mate watched its dying struggles with extreme surprise, two or three more feeding near, taking no more notice of the report of my fowling-piece than slowly to swim towards the opposite margin. The shield was, as you describe, not entirely white.

"The morasses of Vere also afforded me a specimen of *Nycticorax*, a male in the finest plumage, and what the negroes call a 'white crane,' which seems a species of *Egretta*; it is 40 $\frac{1}{2}$ inches in length and 57 inches in expanse; it may be *E. leuce*, which you include in your list.

"I hope soon to follow this up with another letter especially devoted to the birds of this central range.

"Yours very faithfully,

"W. OSBURN.

"P. H. Gosse, Esq., F.R.S."

How does the Wolf drink?—This was a question recently put to me by some juvenile naturalists, and on my replying, "Most likely in the same manner as the dog," I was triumphantly referred to the Rev. J. G. Wood's '*Anecdotes of Animal Life*,' fifth edition, p. 187, where it is stated that "Wolves drink in a different manner from dogs. Dogs, as we all know, drink by lapping with the tongue, but wolves draw the water into their mouths after the manner of horses. These peculiarities, together with the obliquity of their eyes, afford good reasons for separating them from the true dogs, of which they were once supposed to be the ancestors." The means of testing the accuracy of this statement are fortunately within reach of all persons who can visit the Zoological Gardens, and a reference to the best authorities on the matter in that establishment—the wolves themselves—at once settled the question in favour of their habit of lapping the water precisely as the dog does. Foxes and jackals also lap like the dog: an examination of their noses will show that any other mode of drinking would be difficult without an alteration of the position of the nostrils, and a greater development of the lips, and I imagine these two characters will generally be found a sufficient guide in determining the mode which every animal adopts in taking fluids into the mouth. I am induced to notice this subject, as Mr. Wood is now bringing out a very useful serial on Natural History, and, as one of the latest writers on systematic Zoology, may probably be quoted in the works of subsequent authors: I trust therefore he will pardon my inquiring on what ground he states that "Wolves draw the water into their mouths after the manner of horses."—*E. W. H. Holdsworth*; 26, *Onaburgh Street*, June 6, 1859.

A List of the Birds of Banffshire, accompanied with Anecdotes.

By THOMAS EDWARD.

(Continued from p. 5268.)

Pied Wagtail (*Motacilla Yarrellii*). Wherever there is a stream or a quarry you will meet, in summer, with a pair or two of these active little insect-eaters. During winter, however, they are invariably to be seen here and there on lawns and about mills and farm-steadings. They remain with us all the year round. A pair built their nest a few seasons since on a ledge of rock at a road-side close to our harbour, and managed, in spite of the bustle of such a place, and though the nest was open to the gaze of all as they passed, to rear a brood of five young ones. They are in no way particular as to the choice of a place to breed in. I have found their nests quite exposed like the one referred to, and as often beneath stones and banks, and in holes completely hidden from view. One of these latter cases occurred in a sand bank. The hole was fully thirteen feet from the ground, and the nest placed about sixteen inches from its mouth. But what added more to the strangeness of the fact was that the whole bank was occupied by sand martins. One which I kept, having winged it, became quite tame, and was allowed to go about a garret amongst a host of mates; and no better or greater dainty could be given it than a piece of raw flesh. I have seen it, though incapable of using its wings, leap nearly two feet from the ground for a morsel of flesh, as also after flies.

The Gray Wagtail (*M. boarula*). This is our yellow wagtail, being known here by no other name. Though generally distributed throughout the county like the last, it is not nearly so abundant. Like the last, too, I have found this species breeding in company with the sand martin. In an old, but now disused, quarry near this town, on the left bank of the Doveran, a pair nest almost every summer: this they do amongst the stones. High above them, and amongst the softer mould, the martins rear their young. These birds like their pied brethren draw towards the towns in winter, and in frosty weather may be seen at our very doors.

Ray's Wagtail (*M. campestris*). This is, so far as I know, only an occasional visitor with us. It may breed, however, but I am not aware of it. I have found them breeding plentifully amongst the hillocks which stretch along the line of coast between the Don (Aberdeenshire) and Newborough; then again from Peterhead to Fraserborough.

Could we boast of similar suitable places, doubtless we should have them too, but this we cannot; hence the fact, as I suspect and have stated, that they are only visitors.

The Tree Pipit (*Anthus arboreus*). I have seen this bird on several occasions in various parts of our county, but have never yet met with its nest. That they all breed, however, there is no doubt, having been known to do so at a place called Dunlugas, and again near Inverness, Keithay, Rathiemay and Inveraven.

The Meadow Pipit (*A. pratensis*). Plentiful throughout the whole county.

The Rock Pipit (*A. obscurus*). Along all our coast. Both these birds are known here only by the name of "peep," the former being known more inland by the term of "heather peeper" or "cheeper."

Richard's Pipit (*A. Ricardi*). I have only seen this bird once within our limits, whilst resting on one occasion at the foot of the Knock Hill.

The Sky Lark or, as we have it here, the Liverock (*Alauda arvensis*), is universally distributed throughout the whole length and breadth of our county. In my opinion it is the most numerous bird we have, for go wherever you will in spring and summer and you cannot fail either to hear its heaven-inspiring strains, as it mounts the skies, or see the bird itself, or perhaps both.

Next to the mavis the lark is the bird for me, and has been since first I learned to love the little warblers of the woods and fields. How oft, Oh! how oft has the lark's dewy couch been my bed, and its canopy the high azure vault been my only covering whilst overtaken by night during my many ramblings after Nature; and Oh! how sweet such nights are, and how short they seem. Soothed to repose by their evening hymns, and again to be aroused at the first blink of morn by their early lays. Towards the months of October and November a great diminution of their numbers annually takes place. You might then travel a whole day and neither see nor hear one, or at most you would meet with very few. But about, or a little after, new year's day, they begin again to re-appear; and should snow come at or about that time then they may be seen in hundreds. Where they sojourn during their absence I have never as yet been able satisfactorily to learn. One thing is certain, however, that I have seen them frequently returning, though never departing, both from the east and the north in immense numbers.

The Wood Lark (*A. arborea*). I have seen but one of these birds within our district. This happened on May 27, 1850 in the delightful

avenue of Duff House. The bird was alone and in song at the time.

The Snow Bunting (*Emberiza nivalis*). In large flocks during winter, and exhibiting generally amongst the various members a motley mixture of colouring, consisting of a pure white, a jet black, a dull tawny and a deep chesnut,—the beautiful white band, however, across the wings being conspicuous in all during flight. I have often met with this bird in different places here during summer, such as at the rocks of Melosoe, the Longman hill, and in Benvennis, but have never as yet been able to detect them breeding. They generally arrive here about the middle of October or beginning of November, and depart again in March or the first of April. They have a most beautiful song; though not loud it is very sweet, and it would seem that they begin early, for I have heard them frequently liting away at it in February and March. On all such occasions they were either seated on the top of a wall surrounding a field, or on ricks.

The Common Bunting, or as we call it here, the Corn Bunting (*E. miliaria*), is not very numerous with us, and, in fact, I do not remember ever having seen them very plentiful anywhere, but I may be mistaken.

The Blackheaded Bunting or Ring Fowl (*E. schœniclus*). About in equal numbers with the last. It is called the "moss sparrow" by the country people. Mosses appear to be a favourite resort with them in our quarter. I have found their nests in pretty bushes, amongst reeds, and on the ground. There were a few, and only a few, whin bushes on a sandy knoll near Aberdeen when I was a boy, where I never failed to find a nest of these birds for many years in succession. I never saw any other birds at the spot but themselves. I remember having seen a black variety of this bird, and one almost yellow.

The Yellowhammer (*E. citrinella*). Far more numerous than either of the two last. Its common name here is "skite." This is another species by no means particular as to the choice of a site whereon, or in, to build. On one occasion I knew of a nest which was placed in a cart track, beneath a tuft of grass, and close by the way-side. The road was a bye-road to be sure, that is, one not much used, and quite narrow, there being only bare room for a cart and one person to pass. I saw the nest when forming, and dreaded, nay knew, its fate should a cart pass. I saw it again with eggs, and then with young, which were at the time about twelve or thirteen days old. No vehicle had passed, and I now began to hope that they would fly. Five days afterwards, passing that way, curiosity tempted me to look once more.

Fresh prints of horses' feet preceded me along the path. My old fears returned, as now with eager step I hastened on. The spot was gained. Alas ! what a sight ! the almost fledged young, four in number, and nest, amalgamated in one shapeless mass.

The Cirl Bunting (*E. cirius*). One near Cornhill, of Park, is the only instance of the occurrence of this species with us, so far as I am aware.

The Chaffinch (*Fringilla cœlebs*). Abundant.

The Brambling (*F. montifringilla*). A winter visitor. A few may be met with almost every season. I have one, a male, which was procured here in May, 1848. They are sometimes taken by the boys catching larks and linnets in stormy weather, and are denominated "foreigners."

The Tree Sparrow (*F. montana*). In Duff House avenue, and, I believe, in several other localities throughout the county.

The House Sparrow (*F. domestica*). Numerous. We call it "spurgie" and sometimes "spurdie." Pied varieties are not infrequent. One of a jet black frequented our harbour for a long series of years. The sparrow, like the skite, does not stand very high in the estimation of many of the young folks ; but why, I am at a loss to understand.

The Greenfinch (*F. chloris*). By no means in such numbers as the chaffinch and house sparrow, but pretty generally distributed throughout the county wherever there is wood. This bird is easily tamed : I have had them so trained as to sit on my shoulders and head, that is, on my bonnet, and to accompany me wheresoever I went, and without ever seeking to fly away. They knew me as well as I did them. If I had left them or hid from them they would have come to me, to any distance, so soon as I called to them or appeared in sight. That there is a great diversity both as regards shape and colouring, amongst the eggs of birds of the same species, is well known to all who pay the very least attention to these things. I have found this to be particularly the case as respects the greenfinch. In nearly every nest which I have seen scarcely two have been alike : some round, like a marble ; some oblong, almond-shaped as it were ; some large and others small ; some beautifully mottled with minute reddish dots, sometimes on a pure white, and sometimes on a bluish or grayish ground, sometimes having large blotches of red, at others having no spots at all. I have found them with young as late as September. It would appear, at least so far as I have seen, that six generally form a brood of this species : I have found them, it is true, with four, as also five, but this very seldom. They are easily reared ; in fact, give them plenty of food, that is,

keep their crops continually crammed and themselves clean, and there is no fear of them.

The Hawfinch (*F. coccothraustes*). So far as I know, this is a rather a rare bird with us. Single individuals, very rarely pairs, are now and then to be seen in our higher districts. A pair are said to have bred in a wood near here called Whyntie. One was captured near Huntly, three winters since, by boys taking linnets, larks, &c.

The Goldfinch (*F. carduelis*). Time was when we Banff folks could have boasted of having the goldie in pretty fair numbers; but now they are nearly as rare as white corbies or dead craws. About thirty years ago, and previous to that, several were known annually to breed in many of the gardens throughout the town, as well as in orchards, gardens and plantations in the country. Bird-catchers, however, came and scoured the land, and the bonnie-painted goldie, with several others, grew less and less common by degrees. That some may yet nestle within our boundaries is quite probable, for small parties are occasionally seen in very severe winters by the sea-shore; but, by-the-bye, these may come from Morayshire, or from the other side of the Firth, where, I believe, they are rather plentiful, in summer at least. Next to, if not before, the golden crest and the longtailed titmouse, the goldfinch's nest is one of Nature's master-pieces. What a beautiful piece of workmanship! how exquisitely woven together! how light, compact, soft and warm its internal lining! and how complete! What hand could imitate the woolly, feathery, mossy, cup-formed, half ball-like structure? How vain the attempt! If any one wishes to have a cage-bird to cheer him with its song, let him get a male hybrid between this species and a canary, and I am sure he will not be disappointed. I have had them, and I have known many others who have kept them also, and I must positively state that they are the most lavish of their music of any cage-bird I know. I do not think that crosses with the chaffinch, or either of the linnets make such good songsters as with the present species; at least, I have never found, or known, them to be so.

The Siakin (*F. spinus*). Like the last once more numerous than now; bird-catchers having greatly thinned their numbers too: still we have a few. This is another very tameable bird. I have had birds of this species that have played with me like so many children, and seemed to enter into the spirit of the fun as well as I did myself, and that they understand my every move is an undeniable fact. They were kept in an open room, from which they might at any time have escaped, if they had so wished, but they never sought to fly away.

Their pranks in the cage must be well known to all who have ever had them. I have crossed these with the canary, but do not think they do so well as the goldfinch. So numerous were they at one time about Aberdeen that, having made a bargain with the bird-catchers to purchase all their dead birds, I remember that for one of any other species I got a dozen siskins, most of them females. I do not know whether they are as plentiful now, but it is not at all likely.

The Linnet (*F. cannabina*) or, as we have it, the Rose Lintie is plentiful. There is no house bird which we possess that rejoices in so many names as this one. It is the rose lintie so long as it retains its red breast; but when that is gone or wanting it is then the gray lintie, whin lintie, brown lintie, rock lintie and tree lintie. Cultivation is doing with us, for the poor lintie, what the bird-catcher leaves undone; viz., tearing down every whin, knoll and brae where it is possible for plough and spade to work their way. I have found the nest of this species three times in trees,—twice in a beech, and once in a Scotch fir. They are very easily reared: keep them clean, and give them plenty of meat, that is, as much as they can hold. The plain truth is, that most people who pretend to bring up young birds literally starve them to death, piecemeal, and all through sheer ignorance; they either do not know or do not choose to recollect that their lawful parents are always and constantly feeding them during daylight: such being the case, is it any wonder that so many of them die, when brought up by hand? when we bear in mind, that many have the notion that twice or thrice in the hour is quite sufficient to feed them; and talk of killing them by giving them too much. Nonsense, perfect nonsense. I say again you cannot give them too much; they will not take it. Water, too, is given them by many people: what foolishness! I have seen it poured down their very throats against all advice until the poor things sneezed again, and were likely to choke from its effects.

The Lesser Redpole (*F. linaria*). As the last was plentiful in the lower districts, this is so in the higher. In severe winters, however, large flocks descend to the lower grounds, where they remain so long as the storm lasts, when they again betake themselves to the hills and mountains, where they breed and remain during summer.

The Mealy Redpole (*F. borealis*). This is a rare species with us. Once on a hill near Huntly and twice on Benvennis are the only times I have met with them.

The Twite (*F. montium*). Another mountain as well as sea-shore rocky species. The most elegant of all our linnets. It is called the "heather lintie" with us, and is much liked as a house bird.

The Bullfinch (*Loxia pyrrhula*). This is another prize for the trapper; but besides those taken by the professionals great numbers are annually destroyed by our gardeners and nurserymen; some from the notion that they are destructive, and others to make prisoners of them. They may be destructive, but really I do not think them more so than any of their kindred species which frequent similar places, as the sparrow, greenfinch, chaffinch, yellowhammer, hedgesparrow, willow wren, common wren, or the bold little robin redbreast. Now it is a fact well known to ornithologists that although some of these do not themselves actually live on insects, these form the chief food for their young: this being the case, what an enormous and countless number of noxious and, allow me to say, truly destructive creatures must they thus consume and rid us of; but we poor short-sighted mortals do not know this. Oh, no! we do not see it in that light; we are all in the dark as regards the good they do us; but let them meddle with any of our seeds or fruits, and then the hue and cry is "Get guns, and shoot every one of them." We do not see the incalculable good they do, but catch hold at once of the little mischief they may occasionally do us. I hope a better day will soon arrive for these lively little birds, when they will be cherished and encouraged, rather than hated and destroyed. Surely intelligence and common sense will triumph in this respect before long. The bullfinch, though much admired as a cage bird, cannot be said to be much of a songster, it being more for its beauty than its music that it is kept; but it is susceptible of improvement in that way, being easily taught to whistle several tunes. My employer had a blackbird which whistled the "Merry Masons" and "Over the Water to Charlie" first rate; but to return to the bullfinch. A gentleman belonging to this place, the late J. J. Robinson, Esq., had one, which he bought from a shoemaker in some part of Germany, that sung, or rather "piped," as Mr. Robinson said, seven different airs: I have both seen and heard it, and must confess that it was a most able musician.

In coming to a close with the finches, I may just mention, that in rearing any of this tribe I invariably feed them on common oatmeal mixed with a little water, bruised hemp and rape seed; this I knead into a sort of paste, mixing it up twice a-day, to prevent it from becoming sour; and on this I have ever found them thrive remarkably; but, as I have already stated, you must give them plenty of it, and not allow the little creatures to hurt their tender throats in calling for food, which injures them and weakens their powers of song.

Ornithological Notes for May and June.—May 4th. A fine old male spoonbill, with a rich buff-coloured band across the breast, was shot at Hickling, in this county, and about the same time a male pied flycatcher: this is rather a favourite locality for the latter species on its arrival here in spring. Another male was obtained on the 5th, at Hunstanton. May 13. A woodcock was flushed to-day in a plantation at Spinworth, near Norwich, which probably had a nest close by. Six grasshopper warblers obtained at Surlingham, in the marshes adjoining the Broad, between the 7th and 27th of May; others heard singing up to the 12th of June. A woodcock's nest, with four eggs, was discovered at Aylmerton, near Cromer, on the 28th of April, in a valley planted with birch and oak: on the 19th of May two young ones were safely hatched and carried off by their parents, leaving the other two eggs in the nest. May 21. A pair of pied flycatchers, in adult plumage, shot at Beeston: these birds, though in small numbers, seem to visit us pretty regularly in spring, appearing almost invariably in certain favourite localities, either, as in this instance, on the coast, or in the vicinity of the Broads, as at Horsey and Hickling, where they occasionally remain to breed. Some singular varieties of nightingale's eggs were lately found in a nest at Ketteringham, in this county: they were all much lighter in tint than usual, and more or less spotted over the larger end, one of them exactly corresponding with the figure given by Mr. Hewitson, in his 'British Birds' Eggs' (third edition), as a rare variety.—*H. Stevenson; Norwich, June 15, 1859.*

Occurrence of the Hobby in the Fern Islands.—On the 16th instant I picked up, on one of the uninhabited Fern Islands, a fine specimen of the hobby (*Falco subbuteo*), a male, in adult plumage: the bird was uninjured and fresh. On inquiry I found that it had alighted, in an apparently exhausted condition, three days before, on the Brownsman Island, and had been caught by the keeper's children, from whom it had escaped the following day. This is, I believe, the first instance of the hobby being found so far north as the county of Northumberland.—*H. B. Tristram; Ferry Hill, Castle Eden, June 18, 1859.*

Variety of the Common Buzzard.—I have in my possession a very beautiful variety of the common buzzard, which was trapped at Lynmouth, some time this spring. This singular variety is nearly a pure white all over, the back of the head, wings, scapulars and upper tail-coverts being narrowly barred with wood-brown. The thigh-coverts are a pale buff. The bird is a female, and when trapped was in a strong and healthy condition.—*Murray A. Mathews; Merton College, Oxford, June 8, 1859.*

Occurrence of the Woodchat Shrike and Ortolan Bunting in Norfolk and Suffolk.—On the 29th of April a male woodchat was shot at Yarmouth: this bird had very nearly completed its spring moult, but from the appearance of the old feathers still remaining in the tail, had probably but just attained its adult plumage: the chestnut patch on the back of the neck and the tints of the back and wings were somewhat lighter than in some older specimens. On the 2nd of May another, also, I believe, an adult male, was obtained at Lound, near Lowestoft, in the adjoining county of Suffolk. The woodchat is a rare visitant to this eastern district, not more than one or two examples having been previously met with. A still greater rarity, in the shape of an adult male ortolan bunting, was shot at Lowestoft, on the 5th of May. It is doubtful if this species has ever been observed in Norfolk.—*H. Stevenson; Norwich, June 15, 1859.*

Unusual number of Hoopoes and Ring Ouzels in Norfolk and Suffolk.—Of late years the hoopoe has undoubtedly become not only a more regular, but a more

numerous visitant to our coast in spring; nor do I think that, in this case, the apparent increase in number can be attributed to their being more observed and recorded now than formerly. No bird has, I believe, from its striking and beautiful plumage, been at all times more persecuted or more faithfully chronicled amongst the "rare bird" paragraphs of local journals than the hoopoe, and deeply to be regretted is that merciless slaughter which deprives us, in all probability, of a willing resident during the breeding season. To what cause may be assigned the unprecedented number that have during this spring appeared on our eastern coasts I am at a loss to determine, but between the 12th of April and the second week in May, six or seven fine specimens were killed in various parts of Norfolk, and others seen. A still larger number, however, appeared on the Suffolk coast, no less than seventeen examples having been killed, to my knowledge, of which thirteen were shot on the Warren and Denes, at Lowestoft, between the 28th of April and the 5th of May. Some of these birds were in most splendid plumage, from the depth and purity of the varied markings on the back and wings. The ring ouzels, generally arriving about the same time as the hoopoes, have also been extraordinarily plentiful this year, so much so as to become quite a drug in the bird market, and dealers were obliged to refuse, in some cases, to purchase more specimens. I have seen upwards of twenty of these birds, both adult and immature, shot in Norfolk between the beginning of April and the first week in May, most of them obtained within a mile or two of this city. Probably as many more were shot, but, not having been preserved, have escaped my notice.—*Id.*

Occurrence of the Hoopoe near Barnstaple.—A hoopoe was shot near Barnstaple a few days after Easter. Many were killed about the same period in the neighbourhood of Oxford.—*Murray A. Mathews; Merton College, Oxford, June 8, 1859.*

A Robin's Nest in a Gardener's Pouch.—Most of our more familiar birds are known, I believe, occasionally to choose strange places for their nests, and therefore I do not give the following fact as anything very extraordinary, but only as another pleasing instance of the confidence which, through kind treatment, animals may be brought to repose in man. In the present case the bird was a robin, and the place chosen for its nest a gardener's leather pruning-pouch, which he had left for some time hung up in a shed attached to the garden in which he was employed. He occasionally took his meals in this shed, and observing that the robin was not disturbed by his presence, he placed crumbs of bread near the nest, which the robin took, and by degrees she allowed him to approach nearer and nearer, until at length she took the crumbs out of his hand whilst sitting on her eggs. But before the eggs were hatched the gardener required his pouch, in order to pursue his work, though of course he could not think of taking possession without furnishing robin with another equally comfortable home. This he did by ingeniously fashioning an old gaiter into a receptacle as near as possible like the pouch, and into it he carefully transferred the nest and eggs; and such was the good understanding established between the parties, that this ejection did not in any way disturb the existing amicable relations. The robin sat on, and in due time the young birds were hatched. I saw them a few days ago in their nest, and by this time, I suppose, they are about ready to fly.—*Thomas Clark; Haleleigh, June 13, 1859.*

Dates of the Arrival of Migratory Birds.—The 'Zoologist' (Zool. 6563) contains a note of the arrival of migratory birds in the neighbourhood of Cheltenham: as the arrival of the birds mentioned appears to be generally earlier in the neighbourhood of Bridgewater, in Somersetshire, about fifty miles more southerly than Cheltenham,

the dates of the arrival of these, and also the wryneck, may perhaps be of some interest.

	Chiffchaff.	Swallow.	Nightingale.	Blackcap.	Wryneck.	Cuckoo.
1851.	April 2.	April 3.	April 14.	April 10.	April 5.	April 16.
1852.	March 30.		" 13.	" 15.	" 9.	" 29.
1853.	April 4.	" 6.	" 15.	" 21.	" 13.	" 21.
1854.	March 31.	" 5.	" 12.	" 18.	" 7.	" 14.
1855.	April 5.	" 15.	" 14.	" 28.	" 17.	" 15.
1856.	March 21.	March 28.	" 22.	" 13.	" 6.	" 23.
1857.	" 30.	April 12.	" 10.	" 17.	" 11.	" 23.
1858.		" 8.	" 11.	March 31.	" 10.	" 18.
1859.	" 25.	" 10.	" 12.	April 20.		" 20.

The chiffchaff, nightingale and blackcap were first heard by myself, in my own garden, at the dates given; the other three birds were heard or seen in the neighbourhood by myself or others; and of these it is possible that the arrival was sometimes earlier than was observed, but I think not much earlier, and perhaps not often, as I keep a pretty sharp look out. It will be seen that the arrival of the nightingale has been remarkably regular, excepting in the year 1856: I cannot account for the late arrival in this year, but had the bird arrived earlier, or at least had sung earlier, I am confident I should have heard it. In 1858 the blackcap was as irregularly early, for which also I can assign no cause.—*Id.*

Occurrence of Rare Birds near Worthing.

By JOHN C. WILSON, Esq.

THE subjoined are notices of the occurrence of some of the rarer British birds in this neighbourhood, within the last few months, and which, I believe, have not yet been chronicled in the pages of the 'Zoologist.'

Roughlegged Buzzard. Female, October 29, 1858; male, March 10, 1859.

Hoopoe. Male, April 25, 1859; female, April 5, 1859.

Kentish Plover. Two females, April 3 and 6, 1859.

Slavonian Grebe. Male in full summer plumage, April 11, 1859.

Sandwich Tern. Male, May 21, 1859.

I also subjoin a list of a few rare birds which have occurred in or about Worthing, within the last few years. For the observation of many of them I am indebted to Thomas Wells, a most intelligent and trustworthy birdstuffer in this place; many, however, I have personally examined.

Common Buzzard. November, 1855. During the four years previous to that date six specimens were obtained.

Roughlegged Buzzard. December, 1850. Arundel.

Kite. Male, 1851.

Peregrine Falcon. Male, 1850 ; Female, September, 1853, taken on the rigging of a vessel off Shoreham.

Marsh Harrier. June 14, 1854.

Hen Harrier. Male, autumn, 1853 ; female, autumn, 1854.

Great Gray Shrike. Male, July, 1853.

Pied Flycatcher. Spring, 1853 ; male and female, spring, 1854, not perfect plumage ; spring, 1855, male in full plumage : April 29, 1856, three young males, one old female ; male, April, 1858.

Hoopoe. Specimens are met with annually. In April, 1855, seven were brought to Worthing, besides several others that occurred in other parts of the county of Sussex. It has been obtained in the immature plumage of a bird of the year. This would suggest the probability of its having been reared in the neighbourhood.

Waxwing. Male, January 7, 1852.

Lesser Spotted Woodpecker. Male and female, April, 1855 ; and a male March 1, 1859.

Whitewinged Wagtail. Generally occurs in the course of the year ; a specimen has been taken this spring.

Grayheaded Wagtail. A most magnificent male of this rare species was taken in April, 1855, and is now in the possession, I believe, of Colonel Carr Lloyd, of Lancing. The head and nape are of a beautiful blue gray, and the difference of colour between those parts and the back is most marked. A female was obtained in April, 1856, but its similarity to the female of the common yellow wagtail is so great that I am led to doubt its identity with the rarer species ; the bird is in my own collection.

Shorttoed Lark. Caught at Brighton. I am assured by Mr. Wells, who saw and examined the bird, that it could not be mistaken for any other member of the family.

Snow Bunting. Male, June 7, 1854.

Ortolan Bunting. A male was taken on the beach, close to the town, in May, 1853.

Rosecoloured Pastor. August, 1855, and July 31, 1856.

Golden Oriole. Young, summer, 1852.

Bluetthroated Warbler. April, 1853 ; a male was seen in April, last year.

Black Redstart. Males and females have been met with occasionally, in winter, for the last six years, and doubtless also before the commencement of that period.

Dartford Warbler, of either sex, occasional, though rare. I have obtained one or two specimens taken in the neighbourhood. The dates I have registered are, male and female, summer, 1853; old male, 1857; young, 1858.

White Spoonbill. Young, October, 1856.

Wood Sandpiper. August, 1851, three; August 4, 1856, one; August 22, 1857, one; August 27, 1857, one.

Common Snipe. August 27, 1857.

Curlew Sandpiper. Male and female, August 26, 1858.

Little Stint. September 20, 1855.

Temminck's Stint. June 7, 1852. Four have been obtained.

Landrail. Male, January 28, 1858. Unusual at this time of year.

Purple Sandpiper. January 23, 1857.

Gray Phalarope. Female, October 8th and 9th, 1857.

Smew. Male, January 1855; female, January, 1856.

Redbreasted Merganser. Male, spring, 1853.

Eared Grebe. Young, winter, 1856.

Great Northern Diver. May 5, 1854, male; November 15, 1857, male.

Ringed Guillemot. Taken in a field, August, 1854.

Sandwich Tern. Another specimen of this tern was seen October 18, 1858.

Ivory Gull. 1845.

Glaucous Gull. December, 1857.

Manx Shearwater. 1847.

Forktailed Petrel. December, 1856, males and females.

JOHN C. WILSON.

Montague House,
Worthing, Sussex.

*"Is the Edible Frog a true Native of Britain?" **

By JOHN WOLLEY, Esq.

SINCE Mr. Alfred Newton, in his important communication (Zool. 6540), has introduced my name as having formerly proposed the question whether the edible frog is a true native of Britain, and as Mr. Bell's latest remarks on the subject (Zool. 6565) are before me, I venture to send you what seems to me fairly to be said upon the subject.

* See 'Zoologist,' p. 1821.

I cannot see that Mr. Bell's belief that the edible frogs being "indigenous to this country rests on irrefragable testimony" is sufficiently securely founded.

Granting that Mr. Thurnall's discovery at Foulmire makes it in the highest degree probable that the recollections of Mr. Bell's father (so long ago made known to his son), of frogs that he considered of a different species from the common frog, and which were called, in the neighbourhood of Foulmire, "Whaddon Organs," referred to the frogs who were progenitors of those edible frogs of Mr. Thurnall's discovering, nevertheless it scarcely seems a necessary consequence of the edible frog being at Foulmire "nearly a hundred years ago" that it was truly indigenous to Britain.

There are quadrupeds, fishes, mollusks, and plants believed to have been introduced to this country far more than a hundred years ago, and now naturalized and wild: why may not an amphibious creature have been so introduced by man, and, as in many other cases, no record been kept of its introduction? This would particularly be likely to happen in the case of a being of some use to man. How many French families of the upper classes, who value these frogs highly, have from time to time settled in England!

How a supposed new species of frog may have been brought into a country and turned out in numbers, without there being any desire on the part of the introducer to make the fact known, Mr. Newton's account of Mr. Burney's experiments is sufficient proof,—his turning out in England two hundred edible frogs and a great quantity of their spawn, in 1837, about two years before the publication of the first edition of Mr. Bell's 'History of British Reptiles,' and thirteen hundred individuals in 1842, the year before Mr. Thurnall's discovery at Foulmire, and nevertheless for the twenty-two years subsequent to Mr. Burney's first bringing over the frogs his avoiding making his experiments in any way public, though indeed they became known, sooner or later, to Mr. John Henry Gurney, who first communicated them to Mr. Newton.

It is rather remarkable that Mr. Bell, in the first edition of his work on British Reptiles, should so clearly indicate his disbelief in the edible frog as a British species (*vide* Hist. Brit. Rept., 1st ed., art. "Scottish Frog"), though he figures, for the benefit of the Scottish naturalists, a specimen of the edible frog sent to him from France by M. Bibron (p. 104). For it would hence appear that his father's account of the "Whaddon Organs," which had been told to him "as

long ago as he could recollect," had not struck him as referring to the edible frog until Mr. Thurnall's discovery was announced.

Mr. Bell gives us, in this first edition, p. 86, an account of the introduction into Ireland, now about a hundred and fifty years ago, of the common frog, which in the same passage is reported to have shortly spread over the whole country. In the previously prevalent belief that no reptile had existed in Ireland, at all events since the time of St. Patrick, a weighty reason appears for the preservation of the account of their subsequent introduction. That, however, even this account was not generally known, appears from Mr. Bell being indebted to Mr. W. Ogilby for a reference to it.

The edible frog has not appeared, as far as I know, in other localities than Foulmire in this country, excepting where it is known to have been newly turned out. In a more recent case of a species of *Amphibia* new to our Fauna, it was soon found at the extreme ends of the island as well as at intermediate places, though I admit that this does not prove much, for we certainly have some other species of *Reptilia* and *Amphibia* very local.

I have heard reports that since the draining of Foulmire the edible frog has not spread in the neighbourhood, but has disappeared. I must acknowledge, from former observation, that I never saw in this country a more peculiar place than Foulmire was. Deep, clear springs in turf, lying near together, perhaps slightly warm; at all events, the vegetation about them seemed luxuriant. It may be that this peculiarity of character made it especially suitable for the edible frog.

We must not forget the assertions of Pennant and Shaw, though without detail, that the edible frog is a British species, though Mr. Bell, in his first edition, refers to these assertions as errors. There can be no doubt he was right in believing that Dr. Stark was in error in exhibiting at the Zoological Society, in 1833, a skeleton of a frog, caught near Edinburgh, as the edible, or indeed, as Mr. Bell (*vide* Brit. Rept., 2nd ed.) afterwards saw, as any other species than the common frog.

But I must repeat that, with all respect for the opinion of Mr. Bell, I can hardly bring myself to believe that we have at present "irrefragable testimony" of the edible or esculent frog being indigenous to Great Britain.

I am afraid we must wait for the discovery of some old fen bones, undoubted allusions in old books, or some such testimony, to strengthen what Mr. Bell has hitherto advanced; for at most he has

proved or rendered highly probable nothing more than the existence, a hundred years ago, at one spot in the island, of the edible frog, apparently abundant,—the same spot where it was found, apparently indigenous, or at least naturalized, now nearly sixteen years ago.

The numerous competent naturalists who are familiar with the Eastern Counties' fens in their less-drained condition, and who, as far as I know, never observed in them anything like what the "Whaddon Organs" are believed to have always been, afford in the question negative evidence not without some little weight; at least, it makes one believe that the edible frog was long nearly, if not quite, confined to Foulmire. Still we must not forget Shaw and Pennant.

But it scarcely seems past all doubt whether or not the term "Whaddon Organs" referred to a peculiar species of frog; for the fen Foulmire is out of the general fen district, and the village Whaddon, being close to it, might get credit for its numerous frogs and toads, which I believe to have been beyond the experience of the rest of that immediate part of the country.

Still, every respect is of course due to the opinion of Mr. Bell, senior, as recorded by his son. But supposing there were any mistake, it appears that there was time, after Mr. Burney's introduction of his first edible frogs, for a good many of them to have moved themselves, or to have been moved, to Foulmire, and to have increased there in the course of the six years that intervened before Mr. Thurnall discovered them. But, whether there be any mistake or not, Mr. Burney's idea may have struck some one else many years sooner than it did Mr. Burney, or than Mr. Bell lived within reach of Foulmire.

JOHN WOLLEY, JUN.

Beeston, June 18, 1869.

Description of the Larva of Eupithecia Haworthiata.—This larva seems to be little known, and has not, I think, ever been described. I have, however, taken it in plenty wherever its food-plant, *Clematis vitalba*, occurs. It is very short and stumpy, the ground-colour pale bluish or yellowish green, with three horizontal dorsal stripes of a darker shade: these stripes are often very indistinct, and sometimes altogether wanting. The head is dusky, spotted with olive, and the body sparingly studded with minute black dots. It is full fed from the middle of July to the middle of August. It feeds inside the unopened flower-buds of *Clematis vitalba*, commonly known as the "Traveller's Joy." When nearly full it frequently feeds among the stamens of the expanded flower, and may then be beaten into an umbrella: it also feeds on the common white garden *Clematis*. The presence of the larva may generally be detected by the blackened appearance of the flower-buds. When it has eaten up the inside of one bud it comes out and bores into a fresh one: I have frequently seen a larva busily

engaged in this operation. In shape and general appearance it is closely allied to the larva of *Eupithecia tenuiata*. The pupa is enclosed in a very tightly-spun earthen cocoon. The thorax and wing-cases are green, and the abdomen red. The perfect insect appears in June and the beginning of July, and is abundant among *Clematis vitalba*: it flies about with extreme rapidity in the hot sunshine, and it is almost invariably wasted when caught; when fresh the upper part of the abdomen is orange. The larva feeds very rapidly.—*H. Harpur Crewe; Breadsall Rectory, Derby, June 4, 1859.*

Description of the Larva of Eupithecia innolata.—This larva has, I think erroneously, been said to feed upon various low-growing plants: I have been acquainted with it for some years past, and never beat it from anything but ash. It is long, smooth, rather slender and tapering towards the head. The ground-colour is a uniform dark green, with a waved, yellowish spiracular line. The segmental divisions are yellow, and on the anal appendage is a dark purplish spot. The belly is whitish, and wrinkled with a dark green central line running the whole length. It feeds upon ash, and appears to prefer the tall suckers in hedge-rows. It is widely dispersed, but nowhere common. It is full fed from the end of August to the middle of September. The pupa is long, rather slender and tapering. The thorax and wing-cases are dark olive; the abdomen still darker, almost black, tinged underneath with red. It is either enclosed in a slight earthen cocoon, at the foot, or under moss on the trunk, of the tree. My friend Mr. Greene has already given the entomological world directions how to find it. The perfect insect appears in June and July.—*Id.*

Observations on the Species of the Genus Prosopis of Fabricius, belonging to the Family Andrenidæ, with Notes on the Economy of P. dilatatus. By FREDERICK SMITH, Esq.

In the year 1842 my first Hymenopterous Essay was published in the 'Transactions of the Entomological Society'; it contained descriptions of nine British species of the Genus *Prosopis* (Hylæus); since that period much additional material has come to my hands. In the year 1848 I again published descriptions of the species: at that time I had not acquired much additional information, but added one species and reduced a second to a synonym. In my 'Monograph on the Bees of Great Britain,' published in 1855, I again added a species, and reduced another to a synonym: the latter circumstance was inevitable, having obtained the nest of *P. cornutus*, from which I bred *P. plantaris* (male) and *P. cornutus* (female).

In the 'Entomologist's Annual' for 1859, I announced the capture of a specimen of the rare *P. dilatatus*, and also noticed the fact of having found a stem containing the nest of a species of *Prosopis*, which I expected would prove to be that of *P. dilatatus*: this opinion has proved to be correct, but I was not prepared for the entire results;

when these presented themselves, I exclaimed to myself, "Oh! how much do we learn from the perusal of a single chapter in Nature's pages! how completely are our most careful deductions set at nought, and our most favourite theories scattered to the winds!" but your readers can only feel an interest in a knowledge of the results; these I will proceed to lay before them.

It appears necessary, in the first place, to add a few words explanatory of the synonyms given in my last work on these insects; that of the first species will remain unchanged: the sexes I know to be correctly assimilated, having bred them from their cells, and also taken them repeatedly *in coitu*.

Of the *P. annularis* of Kirby two sexes are described in the 'Monographia' of that author, and I have always considered them to be correctly united. I have carefully compared specimens with Kirby's types, and have described them in my various papers. The disclosure of the sexes of *P. dilatatus* from the nest, shows that the hitherto-supposed sexes of *P. annularis* belong to different species, the female being that sex of *P. dilatatus*, and the male being that of *P. hyalinatus*. This discovery enables me to publish the correct synonyms of the genus, having now bred four species, and the remainder offering very distinct specific characters. The following list I believe to be correct:—

1. *Prosopis communis*, Nyland. Revis. Ap. Boreal. p. 234.
Melitta annulata, Kirby, Mon. Ap. Angl. ii. 36, 3 (nec Linn).
2. *Prosopis dilatata*, Nyland, Revis. Ap. Boreal. p. 234, ♂.
Melitta dilatata, Kirby, Mon. Ap. Angl. ii. 39, 5, ♂.
Melitta annularis, Kirby, Mon. Ap. Angl. ii. 38, 4, ♂.
3. *Prosopis signata*, Smith, Mon. Bees Great Brit. p. 12, 6, ♂, ♀.
Sphex signata, Panz. Faun. Germ. 53, 2.
4. *Prosopis cornuta*, Smith, Mon. Bees Great Brit. p. 10, 4, ♀.
Prosopis plantaris, Smith, Zool. vi. 2205, 6, ♂.
5. *Prosopis punctulatissima*, Smith, Mon. Bees Great Brit. p. 11, 5,
♂, ♀.
6. *Prosopis hyalinata*, Smith, Mon. Bees Great Brit. p. 13, 7, ♂, ♀.
Melitta annularis, Kirby, Mon. Ap. Angl. ii. 38, 4, ♂.
7. *Prosopis varipes*, Smith, Mon. Bees Great Brit. p. 14, 8, ♂, ♀.
8. *Prosopis variegata*, Fabr. Syst. Piez. p. 259, 1, 2.

I have given the neighbourhood of London as a locality for this species, but this is an error into which I was led from having captured

the supposed male, which I now find to belong to *P. hyalinatus*. Mr. S. Stevens took both sexes in Sussex, but I never suspected their affinity. In the Kirbyian collection I had seen the male, which the monographist himself had united to the species without any remark or indication of doubt, so that nothing but positive observation, proving him to have been mistaken, could have warranted me in differing from so high an authority. The fact of the male of *P. hyalinatus* being identical with that given as that of Kirby's *P. annularis*, had escaped my observation.

The cells of *Prosopis dilatatus*, which I found at Pakefield, in Suffolk, were constructed in the dead stem of some umbelliferous plant; the parent bee had formed a burrow five inches in length and one in diameter, the tube being lined with a delicate colourless transparent membrane; each cell was four lines in length, and separated from the next in succession by portions of the excavated pith; the cells were seven in number, six only being provisioned and closed; the food stored up consisted of semiliquid honey. In a few days the young larva appeared, and at the expiration of about ten days were full fed and entered upon a lethargic state, in which they continued from July, 1858, to May, 1859; at the beginning of the latter month they assumed the pupa state, and gradually progressed to the imago or perfect condition; two males were developed on June 10, two females on the 15th, and two on the 16th. Had the bee completed her task before I discovered the nest, in all probability the number of males would have equalled that of the females.

The economy of this genus was first discovered by Mr. Thwaites in 1841, previous to which they were considered to belong to the parasitic division of the Apidæ; since that period I have bred *P. communis*, *P. dilatatus*, *P. signatus* and *P. hyalinatus*. All the species usually burrow in the stems of dead plants, bramble, sticks, &c.; but some of the species at times deviate from the usual course: thus *P. signatus* occasionally burrows in the mortar of old walls, and I once had a hollow stone given me which contained cells of *P. communis*.

In conclusion, I should observe that the spots described as yellowish white in the 'Monograph' are snow-white in specimens when first developed. The *Prosopis variegata* has not been captured, to my knowledge, since Dr. Leach is supposed to have taken it at Kingsbridge, Devonshire; and the correctness of keeping it in the British list requires confirmation.

FREDERICK SMITH.

Proceedings of Societies.

ENTOMOLOGICAL SOCIETY.

April 4, 1859.—Dr. GRAY, President, in the chair.

Donations.

The following donations were announced, and thanks ordered to be presented to the donors:—‘Mémoires de la Société de Physique et d'Histoire Naturelle de Genève,’ Tome xiv. 2e Partie; presented by the Society. ‘Mémoires couronnés et Mémoires des Savants étrangers,’ publiés par l'Académie Royale des Sciences, des Lettres et des Beaux-arts de Belgique, Tome xxvii.; by the Academy. ‘On the Digestive and Nervous Systems of *Coccus Hesperidum*,’ by John Lubbock, Esq., F.R.S., F.L.S., F.G.S.; by the Author. ‘The Zoologist’ for April; by the Editor. ‘Première Centurie de Longicornes du vieux Calabar,’ par Auguste Chevrolat, &c.; by the Author. ‘A Manual of British Butterflies and Moths,’ Nos. 27 and 28; ‘The Entomologist’s Weekly Intelligencer,’ Nos. 128—131; by H. T. Stainton, Esq. ‘The Athenæum’ for March; by the Editor. ‘The Literary Gazette’ for March; by the Editor. ‘The Journal of the Society of Arts’ for March; by the Society.

Election of Members.

W. S. Coleman, Esq., 7, Ampton Place, Gray’s Inn Road; and W. Jeekes, Esq., 22, Camden Road Villas, Camden Town, were balloted for and elected members of the Society.

Exhibitions.

Mr. Stevens exhibited some beautiful Coleoptera, taken by Mr. Wallace, at Dory, New Guinea, amongst which were *Eupholus Cuvieri*, E. *Schonherri*, *Promechus splendidus* and *Oxycephala speciosa*. He also exhibited, from the same locality, a most extraordinary nondescript Dipterous insect, having long horn-like appendages to the eyes.

Mr. Smith mentioned that amongst the Hymenoptera recently sent by Mr. Wallace from Celebes, was a species of *Dolichurus*, which was interesting from the fact that the only other known species of this remarkable genus, *D. corniculus*, is European.

Mr. Janson exhibited five species of Coleoptera hitherto unrecorded as British, with notes of their localities, &c., as follows:—

1. *Oligota atomaria*, Eric., Kraatz. Colney Hatch, December 27, 1855. Distinguished from *O. pusillima* by its broader form and its pitchy black legs and antennæ.
2. *Stenus proditor*, Eric., Kraatz. Near Finchley, December 5, 1858.
3. *Platystethus nitens*, Sahlb., Kraatz. Highgate.
4. *Abracus granulum*, Eric., de Morseul. Walthamstow, Essex, May 18, 1851.
5. *Lamophleus duplicatus*, Waltl., Eric. Beneath bark of a dead oak near Highgate, March 27, 1859. Readily recognised from its congeners by the two impressed longitudinal lines on each side of the thorax, and the truncate elytra of the male.

Mr. Janson also exhibited the following Coleoptera:—

Carabus granulatus, Liun. Variety, having one elytron bright green, the other

and the remainder of the upper surface of the usual brassy tint. Hammersmith, March 24, 1859.

Lyctus brunneus, Steph. (Xylotrogus). Felled elms, Highgate, August 11, 1858.

Stenolophus elegans. Ditch by the Fort below Gravesend, May 28, 1858. One specimen.

Lymnæum nigropiceum, Marsh. Southend, August 3, 1858. One specimen.

Mr. Janson announced that having recently placed his collection of Trichopterygidæ in the hands of the Rev. A. Matthews, that gentleman informed him that he has identified therein the following species, previously unknown as inhabitants of Britain:—

Ptinella ratisbonensis, Gillm., var.

P. tenella, Eric. (*microscopica* [Waltl. in litt.], Gillm.)

P. angustula, Gillm.

These insects were captured during the past year, at various points near London, beneath the bark of dead trees. Mr. Janson added that this announcement was made at Mr. Matthews' request, and that he (Mr. M.) is now preparing for publication, in the 'Zoologist,' a supplementary paper to his former valuable contribution on this family.

Mr. Wilson Saunders exhibited a living specimen of *Scolopendra morsitans*, found in a chest of tea from China, and some living examples of *Branchipus stagnalis*: this largest and most beautiful of British Entomostraca had lately been found by Mr. Brewer, jun., on Reigate Heath, in some shallow pools which were quite dry during the summer.

Dr. Gray observed that he had noticed this species on Blackheath, in puddles left by rain which had fallen within the previous twenty-four hours.

Mr. Saunders also exhibited some galls on branches of young oaks, also from Reigate, and remarked that they appeared to be those produced by *Cynips Quercus-petoli*, formerly observed only in Devonshire, but now apparently spreading over the South of England; although they do not contain so much tannin as foreign galls, yet, as they could be obtained in large quantities, he thought it worthy of consideration whether they might not be advantageously collected and employed as a substitute for the foreign article, and the young plantations would certainly be much benefited by the removal of them.

Mr. Westwood remarked that these galls were now found in the Midland Counties as well as in the South of the kingdom.

Mr. Westwood exhibited specimens of the case-bearing larva of *Coleophora gryphipennella*, which had recently been very injurious to some pot-roses in a greenhouse.

Mr. Waterhouse exhibited British specimens of

Epuræa neglecta, Heer, Sturm, Erichs.

Anisotoma nigrita, Schmidt, Erichs.

Olibrus oblongus, Erichs.

Mr. Waterhouse stated that the first of these insects had long been named, by Mr. Murray, in Dr. Power's collection; that he (Mr. W.) had supposed the insect to be identical with an *Epuræa* in his own collection, which he made out to be the *E. parvula* of Sturm, and had not inserted the *E. neglecta* in the 'Catalogue.' Having, however, recently had an opportunity of comparing the two insects, he was

convinced of their being distinct. *E. neglecta* was taken by Dr. Power, at Holt Forest, near Farnham. *A. nigrita* was taken by Dr. Power, at Addington, near Croydon: Mr. Waterhouse believed that the insect inserted in his 'Catalogue' as *Anisotoma rubiginosa*, with a note of doubt, was a small female of the same species. *O. oblongus* was found by Mr. Squire, at Horning Fen and Whittlesea Mere.

Mr. Waterhouse took this opportunity of mentioning that the following numbers had been omitted in the third edition of his recently published 'Catalogue of British Coleoptera,' viz. :—

No. 14 to *Hister 12-striatus*.

„ 2 to *Oxylemus variolosus*.

The omission of these numbers caused the names of these species to appear as synonyms of the preceding insects.

Mr. Stevens exhibited a fine *Buprestis*, allied to *Catoxantha*, found by Mr. Wallace at Gilolo, of which Mr. Adam White furnished the following description:—

"The *Buprestidæ* are separated into genera and even into great groups by characters which, in many other families of insects, would be deemed hardly important enough to be regarded as anything but specific. The subgenus, here briefly described, more nearly resembles *Catoxantha* in the shape of its thorax than *Chrysochroa*; it has an apparently dull-coloured look, compared with either of the two genera alluded to; its under side is decidedly metallic, except on the last segment of the abdomen beneath; its elytra are strongly grooved, and in their contour considerably resemble *Catoxantha*, differing in surface and in terminal pointing. It may be called *Catoxantha (Demochroa) carinata*.

"*CATOXANTHA* (? *DEMOCHROA*) *CARINATA*, n. s.

"*C. Elytris viridi-purpurascens, creberrime acupunctatis, costis quatuor cultratis elongatis, costa brevi obliqua ad suturam prope basim, apice subtruncato, triapiculato; capite, caruleo, purpureo et viridi decorato, antice inter antennis subcavato, et cultrato; thorace dorso irregulari, creberrime acupunctato, postice sulculis duobus curvatis longitudinaliter directis, et sulco ad latera singula; thorace, abdomineque subtus purpureis, pilis brevibus subdensis ochraceo-flavis, indutis, pedibus cyaneis, femoribus, basi præsertim, viridi et igneo variegatis, abdominis segmento ultimo subtus pallido flavo, dorso late metallico-viridi.*

"Hab. in Insula Gilolo. Long. unc. 1, lin. 6."

May 2, 1859.—H. T. STAINTON, Esq., V.P., in the chair.

Donations.

The following donations were announced, and thanks ordered to be presented to the donors:—*Journal of Proceedings of the Linnean Society*, Vol. iii., No. 12; presented by the Society. '*Abhandlungen der Koeniglich Bayerischen Akademie de Wissenschaften*,' Vol. iii., Part 2; by the Society. '*The Zoologist*' for May; by the Editor. '*The Literary Gazette*' for April; by the Editor. '*The Journal of the Society of Arts*' for April; by the Society. '*The Entomologist's Weekly Intelligencer*,' Nos. 132 to 135, and Vol. v.; '*Manual of British Butterflies and Moths*,' Nos. 29 and 30.

Election of a Member.

Douglas Timmins, Esq., of Oriel College, Oxford, was balloted for and elected a Member of the Society.

Exhibitions.

Mr. Stevens exhibited some butterflies taken by Mr. Wallace, in New Guinea, the most conspicuous being a beautiful *Hestia*, allied to *H. D'Urvillei*.

Mr. Westwood exhibited a number of specimens of *Oxytelus sculptus*, one of the smaller *Brachelytra*, which had been found by a correspondent upon young cucumber plants after dark, four different sowings of which had been destroyed without any trace of the depredator being visible, during the day. It was consequently supposed that wood-lice were the cause of the mischief, but on examining the plant with a light, after dark, vast numbers of this species, with a few individuals of two small species of *Philonthus*, were captured, which were considered by Mr. Westwood to be the cause of the damage in question, although contrary to the generally-received opinion of the insectivorous habits of the *Staphylinidæ*. Mr. Westwood referred to the occurrence of great numbers of these insects in decaying Fungi, Boleti and dung, considering that it was on the vegetable matter they fed, as was also the case with the larva of one of the species described in the Linnean 'Transactions,' by Mr. Walford, which destroys young wheat plants by gnawing through the stems.

Several members present dissented from this view, and Mr. F. Smith especially mentioned *Oxyporus rufus*, which, although always found in Fungi, is evidently, from its structure, a very voracious insect-feeder.

Mr. Westwood exhibited both sexes of *Mutilla* (*Psammothera*) *flabellata*, one of the *Aculeate* Hymenoptera, from South Africa, anomalous on account of the male possessing bipectinated antennæ, a peculiarity known only to occur in two or three other of the *Aculeata*. Mr. Westwood regretted that he was compelled to employ this term anomalous after observations made at the last meeting, and subsequently in the 'Intelligencer,' with reference to its alleged impropriety, considering that no other word so completely expressed the peculiarity of an animal which exhibited a departure from the ordinary structure of the group to which it belonged. It was erroneous to assert that it was only our ignorance which compelled us to regard such structures as irregularities or anomalies; on the contrary, it was our knowledge of vast numbers of species belonging to the group in question which enabled us to say what were its regular, normal or ordinary characters.

Mr. Westwood also exhibited three very interesting additions to the British lists. The first of these was the *Blatta Acervorum* of Panzer, which formed the type of the genus *Myrmecophila*, and which, although strictly belonging to the family of which the house cricket may be considered as the type, had been regarded by Mr. MacLeay as the oeculant form between the *Blattidæ*, representing the cursorial, and the *Achetidæ*, representing the saltatorial, Hymenoptera. It had been found in moss by the Rev. F. W. Hope, in the Archdeacon's Copse, near Netley, Shropshire. The second was the *Bethyllus depressus* of Fabricius (being the type of Klüg's genus *Pristocera*), and interesting amongst the Hymenoptera as forming one of the connecting links between the *Aculeata* and *Terebrantia*; it had also been taken by Mr. Hope, in Shropshire. The third of these insects was the *Dryinus formicarius* of Latreille, figured in the 'Genera Crustaceorum,' and of the greatest rarity on the Continent. This elegant insect was remarkable for the anomalous structure of its anterior tarsi, which are terminated by a long slender recurved forceps nearly as long as the entire tarsus: a single specimen had been taken by Dr. Baly, at Cobham, in October, and by him presented to Mr. Westwood.

Mr. Westwood also exhibited several specimens of the insects which injure books and book-bindings, namely, a small species of *Anobium* with punctate-striate elytra, in the imago state, which Mr. Westwood regarded as *Anobium paniceum*, but which Mr. Janson thought was not a native species (a question, indeed, of considerable importance); these had been found dead in eastern manuscripts, with many living larvæ, which from their size might fairly be assumed to be those of this species of *Anobium*: also a *Ptinideous* larva, which Mr. Westwood had found gnawing the morocco covers of books in his own library, in the same manner as the *Lepidopterous* larva which he had exhibited at a previous meeting of the Society: also a large *Ptinideous* larva, found within the covers of a Syriac manuscript, which Mr. Westwood considered to be that of *Ptinus fur*, as dead specimens of that species had also been found in the same collection of books.

Mr. Smith observed that he had seen the female of *Vespa vulgaris* on the wing on the 14th of February last,—a proof of the unusual mildness of the season at that period.

The Secretary read the following communication from Mr. A. R. Wallace, Corresponding Member of the Society, dated Batchian, Moluccas, Nov., 1858, intitled

Remarks on enlarged coloured Figures of Insects.

"The practice of publishing highly-coloured figures of insects, more especially of Coleoptera, above the natural size, is so very general that I fear I shall stand almost alone in protesting against it.

"Coloured figures should represent nature in every respect. They should as much as possible take the place of actual specimens, enabling us more readily to determine species than can be done by descriptions, and making us acquainted with the actual appearance of the rare and beautiful forms which are daily being discovered. Insects, it is true, vary very much in size; yet, as a general rule, magnitude is a great assistance, and often an important supplementary character, in determining species. This assistance we altogether lose by enlarging our coloured figures; for not only does it require time to look for the line of size appended to each, and to consider the effect of reducing the insect to that size, but a small and obscure species is often so transformed, by all its delicate detail being brought out and exaggerated, that we may pass it over altogether as something we have never seen, although the identical insect may be waiting for its name in our cabinet. The evil is made still greater by no system being followed. In the same plate we have insects figured of the natural size, and others slightly or very much enlarged; so that in some cases the largest figure represents the smallest of the insects. See White's Cat. of Longicorns in B. M. tab. 6, figs. 5 and 9. An instance of the same anomaly occurs also, I believe, in one of the plates of Longicorns illustrating Mr. Pascoe's second paper in the Transactions of the Society.

"There is also another evil in this unsystematic enlargement of insects,—that we cannot readily check the accuracy of the figures, which must be often very doubtful, as the artist must trust solely to his eyes for the various proportions; whereas in figures of the natural size a fine pair of compasses will both give the principal dimensions accurately, and enable any one in a moment to test their accuracy. Now, though

size may not be, yet *proportion* is certainly an excellent specific character; and it cannot be considered a trifling matter that, by enlarging our figures in no determinate scale, we can no longer use this character with confidence.

"In turning over good coloured plates of an entomological Monograph or of a local Fauna, we may get at once a mass of useful information. We can compare the species with those of our own country, or of any other district with which we may be acquainted, or the species of a new genus with those of an allied group in our cabinet, seeing at a glance their several relations of size, form and colour. But this can only be done if the figures are of the natural size. In the other case we get quite an erroneous idea of the new group or of the unknown Fauna,—erroneous not only as to size, but in form and colour also; for a mass of colour, though of the same tint, strikes the eye more forcibly than a small portion; and in like manner any abnormal form becomes far more striking when exhibited of a larger size than usual. Let any one compare two plates of well-known insects, in one of which all the figures are of the exact natural size (representing actual specimens), in the other variously enlarged (representing nothing in nature), and he will be convinced that the former is in a very great degree more useful and instructive than the latter. It is the difference between truth and error.

"Species which are too small to be well coloured of the natural size should be represented by outlines enlarged in some definite given proportion; and such figures should be given on separate plates, so as to be comparable with each other.

"To make our coloured figures larger than nature has formed the objects which they are intended to represent, in order to make them more showy and ornamental than they really are, is quite unworthy of Science. Such figures do not possess any one solid recommendation, while they do possess many positive disadvantages to the scientific inquirer. They are also likely to disgust the incipient entomologist with his study when he finds that his cabinet can never be so showy as the plates on which entomologists profess to represent his specimens.

"In Lepidopterous figures nature is seldom so falsified. Who ever thinks of figuring a new *Erycina* or *Lycæna* so as to equal in size a *Papilio* or a *Morpho*? The thing would be scouted as absurd, yet it would be in reality not one whit more objectionable than is the present practice as regards Coleoptera.

"I beg, therefore, to propose that the Entomological Society of London should lead the way in this salutary reform, and allow, in its 'Transactions,' fully-coloured figures only of the natural size, and outlines enlarged in some definite degree which should be uniform for at least all the figures on the same plate."

Several members present objected to the opinions expressed by Mr. Wallace, and Mr. Smith suggested that Mr. W.'s dislike to enlarged coloured figures might arise from the fact that he had never seen any well-executed plates containing such figures.

Mr. W. Wilson Saunders read a paper on some remarkable Dipterous insects from Dory, New Guinea, having long horns arising under the eyes, and projecting forward like those of some of the deer tribe. The specimens were exhibited at the last meeting of the Society, and were sent to this country by Mr. Wallace. Mr. Saunders proposed for their reception the genus *Elaphomya*, and described five species, *viz.*, *E. cervicornis*, *E. Wallacei*, *E. alcornis*, *E. brevicornis*, and *E. polita*.

June 6, 1859.—Dr. GRAY, President, in the chair.

Donations.

The following donations were announced, and thanks ordered to be presented to the donors:—‘The Journal of the Royal Dublin Society,’ Nos. 12 and 13; presented by the Society. ‘Journal of Proceedings of the Linnean Society,’ Supplement to Botany, No. 2; by the Society. ‘Catalogue of the described Diptera of North America,’ prepared for the Smithsonian Institution, by R. Osten-Sacken; by the Smithsonian Institution. ‘List of the Specimens of Lepidopterous Insects in the Collection of the British Museum,’ by Francis Walker, F.L.S., &c., Part XVII., Pyralides; by the Author. ‘The Zoologist’ for June; by the Editor. ‘Bibliotheca Historico-Naturalis heraus gegeben,’ von Ernst A. Zuchold, Achter Jahrgang, Heft 2; by the Author. ‘Boston Journal of Natural History,’ Vol. vi. No. 4. ‘Proceedings of the Boston Society of Natural History,’ Vol. vi. Nos. 11—22; by the Society. ‘Eleventh Annual Report of the Board of Agriculture of the State of Ohio,’ to the Governor, for the year 1856; by the Board. ‘Report of the Commissioner of Patents for the year 1856,’ by the Patent Office of the United States. ‘The Journal of the Society of Arts’ for May; by the Society. ‘The Literary Gazette’ for May; by the Editor. ‘The Athenæum’ for April and May; by the Editor. ‘The Entomologist’s Weekly Intelligencer,’ Nos. 137—140; ‘A Manual of British Butterflies and Moths,’ Nos. 31 and 32; by H. T. Stainton, Esq. ‘Stettiner Entomologische Zeitung,’ Nos. 1—6; by the Entomological Society of Stettin. ‘Fabricia Entomologica,’ Part I., No. 3; by the Author, M. H. Jekel. ‘Description de la Leptura Militaris,’ par M. Aug. Chevrolat; ‘Description de Nouvelles espèces de Coléoptères,’ par M. Aug. Chevrolat; by the Author.

Exhibitions.

Mr. Stevens exhibited some fine examples of both sexes of *Papilio Ctenomaus*, sent from Ternate by Mr. Wallace.

Mr. Stevens also exhibited specimens of *Lœmophlæus Clematidis*, of which species above a hundred examples had been captured by Dr. Power, Mr. Jeakes and himself, near Gravesend; *Stenolophus elegans*, of which Dr. Power and himself had secured about fifty, at Southend; and a living example of *Heteris sesquicornis*, one of several which he had recently taken near Hampstead, in nests of *Formica fusca*.

Mr. Janson exhibited specimens of *Haploglossa gentilis*, found by Mr. F. Smith, in company of *Formica fuliginosa*, at Hampstead. The species had not hitherto been detected in this country.

Mr. R. B. Were exhibited a specimen of *Crioceris merdigera* having a transverse lateral black patch on each elytron, which had been recently found in a garden at Homerton.

Mr. Stainton stated that when at Ratisbon lately, Dr. Herrich-Schäffer had informed him of a new Lepidopterous insect frequenting ants’ nests, which he had received from the East Indies; and he had been exceedingly surprised to hear that this new inmate of the formicarium was a butterfly, apparently of the family *Lycænidæ*. Dr. Herrich-Schäffer had been assured that this insect made no use of its wings, and merely walked about in the ants’ nests, having thick legs, of a peculiar construction, not unlike wooden legs.

Mr. Westwood had little doubt but the butterflies alluded to were the singular insects figured by Dr. Horsfield in his 'Lepidopterous Insects of Java,' Plate II., under the generic name of *Symetha* (*Polyommatus Symethus* of the 'Encyclopédie Méthodique' being the type), and having remarkably developed and thick tarsi. This opinion was subsequently confirmed by Mr. Stainton.

Mr. Douglas exhibited the following insects, and notes of their economy:—

"*Ornix Scoticella*, with its pupa-case projecting from its puparium, within a leaf of *Sorbus aria*.

"*Coccyx splendidulana*, Guén., with its pupa-case projecting from its puparium, in a piece of the bark of a willow, where I found it in March. Mr. Wilkinson, in his 'British Tortrices,' says the imago of this species 'appears among fir trees;' but this does not accord with my experience, and in the present instance there is not a fir tree within half a mile of the place where I found the pupa.

"*Raphidia* ———? Last February, when examining, in Richmond Park, the rotten pieces of oak branches blown down by the wind, I found, in the centre of two of them, a larva of a *Raphidia*. What they did there I do not know; they appeared to have nothing except the wood to eat, but they were very lively. I took them home and put them in a large glass jar, still in the wood; and there they remained till the 6th of May, when I found two perfect insects. Attached firmly by the outstretched feet, was the pupa-skin which I now exhibit; it was in a vertical position, rent on the back where the imago had emerged, and resembled the exuvium of a dragon-fly, such as we constantly see attached to the stems of plants growing in water. The other pupa-skin I could not find. Twenty-five years ago Mr. Waterhouse read a memoir on the transformations of a species of *Raphidia*, to this Society, and it is published in the first volume of the 'Transactions.' I should not have deemed it worth while to bring the subject again under your notice, only that my observation of the position of the larva goes to prove his supposition that the habit is not carnivorous; and, moreover, I thought it might be of interest to show that, in the instances I noticed, the larvæ were not immediately beneath the bark of solid wood as his were, but in the centre of rotten branches, so rotten indeed that they crumbled beneath the fingers. Possibly they are not the same species as Mr. Waterhouse's. Percheron says the larvæ feed on larvæ of *Arachnides* and *Onisci*; certainly mine had no such food after I got them, and as the pupa state lasts, according to Percheron, about fifteen days, mine either fasted two months or fed on the wood.

"*Trinodes hirtus*. The larva I exhibited recently, at a meeting of this Society, has, as I expected, produced an example of *Trinodes hirtus*. The following is a description of the larva:—

"Length $1\frac{1}{2}$ line. Dirty white; head large, testaceous; second segment narrow, black; each segment is narrowly margined with black, and down the back is a row of black spots. The whole larva is densely clothed with black, stout hairs, arising in fascicles; these hairs are erect on the back, but those along the sides are rather curved; they are shortest at the head and anus, but the longest are more than half as long as the body. The larva is without the dense anal tufts of hairs which are so conspicuous in the larva of *Tiresias serra*.

"The pupa state was assumed about the middle of May, within the skin of the larva, and under the web of the spider in whose company both this species and *Tiresias serra* live together under the loose bark of old oak trees. The imago appeared on the 3rd of June."

Mr. Stevens communicated the following extracts from a letter received by him from Mr. A. R. Wallace, dated Batchian, January 28, 1859 :—

"I had determined to leave here about this time, but two circumstances decided me to prolong my stay—*first*, I succeeded at last in taking the magnificent new Ornithoptera, and, *secondly*, I obtained positive information of the existence here of a second species of *Paradisea*, apparently more beautiful and curious than the one I have obtained. You may perhaps imagine my excitement when, after seeing it only two or three times in three months, I at length took a male Ornithoptera. When I took it out of my net, and opened its gorgeous wings, I was nearer fainting with delight and excitement than I have ever been in my life; my heart beat violently, and the blood rushed to my head, leaving a headache for the rest of the day. The insect surpassed my expectations, being, though allied to *Priamus*, perfectly new, distinct, and of a most gorgeous and unique colour; it is a fiery golden orange, changing, when viewed obliquely, to opaline-yellow and green. It is, I think, the finest of the Ornithoptera, and consequently the *finest butterfly in the world?* Besides the colour, it differs much in markings from all of the *Priamus* group. Soon after I first took it I set one of my men to search for it daily, giving him a premium on every specimen, good or bad, he takes; he consequently works hard from early morn to dewy eve, and occasionally brings home one; unfortunately several of them are in bad condition. I also occasionally take the lovely *Papilio Telemachus*, *n. s.*

"I have sent off a small box containing four males, one female, and one young bird of the new Batchian *Paradisea*, besides one red-ticketed private specimen; six males and five females of the new Ornithoptera, and seven *Papilio Telemachus*.

"Tell Mr. Gray and Mr. Gould that the *Paradisea* had better not be described yet, as I am making great exertions to get the second species, evidently of the same genus, which will enable a generic character to be more accurately given. The butterflies, I trust, will be both figured, male and female, either in Mr. Hewitson's book or in Ent. Soc. Trans. For the Ornithoptera I propose *Croesus* as a good name. Butterflies are scarce; good beetles turn up occasionally, but nothing very grand. I have now a handsome series of *Buprestidæ*, and a remarkably pretty lot of *Longicornis*; one of my last acquisitions is a grand bronzy *Tmesisternus*, 1½ inch long, a single specimen only. In almost all orders, and in birds, there is a deficiency of species; yet there are so many pretty and brilliant things, and a few so grand and new, that on the whole I am inclined to think my Batchian collection will be the best I have made anywhere.

"Another reason which may induce me to stay perhaps two or three months longer at Batchian is that I have had no fever here, which I have never been free from two months at a time for the last two years before; and I may therefore hope to get my health well established for my next journey to New Guinea.

"The butterflies will make a show-box which will, I think, be admired almost as much as the birds of Paradise."

Mr. Westwood observed that he had little doubt the male Ornithoptera of which Mr. Wallace had given such a glowing description, in the letter just read, was the Ornithoptera *Tithonus* of De Haan, figured on the first plate of his fine work on the 'Insects of the Dutch Settlements,' the hitherto unique specimen of which is in the Leyden Museum, and was seen by Mr. Westwood on his visit last year; he had also little doubt that the female would prove to be the *O. Victoria* of G. R. Gray, figured, some time since, in the 'Proceedings of the Linnean Society,' from a specimen taken

by Mr. M'Gillivray in one of the islands of the Eastern Archipelago, and now in the British Museum collection.

Mr. Shepherd thought, with Mr. Westwood, that Mr. Wallace's description agreed with *O. Tithonus*, but considered it hardly possible that Mr. Wallace was not acquainted with De Haan's figure. Previous to leaving this country for the East, Mr. Wallace had carefully investigated the works containing descriptions and figures of the entomological productions of the countries he was about to visit; and it seemed almost incredible that he could have overlooked or forgotten this fine insect.

Mr. Baly read a paper on new species of Phytophagous insects, together with the characters of a new genus, *Paralina*: this latter is closely allied to *Lina* and *Chrysomela*, and is separated from these genera on account of its produced meta-sternum, which, passing forwards between the meso-coxæ, articulates with the base of the pro-sternum, entirely concealing the meso-sternum; its type is *Lina Indica*, Hope.—*E. S.*

The Crab and its Allies.

By C. SPENCE BATE, Esq., F.L.S., &c.

(Continued from p. 6578.)

It will be here, perhaps, desirable rapidly to review the nervous system of the Crustacea.

The symbolical Crustacean consists of twenty-one segments, every one of which carries a pair of limbs. The nervous system that supplies these segments and their appendages consists of a series of ganglia, one being lodged in each successive segment, and connected to each other by two parallel nervous cords: the whole of these lie close to the ventral surface of the integument and beneath the organs of the body, except the three anterior pair, which supply organs of sense; these are situated above, or, rather, I should say before, for the oral aperture is situated in the fourth segment; they give off threads to the members and other organs: the more important parts are supplied from the ganglia; those of less consequence receive their supply from the intermediate cord. Though this is the type of the nervous system, yet in no known Crustacea is it found exactly to correspond. In all there is a tendency of the ganglia and the corresponding segments to fuse with each other; this is of a degree more or less in different species or groups; thus, in the sessile-eyed Crustacea all the ganglia are distinct except the seven anterior; the three first form one, the supra-œsophageal ganglion, as it is named; the four succeeding build up the infra-œsophageal, which are so called from their relative position to the alimentary tube. But

this fusion, which here embraces but four ganglia, in the higher types embrace as well the seven succeeding. This is more or less perfect in its completion in different animals. In the Macroura, that is the lobster, the long-tailed order, the union of these several ganglia (according to Edwards) form one long ganglion, like several in conjunction; but in the Brachyura, or short-tailed species, they are more perfectly formed into one large ganglion; and the only difference observable between the nervous systems in the swimming and the spider crabs consists in there being a hollow space in the centre of the large ganglion, or mass, in the former, whilst it is filled up and solid in the latter. It has on this account always been orthodox, from Edwards and Audouin, who first carefully described the nervous system of Crustacea, down to Dana, the latest who has written systematically upon the subject, to consider that of the spider crabs as being the most perfectly fused, and therefore highest in grade.

But it should be remembered that that which gives rank to all animals is the greater or less degree of its intelligence and instinctive force. All consciousness of power and existence in animals comes through the senses, and the organs endowed with the capability of sensation are supplied by nerves that come directly from the brain. We have, then, *à priori*, a right to assume that those organs which are similarly endowed in the lower forms are supplied by nerves that proceed from an organ which represents the seat of consciousness; and although it bears no resemblance to a brain, and in fact is scarcely more if as important as the other ganglia of the body, yet must be analogous to a brain. The antennæ and the eyes receive their supply of nerves from the first or supracæsophageal ganglion, which is the result of an union between the three most anterior ganglia, and which are only separated in the Squilla, where the anterior segments are not fused with the carapax.

The antennæ and the eyes are known, from external evidences, to be organs of sensation, and therefore the mass from which their nerves originate must be endowed with the capacity of receiving impressions derived through those organs; therefore it must be the seat of consciousness. The more perfectly endowed the animal may be with conscious power, the higher we should esteem its rank among animals; and in dissecting for the purpose of verifying this hypothesis, we should anticipate a greater or more perfect development in the appearance of those ganglia that supply the organs of sense, with or without a corresponding degree in that of the other parts of the nervous system.

It is the opinion of many naturalists that there is no analogy between any of the ganglia of this class of animals and the brain of the higher forms ; that in fact these animals live with scarcely a consciousness of their existence ; that their nervous system represents only the spinal cord in the Vertebrata ; — thus depriving the animal not only of feeling, but, as it seems to us, of all those powers which make existence an enjoyment ; for the arguments that are made use of to prove the deficiency of any one faculty must possess the same amount of importance in relation to the others.

It is a pleasant thing for the naturalist to believe that the animal he wishes to impale in his collection does not, upon being killed,

“ Feel a pang as great as when a giant dies.”

No doubt but that feeling, as every other sense, is much reduced, and that a Crustacean cannot hear, taste or smell as animals endowed with a higher nervous system ; but it is hard to believe that pain is unknown to this class of animals ; and against the hard negative evidence deduced from a study of the structure we must place that which is demonstrable from the habits of the living creature.

It is true that certain animals, as the ant and the wasp, may lose the body without, apparently, being conscious of the fact, and go on without interruption in their present occupation. I have a friend who was shot in the excitement of a naval engagement, the ball entering near the waist and traversing the circumference of the body just beneath the skin, and who was not aware of the circumstance until he grew faint from the loss of blood. No one, I presume, will argue that therefore he was not susceptible to pain.

The crab will, upon receipt of an injury in any of its limbs, throw off the whole member, that a new one may grow : are we therefore to infer that it suffered no pain from the original wound, or in the amputation because the act is voluntary ? but rather should we not insist that it was suffering that induced it to inflict the otherwise rash act of mutilation ? That this is the case, we may infer the more decidedly from experimental evidence. In order to make observations I procured a number of young crabs. These I used to treat often unkindly. I would, with a pair of scissors, cut off a leg or an arm ; but the animals were very adroit, as if they knew of my intention ; and hard work I had to catch a limb between the savage blades, and when it was there it would frequently escape again before the blades were closed. Immediately the limb is injured it is thrown off by a violent

muscular contraction at the joint second from the body of the animal; it is then struck against some foreign substance, and belongs no more to the creature. Simultaneous with this operation, a thin membrane of chitine is generated upon the surface, and it is not impossible that this may be the amputating means. The entire act is one of a few seconds only, except when they have but recently cast the old shell; while the new one is soft and yielding it will remain attached sometimes for half an hour, but this attachment I presume to be merely mechanical, the organic union having been, internally, previously severed.

In carrying out these experiments I once cut the claw of a crab so as to remove only part of the thumb and finger. The limb was not rejected, and when the shell was cast the hand continued maimed, and never was reproduced. I well remember that immediately after the injury the poor thing raised up its wounded arm and fled from the scene of danger; and when it had gone as far as the prison would permit, it with the other hand cautiously felt the wound; and then repeatedly, for some time, gently stroked the arm between the fingers of the claw, and, as much as it was possible to express pain, showed that it was suffering. It is easy to say, and perhaps demonstrable theoretically, that the nerves which give an expression of agony are not those which convey the sensation of pain; but a reflex action seldom occurs in ourselves without a previous sensation of pain.

Philosophy teaches us that pain is no evil,—that it is sent as a monitor to instruct us as to the health or disease of any part of the body. But surely it would be unphilosophical to teach that the same law holds not its place in relation to the lower forms of animal life, because they are less dependent upon external curative treatment; and certainly the fact of the self-amputation of a limb, because it is wounded, is evidence of the value of pain, since it is an operation that we could never suppose any animal to perform unless it instinctively felt that it would remove a greater evil, just as is the case in man when he extracts a tooth to relieve himself of a severer pain.

As before remarked, the arguments which are made use of to prove the animal cannot suffer pain must also have force in relation to the senses. Pain is no independent sense: it is only a modification of touch, in the same way as acute hearing amounts to suffering; and no one doubts that these animals can see, hear and smell, and that they have especial organs for the purpose.

The sense of sight may not be as definite in the Articulata as it is in man, but there is every external evidence to demonstrate that the organ of vision is perfect in its adaptation, and as perfect in its

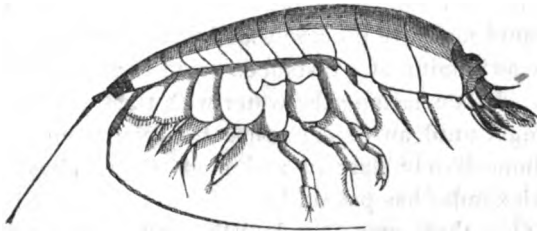
youngest stage of development as in its complete form. The eye in the larva of a crab appears by far the most important organ that it possesses, being considerably larger in relation to the animal than in the full-grown crab.

I have not ascertained the circumstance in the pedunculated orders, but it is a fact in relation to the sessile-eyed Crustacea that the organ continues to grow, that is, the number of lenses in the visual organs continually increases with age, and that a considerable number is present to build up one eye; in the young amphipod there are from eight to twelve, in the adult there may be from fifty to sixty; but in the crabs and lobsters there are a great many more; the quantity being required to counteract the want of more perfect movement and the position of the organ.

It was on this class of animals that Divine Will first manifested his power, in the construction of these organs; and though ages, which the mind wearies in attempting to calculate, have since passed away, the plan of the organ is still the same; it differs not more than specifically from that of recent Crustacea. It evidently, in the Trilobites, from its position, belonged to an animal that was always groping at the bottom of the sea, for its vision was limited to things that were situated above it; and that it frequented shallow water is also demonstrable, from the limited extent of its upward range. In the pedunculated order of recent Crustacea the range of vision is more extended, and is also rendered more complete from the fact that the organ is raised upon foot-stalks and moveable; but still the power of vision appears most complete in the centre of the organ. Upon the inner surface of the eyes there are no lenses placed; thus all objects between them are less distinctly seen. To overcome this circumstance as much as possible, and also to keep guard more watchfully, the eyes are as in the timid hare, keeping especial look-out behind. The common shrimp has often allowed the hand to come quite close to it, when the action is made in front, before it observed the circumstance; but will dart away long before if an attempt be made to steal near it from any other quarter. In comparing the present with the past, the most recent with the most ancient, there appears no change of purpose; the organ that was found to be adapted for the primeval waters is equally available for the ocean of the present day; the first-created eye and the last are alike complete and perfect in their adaptation to the class of animals to which they belonged, even though it may bear, as the Trilobite to the recent Crustacea, in general structure, the most distant analogy

of parts, and as an animal has itself passed out of the list of the living.

Among mammals we find the organs of vision adapted to the peculiar wants of the animal. The mole, which burrows where but little light can reach, possesses a very small eye. This regulation is also carried out among animals of the lower order. Some of the shrimps are known to live deep in the mud and sand, and some amphipods dwell in dark underground wells. The *Thalassanassa* which was found by Colonel Montagu at the mouth of the Kingbridge river inhabits passages in the sand at the depth of a foot or more; the *Gebia*, also a closely-allied genus to the last, dwells in the mud; and in Plymouth Sound, Dr. Leach has excavated individuals, and found their subterranean passages to extend in a horizontal direction often to the length of a hundred feet or more; the *Callocaris Macandriæ* is stated by Mr. Bell to be fossorial at the depth of eighty fathoms. Positions such as these, we should suppose, must render the eyes useless as organs of vision; we therefore find that in these and similar-dwelling Crustacea the eyes are reduced to a rudimentary condition; and to such a degree in nature has this fact become constant that we are fully justified, upon finding an animal the habits of which are unknown, with but imperfectly-developed organs of vision, to infer that they are generally so placed as not to require their use. An instance may be given in one of these forms that is figured in Dana's great work on Crustacea (*Cryphiops spinuloso-manus*), where the eyes are placed so far back beneath the carapax that they cannot be seen until a considerable portion of the latter be removed. We can scarcely doubt that in its natural state this animal is subterranean in its habits.



Ampelisca Gaimardii, Kroyer.

In the Amphipoda, nearly the whole of which reside beneath stones, or in dark recesses at the bottom of the sea, the eyes are lodged beneath the common integument. Only one genus is an exception to this rule, and that is the remarkable *Ampelisca*, an animal apparently

with four eyes. Without doubt there are four distinct lenses, two to each eye; and these are placed at the extremity of each organ, and implanted in the integumentary structure; from which we may assume that an arrest in the number of lenses takes place at an early stage, and that in the *Ampelisca* they do not increase in number, as is the case in the *Amphipoda* generally.

The distinction of the character of the eye in the *Amphipoda* and *Isopoda* from that of the *Decapoda* appears, in an anatomical point of view, to rest chiefly upon the peduncle being absent in the former, rather than to any definite alteration in the eye itself; and by no means is it the test of any inferiority on the part of the animal. This appears to be easily demonstrated by the fact that in all the *Diastylidæ* the eyes are sessile, and converge into a single organ; this is the case also with some of the *Entomostraca*; but, on the other hand, the genera *Tanais*, among the *Isopods*, and *Nebalia* and *Artemia*, among *Entomostraca*, have the eyes supported upon foot-stalks, in a manner corresponding with the decapod *Crustacea*.

The eye appears to be designed to suit the want of the animal, and is developed according to the habits of the creature, being more important in those which are erratic and swim about in the light, as *Nebalia* and the *Macroura*. Take a prawn for instance, and see, in the vivarium, how it will gracefully swim about in search of food; and if you are in the habit of feeding it, as one which I recently noticed in the possession of Dr. Dansey, it soon becomes very tame, and knows the stick that hands its food to it, which as soon as it perceives comes over to it. But to those animals which are so situated that eyes can be of no use, as the fossorial *Crustacea*, whose residence is in the dark; or, again, as to the barnacle tribe, which reside in the light, perfect vision would have been an evil; for animals stationary as they are could not have procured food, let them be ever so hungry, that they saw swimming at a distance: sight is granted them only to avert danger. When lashing the water with their plumose cirri, they know no danger until an object swims between them and the light, when they immediately dart in and close their valves. *Diogenes* waits until *Alexander* has passed by.

It is probable that some may believe, and it was a fancy of my own for a time, that the power of sight in the inhabitants of the water must be very imperfect, and probably indistinct in outline. I recollect how indistinctly objects are seen when diving under water, but we also know how considerably objects are magnified when seen through the water, and that a small alteration of the convexity

of the several lenses would greatly perfect the adaptation of the organ to the medium in which it exists. We may therefore fairly infer that, in common with the universal scheme in nature, the organ is as fully adapted to see objects distinctly in the water as other animals see things on land; and thus, to all, the endowment is made a blessing. Divine love has ruled this a paramount law, and nowhere do we see it more forcibly exemplified than in the organs of vision of the Cirripodia. Whilst they are young, and swim freely in the water in the full light of day, and have to seek out and choose their own permanent place of rest, they have distinct eyes, although in the earliest form the two are confluent, and appear as a single organ. In a second stage they increase in size, and separate; but directly the animal is fixed to the rock, and shut up in his shelly cavern, the organs are not to be seen, and eyes, really as such, probably do not exist, although careful dissection first demonstrated, by Prof. Leidy, in the *Balanus*, or sessile group of barnacles, and since by Mr. Darwin in *Lepadidæ*, or pedunculated family of these same Crustacea, that the ophthalmic ganglion is present in the adult form. Thus the animals appear to be endowed with a low power of vision, which probably does not reach beyond the consciousness of objects that may interfere with the rays of light that pass into the shelly entrance.

We have repeatedly noticed them throwing their cirri with the unerring constancy of clock-work, until a hand be moved in front of their small opening, when they immediately retract themselves, and shut up their valves until the supposed danger has passed away; but beyond this, sight can be of no use to them. No animal but man is supposed to enjoy the beautiful in nature; sight, therefore, is only valuable to animals to seek food and avoid danger, and it is only in the latter sense that it can be available to the barnacles in their adult character, since they are anchored to a rock and have no power to move.

But the barnacle family are not the only Crustacea in which the organs of vision are reduced to a rudimentary condition. Some of the parasitic Isopods take up their abode beneath the carapax of the higher forms, where they become a disease, and distort the fair proportions of the creature upon whose life they feed. The females of *Bopyrus* and allied genera are found upon crabs, shrimps and barnacles, where they feed and vegetate to such an extent that they outgrow all resemblance to the normal character of a Crustacean; whereas the male, which continues through life an active individual, preserves the typical form.

The relation of one of these to *Balanus balanoides*, with which it is found associated, was mistaken by Mr. Goodsir for the male Cirripodia, but which Mr. Darwin has shown, from the hermaphrodite character of the latter, must be a parasite inhabiting the shell. The females of these genera appear to be quite blind.

There are parasites among Crustacea the eyes of which appear to be monstrously developed, as in some of the Hyperidæ; but this is no evasion of the general scheme, that the organs of vision shall be in accordance to the wants of the animals. *Hyperia Galba* and many others take up their abodes within the transparent Medusæ, and swim the clear surface of the broad ocean, floating in their balloon-like cars. These, though parasites, live in the clear effulgence of the day, but which must be lessened in degree, independent of the passage of its beams through the water, by the interference of the tissues of the animal, in the hollow chambers of which they reside. The eyes of *Hyperia* are large, and embrace in compass nearly the whole of the head of the animal; the colour is of a pale and delicate green. But under whatever colour or circumstances perceptible, the organ seems developed in a proportion best suitable to the wants of the particular being it gives light.

When the range of vision is required to extend far, the eye is carried upon foot-stalks, and these, in some species, are not much less important than the legs of the same animal, as in the exotic genus *Podophalmata*, and in the beautiful little translucent stomapod, the *Philosoma* of the temperate ocean.

Sometimes they are lodged beneath the integuments; and, again, they are brought so near together that they converge into a single organ; and in some they appear to be wanting, though this is probably owing to the absence of a coloured cornea. But, wherever the eye is placed or formed, it holds, homologically, the same position throughout Crustacea, and must be looked upon as first of a series of members formed to suit peculiar conditions; one is developed to act as a leg; another to assist in swimming; a third is formed so as to be useful as a mandible. Under all these various changes the appendages are to be seen, each one adapted for an especial use; thus, the eyes are but tactile organs, modified so that the nerves may receive impressions of light, just in the same way as we may suppose an extended arm would hold a ball, or, to speak more correctly, the hand itself be converted into an eye-ball.

(To be continued.)

A List of the Birds of Banffshire, accompanied with Anecdotes.

By THOMAS EDWARD.

(Continued from page 6601.)

Crossbill (*Loxia curvirosta*). Of late years the common crossbill has either become more plentiful or observers more numerous, or perhaps partly both. Twenty years ago the bird was considered a rarity; but this is not so much the case now. It is now believed that they nest with us, and have done so for some years. There is great diversity in colour and size amongst these birds; of about two dozen which have passed through my hands not two were alike, either in size or colour, although from the same flock.

Parrot Crossbill (*L. pityopsittacus*). While walking, one morning, round the fern-hill (whin-hill), and just as I reached the south side, I was rather surprised at hearing the voice of what I knew to be a stranger in that quarter, and in fact within our limits altogether. On looking to a low, bare wall, about three or four yards in front of me, I beheld, in all his pride and beauty, a male parrot crossbill. This is the only instance, to my knowledge, of its occurrence with us.

Whitewinged Crossbill (*L. leucoptera*). One very stormy winter, about fifty years ago, the good lieges of our quiet little borough were rather astonished by the presence of a large flock of these birds. Having alighted on what are termed the "Castle trees," their strange appearance and gaudy plumage soon attracted notice, nearly the whole town flocking to the spot to see the "foreigners." They appeared quite exhausted, many of them dropping from the trees.

Starling (*Sturnus vulgaris*). More numerous now than they were some years ago. There are many places throughout the country where they now breed annually, in holes in trees and old buildings.

Rosecoloured Pastor (*Pastor roseus*). This is another rare beauty whose presence we can boast of, a male having been shot in a garden at Ardmellie. It was a most splendid specimen, and in first-rate plumage.

Raven (*Corvus corax*). A few pairs of these birds inhabit the precipitous parts of our coast, where they breed, generally in company with the falcon, kestrel, gull, guillemot, &c. Single pairs are to be met with also in other parts of the country. A pair and their descendants, but never more than a pair at a time, frequented and bred for many generations on a particular rock in the crags close to the bridge of Alvah, a most beautiful and romantic spot. From some

cause or other, however, they have long since disappeared, and are not now known to visit the place. The raven will tame pretty well, and become very tricky too if you liké. One which I kept had such a predilection for interfering with water, that he could not see a pail or tub containing any without attempting either to capsize it, or render the water useless by throwing in all sorts of filth and stones he could lay his beak on ; this done, he would give a few croaks, and retreat to some convenient spot out of harm's way. And as for thieving, he was a perfect devil. But everybody liked him, despite his mischievous pranks. One kept by a person here was just such another: he stole everything he could carry off, and when his retreat or nefarious repository was discovered it contained more than a barrow full of miscellaneous articles. A bonnet or a cap was a most glorious prize. You had no more to do, if you saw a boy passing, than to whisper to the raven "bonnet" or "hat," as the case might be, when off he would go to the boy's back, and soon possess himself of the article, which not every little chap could retake. In a part of our town called Gallowhill there once lived a bit of a character called Robert Rhynd, but more commonly Rob Rinn, a shoemaker, who gained for himself the cognomen of "Boots," simply because he wore those articles, and delighted in having them always very clean. But he didn't like the name at all, in fact he could not bear it, and well did the youngsters of the neighbourhood know it, and many were the battles he had with them ; and to throw dirt of any sort on his boots was just as bad. At this time another individual, of quite a different stamp, and one which the mischievous portion soon initiated into the secret of "Boots," came to live in the same locality ; and so artfully did the new comer perform his work that the poor snob could not leave his house without being instantly assailed by a hoarse, croaking sound of "Boots, Boots, Boots ;" and if dirt could be got, it was a rare case if Rob didn't get his boots bespattered before he got home again. It was in vain that he swore and kicked : the raven was too bold for him. It pleased the urchins to the very heart to see the bird and Rob in a fix. The boys he chased ; the bird he could make nothing of. At length, however, the raven, during some of his wanderings about the place, by mere chance got upon the top of a wall, where, through a window, who should he espy but his old friend hammering away at a piece of leather. This was too much to let slip. Habit is a terrible thing. Round he turns fairly in front of the window, becking and bowing, and croaking out "Boots, Boots." "Aye! —!" roared our friend, maddened at the seeming impudence of the bird, "I'll 'boot'

you!" With that away flew the hammer right through the window,—glass, frame and all,—and, hitting the unsuspecting creature on the head, felled him to the ground, a corpse.

The Carrion and Hooded Crows (*C. corone* and *C. cornix*) seem to be in about equal numbers, not very numerous. They appear also to associate together, in winter as well as in summer. They are to be found in certain parts of our coast all the year round. Many of them breed there; others retire inland for that purpose. Our keepers destroy them whenever opportunity offers. I wonder that our fishermen do not do the same, considering that they destroy great numbers of a certain Crustacean, namely, *Carcinus Mœnas*, which is sometimes used as bait. One would almost think that Mr. Crab's head would be proof against black-neb. But no; and what he cannot manage below he goes up aloft with. What! to break the shell against the edge of a cloud? O no; but to let poor crabbie fall on some stone or rock, chosen for that purpose. If one topsyturvy doesn't do, up he goes again: another summerset, and still not smashed. Up he goes a third time, and I have seen him a fourth, but this is rarely the case, the first or second generally doing the work of destruction. When once a convenient stone or rock is met with, these birds resort to it for a long time. I myself know one, a pretty high rock, which has been used for this purpose for the last twenty years; I don't say by the self-same birds, but it has been used for that period, and perhaps considerably longer. Besides being fond of crabbie, they are very partial to the finny tribes, and, though very good fishers themselves, very seldom if ever lose an opportunity of assailing the heron when he has had the good fortune to make a prisoner. I have seen them watch him intently, and, as soon as a successful dive could be made, rush upon him; and if the heron did not instantly swallow his prize, he was almost sure to come off second best, with a good teasing to boot. I have also seen the heron attacked when on his way home in summer time loaded with food for his family.

Early in the summer of 1845, whilst loitering about the hills of Boyndie, I observed a heron flying heavily along in a direction as if passing from the sea, and seemingly well stored with provisions from that rich and inexhaustible magazine of nature, and at the same time pursued by a carrion crow, followed at some distance by two magpies. They had not proceeded far when two hooded crows made their appearance, and quickly joined their black associate in his attack on the heron. The heron had by this time got into an open space

between two woods, and it would appear to have been the determined intention of his opponents to have kept him there until he should satisfy their demands. During the whole time that the affray lasted, nearly half an hour, they did not suffer him to proceed above a few yards in any way, either backward or forward; his principal movements being ascending or descending alternately, in order to avoid the assaults of his pursuers. They having chosen their battle-ground, as it were, near to where I was, and being sanguine in my hopes of enjoying a rich treat, I concealed myself behind a whin-bush, where I had an uninterrupted view of the whole affair. I was very much gratified in having my expectations realised to the fullest extent. The battle might now be said to have been fairly begun; and between the sonorous screaming of the heron, the cawing of the crows, the chattering of the magpies, who were hopping on the ground beneath the scene of action, we had a most inharmonious concert. The manœuvring of the crows with the heron was most admirable; indeed their whole mode of procedure had something in it altogether very remarkable; and so well did each seem to understand his respective position, that the one never interfered with the other's point of attack. One rising higher than the heron, descended upon him like a dart, aiming the blow in general at his head; another at the same time pecked at him sideways and from before; whilst the third assailed him from beneath and behind. The latter several times, when pecking at him from behind, seized hold of his feet, which, being extended at full length backwards, formed a very prominent and tempting object for the crow to fix on. This movement had the effect each time of turning the heron over, which was always the signal for a general outburst of exultation amongst the three black rogues, manifested by their much louder and complacent cawings and whimsical gesticulations, no doubt laughing (if birds can laugh in any way), after their own fashion, at seeing their victim turning topsyturvy in the air, which, from his unwieldy proportions, exhibited, before he could get himself righted again, a rather comical scene. During one of these summersets the heron disgorged something, but, unfortunately for him, it was not observed by any of the crows, and on its falling to the ground was set upon and soon devoured by the magpies, which were still there in attendance. Finding no relief from the dropping of the article, and being still hard pressed, he again disgorged what appeared to be a small fish. This was noticed by one of the hooded crows, who speedily secured and made off with it, and quickly disappeared, leaving his two less

fortunate companions to fight the battle out. The heron, having now got rid of one of his pursuers, seemed, from his appearance, determined to push his way forward in spite of all opposition. But this was not to be so easily done as Mr. Heron had anticipated; for his assailants, apparently either from being disappointed of the aid of their comrade, or beginning to get irritated at the length of the struggle, recommenced their attack upon him with renewed vigour, and so artfully did they manage that they kept him completely at bay, and baffled all his endeavours to get away. Wearied at last of the contest, he once more dropped something, which from its length appeared to be an eel. On its being observed by his opponents they quickly followed it. In their descent they fell a-fighting with each other; the consequence of which was that the eel, falling to the ground previous to either of them, was set upon by the magpies, who were very loth to give it up when the crows arrived. Of course a battle amongst the four was the result. The magpies were soon repulsed. The crows now seized hold of the eel with their bills, and kept pulling it from each other until it eventually broke in two, when, each still keeping hold of his portion, they rose, and were soon lost sight of amongst the trees. On looking again for the heron I was just in time to behold him far in the distance, ere he disappeared from view, winging his flight with unusual rapidity, apparently little if any the worse for the fray.

On another occasion, when passing along the Green Banks, my attention was attracted by a loud and clamorous noise. On looking in the direction of the same I observed, upon a bank on the opposite side of the river, a heron, surrounded by a very large crowd of black-nebs, composed of hoodies, rooks and jackdaws, which were making the noise alluded to. The hoodies were shouting at the distance of a few feet round about the heron, every now and then bowing and cawing very politely to him; whilst he appeared, from his haggling, to be somewhat puzzled as to how he could manage to swallow a fish, which was still alive, and which from its breadth I considered to be a flounder. The crows began to press rather near; and the heron, not wishing to be so closely beset with so many of the black gentry, and perhaps dreading that an attack was about to be made upon him, very cautiously placed one of his feet upon the fluke, and, raising his head, surveyed his sable neighbours with a keen and distrustful gaze. Being satisfied, he suddenly sunk from view, but presently reappeared with the fluke in his bill, and betook himself to flight, followed only by two of the hoodies.

Wending his way up the river, pursued by these two, which teased him very much, and made several unsuccessful attempts to snatch the fish from his mouth, he passed over the bridge and alighted on an embankment a little above it, the two hoodies taking up their position at the distance of a few yards. The heron stood quite erect, and, after having for a few minutes eyed his two attendants with a haughty look, dropped the fluke, which he had hitherto held in his mouth, on the grass, and, with a significant nod of his head, turned and bowed to the hoodies, which was tantamount to saying, "Come and take it now, ye black rogues." The invitation not being accepted, craigie thought it proper to take it up again himself, and after a good deal of labour and not a little difficulty, caused by the breadth of the fish, he succeeded in putting it into his stomach, when he again took to wing, and was hotly pursued by the hoodies, which pecked at him more furiously than before. But, as bad luck would have it, a keeper, chancing to pass that way at the time, soon put an end to the squabble by shooting one of the crows, the other sneaking off when he saw his companion fall.

Reclining on the beach, one afternoon, near to where the burn of Boyndie falls into the sea, admiring the manners, but more particularly the tameness of a flock of sanderlings, the greater number of which were chasing each other to and fro in seeming sportive play, and uttering their merry notes of "peak, peak, peakie chur;" while others were enjoying themselves bathing in a shallow pool which had been left in a hollow of the sand by the previous tide, the remainder being employed probing with their bills the soft sand round the margin of the pool, in search of marine insects;—a gun was fired by some person close by, which had the effect of raising, from the rocks in my vicinity, amongst other birds, a heron and several carrion and hooded crows. The heron winged his flight, and was closely pursued by three of the crows, in the direction of the rocks situated a little below the "Red Well," and made as if he would have alighted on them, but from some cause or other he did not do so. Turning abruptly round, he came back nearly in the same path, and, passing over the rock he had first left, bent his course eastward, pursued now only by one crow, which pecked at him with such fury that he kept him screaming almost without intermission. Having my attention withdrawn for a few minutes, I was surprised, on again looking towards them, at finding that the progress of both had been suddenly arrested, being still only a short way off. The crow was attempting to pick something out of the sea, whilst the heron was

hovering round and round a little above him. Whether it was anything dropped by the heron to get rid of his tormentor, or some other article of food floating on or near to the surface of the water, which had attracted the eye of the crow, I cannot say, but I suspect the former. The crow, after making a number of unsuccessful attempts to pick the object of his solicitude out of the sea, had just succeeded in getting hold of it with his bill, when I observed the heron suddenly ascend close upon him, and, stretching out his long neck, strike the crow on the back with his strong bill, and with such force that poor hoodie had only time to cry out "caw" once before he fell plump into the sea, right over head and ears. It seemed to me that the heron's only motive in hovering about the crow was to get him into the water; for no sooner was it done than he rose again a little higher, and, doubling his neck again on his breast, pursued his way as unconcernedly as if nothing particular had happened, leaving the crow to get out of the briny dilemma he had unwittingly brought himself into the best way he could. The crow, emerging to the surface of the water, and having somewhat recovered from the effects of the blow, and no doubt not feeling at all comfortable in his new situation, began to sprawl furiously about, with the view of getting out of the watery element. But, unfortunately for him, his feathers had absorbed too much moisture, which for a time rendered his wings entirely unfit for flight, so that he could not rise out of the water. Although the sea was comparatively smooth, still there was what is generally termed a rough jabble inshore; and the crow, instead of turning his head, as water-birds would have done, to the waves, turned his tail; the consequence of which was that each successive wave tossed him over, and frequently submerged him for a time. Growing wearied at length with exertion, he became quiet, and resigned himself to the mercy of the waters. The wind and tide being both in his favour, he eventually got landed on a rock at some distance from the shore, surrounded by the sea, and, having scrambled to the top, he shook himself heartily, making the water fly from his feathers in every direction. Marching about on the top of the rock, the beams of the bright sun shining with unclouded lustre upon him, he was, from his glistening appearance, an object of curiosity to people passing on the shore at the time. He also attracted the attention of a few of his own brethren, who, alighting on the rock beside him, began to caw and bow to him, which made me conclude that they were congratulating him on having escaped a watery grave.

THOMAS EDWARD.

(To be continued).

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Warbling Parraquet (*Melospittacus undulatus*) *breeding in England*.—In the first place, the cage was a large, common breeding one, such as is used for canaries, with boxes at the ends, which are entered by round holes, so as to form as nearly as possible the hollow of a tree. I put into the cage several different kinds of materials, such as moss, feathers, hair, dried grass, &c., the same as we give other birds, hoping that they would build with them; this, however, they did not appear at all inclined to do, but, on the contrary, tried hard to push out what little I had put into the boxes; therefore, finding the eggs were likely to get laid upon the bare boards, I took a pair of scissors and cut up the above-mentioned materials quite fine, so that the birds could not get them out; and this was all the nest they had. The first egg was laid on the 1st of March, the second on the 3rd, and so on every other day until there were four eggs. The hen began to sit when the second egg was laid, and continued to do so until the 18th of March, when the first bird came forth, and so on, in the same succession in which the eggs were laid, until the four birds were hatched. I fed the old ones entirely upon canary-seed, as I had always done; and all the young ones appeared to grow and do extremely well till the 22nd of April, when one died, and another on the next day. I am quite unable to account for this, as they had invariably appeared so healthy up to that period; but I fancy they were seized with cramp in their legs. The eggs were perfectly white, and about the size of a canary's. The young are very much like the parent birds, but the plumage is not quite so bright at present. The hen laid altogether nine eggs, in the same rotation as at first, but did not sit again, and I am sorry to say died on the 19th of May. The two young ones I have left are, I hope, a pair, and with their father are now in good health, and I trust will continue so, and that I shall be more fortunate next year with them.—*Eliza Anne Eeles; Southwold, July 1, 1859. [Communicated by John Curtis, Esq.]*

Suggestion as to the Eggs mentioned by the Rev. J. C. Atkinson.—I do not for a moment doubt that the eggs mentioned by the Rev. J. C. Atkinson (Zool. 6563) belong either to a missel thrush or a blackbird. I have in my own collection, and have seen in others, missel thrushes' eggs bearing a very close resemblance to strongly-marked specimens of the ring ouzel's eggs; and the situation mentioned is a very likely one to have been chosen either by a blackbird or a missel thrush; whilst a ring ouzel, on the other hand, would never have built in the fork of a stunted Scotch fir; and the redwing also, as far as I can ascertain, never selects such a situation. The probability, however, seems to be that a blackbird was the real owner. The size of the eggs might be caused by their being the produce of a young bird, and the trifling variation in the materials of the nest from those usually used may, I fancy, be ascribed to local causes. Mr. Atkinson has, I see, yet to learn to what an extraordinary and puzzling degree the eggs of our common birds vary. I may mention here, for his edification, that the eggs of the yellow bunting alone I have seen ascribed to no less than five different species, and all with a show of reason.—*Henry Smurthwaite; 9, Bedford Row, Barnsbury Street, Islington, July 11, 1859.*

Singular Sparrow's Nest.—Last month our gardener showed me an egg which he thought a house sparrow's, taken from a nest "queerly built." The egg was so very light and simply marked, that he had misgivings. At once we proceeded to the tree and visited the nest, which was undoubtedly "queerly built," being a kind of double tenement. From it we took three more eggs, all very large, and much longer than the one previously taken; their colour was extremely dark. Evidently they were deposited by a different sparrow. From the peculiar shape of the nest I am inclined

to the belief that it was occupied, if not built, by two pairs of birds, as there appeared to be two distinct nesting corners inside; one was lined with feathers merely; the other had a few rags, and a torn page of a hymn-book, on which the eggs were lying. The nest was domed. — *G. R. Twiss*; *The Elms, Camp Hill, Birmingham, July 9*.

Notes on the Partridge. — On the 18th of June a friend and I were driving on the lower road from Oxford to Abingdon. On turning a corner we perceived a pair of partridges, with a brood of freshly-hatched chickens, occupying the centre of the road a little distance a-head. The herbage on either side of the road being scanty, offered but little opportunity for concealment; but the young birds made for the short grass, and, crouching down, became at once invisible. The old birds, however, waited in the road until we drove up, without seeming to evince any trepidation; and we were so much amused and astonished at their audacity that we drew up to see what they would do. The male bird ran up and down by the side of our gig, uttering a low sibilant cry, drooping his wings, and every now and then running towards our pony, as if with the intention of attacking him. The female bird remained nearly stationary by the spot where her young ones were hid, occasionally calling to them with a soft "cluck," like a hen calling her chickens. When we drove on again the male bird ran along the road before us, with his wings drooping, and his neck stretched far forward so as almost to touch the ground with his head. He evidently imagined that we were pursuing him, and thought, cunning fellow, by so deceiving us on to lead us from the spot where his family was concealed. When he had led us some hundred yards or so, he triumphantly rose on the wing, and swept back to calm the fears of his wife and her young brood. Such extraordinary boldness on the part of birds generally so timid as the partridge is a proof how great a change parental *storge* can effect upon their habits. I may also mention that a short time since I saw a partridge sitting on her eggs on a railway-bank. I was in the train at the time, and looking down saw the bird sitting quietly while the train thundered on close to her. — *Murray A. Mathews*; *Merton College, Oxford, June 20, 1859*.

Description of the Larva of Eupithecia coronata. — This larva is, I think, the prettiest of all the genus. It is excessively variable in colour, so much so that it was not till I had repeatedly bred the insect that I could believe that such different-looking larvæ could produce the same moth. The following are some of the principal varieties:— *Var. 1.* Ground-colour yellowish green, with three reddish dorsal lines, the centre one interrupted, and sometimes enlarged into a chain of lozenge-shaped spots, the two side ones very indistinct. Body, when closely examined, very slightly hairy. *Var. 2.* Ground-colour one uniform sea-green. The dorsal lines and spots wholly or almost entirely wanting. *Var. 3.* Ground-colour greenish yellow, with a series of rusty lozenge-shaped dorsal spots or bars. The sides and belly more or less suffused with rust-colour. Segmental divisions bright yellow. *Var. 4.* Ground-colour bright yellow, with a series of broad dull red dorsal bars, intersected and bordered by lines of the same colour. Sides and belly thickly clouded with red. This larva is somewhat different in gait and shape from those of all the other *Eupitheciæ*, and resembles that of *H. rupicaprarum*. Its favourite food is the petals of *Clematis Vitalba*, from which plant it may be beaten in some plenty from the middle of July to the middle of August. I have also beaten it from the flowers of the hemp agrimony (*Eupatorium cannabinum*), the golden rod (*Solidago Virgaurea*), and the wood Angelica (*Angelica*

sylvestris). The pupa, which is enclosed in a rather closely-spun earthen cocoon, has the abdomen very much curtailed and sharply pointed, the eyes black and very prominent, the thorax and wing-cases spotted with black, the latter much ribbed. The spots do not appear for a week or two after the caterpillar has turned, and till then the pupa is a uniform pale yellowish red-colour. The perfect insect appears from April to July. In confinement I have occasionally had the earlier fed July larva produce the perfect insect in August.—*H. Harpur Crewe*; July 9, 1859.

Description of the Larva of Eupithecia venosata.—This larva is by no means uncommon, though the perfect insect is seldom seen. It is also very easy to rear. It is short, thick and stumpy. Back dull leaden gray, sparingly studded with minute white spots and short hairs. Belly and sides dirty greenish white. Head black. It feeds inside the seed-capsules of the bladder campion (*Silene inflata*) and the common red Lychnis (*Lychnis dioica*), and is full-fed from the middle to the end of July. When ready to assume the pupa state it comes out of the capsule and enters the earth, where it spins a very slight cocoon, and turns to a bright red chrysalis. It is very subject to the attacks of ichneumons. The perfect insect appears from the beginning to the end of May. When quite young the larva is black.—*Id.*

Occurrence of Erastria tenuistula in Epping Forest.—I have met with this insect two years running, at Loughton, in Epping Forest, having taken two last year and four this. They were all taken in the month of June, flying low down among the herbage at dusk. Upon the wing they are very inconspicuous, and appear to be partial to thickets. The species would appear to be generally distributed over the Forest. Had I known the rarity of the insect I might have taken some forty or fifty; but unfortunately I, in common with most of the gentlemen who have taken it, mistook it for a Tortrix; and when I had taken enough to represent the species in my own collection I did not care to catch more. Specimens were exhibited by Mr. Eedles at the Haggerstone Entomological Society on the 14th instant.—*H. W. Killingback*; 10, Oldham Place, Coppice Row, July 14, 1859.

Note on the parasitic Grubs found in the Brain of the Harte-beest and the Gnu.—Mr. Ayres, of Natal, in a letter which I lately received from him, informs me that the "large kind of antelope, here called the Harte-beest, has invariably a number of large white maggots in the brain, each the best part of an inch long, which do not seem to affect the health of the animal at all." Captain W. R. King, in his work entitled 'Campaigning in Kaffirland,' second edition, p. 306, gives the following account of a similar phenomenon in a bull gnu, or Wilde-beest, which he shot near the Caledon River:—"We had often heard that the brain of the Wilde-beest harbours gentles or grubs, to which its wild extraordinary vagaries are by some attributed; and being anxious to ascertain the truth of such a phenomenon, the head was opened by Dr. Fayson, R.A., in the presence of a number of officers. To the disappointment of the sceptics and the astonishment of all, in the very centre of the brain, still quite warm, there was found a large maggot, which when put on the table wriggled across it with great activity." A friend of mine who was present on the occasion referred to by Captain King assures me that the account contained in that officer's work, and quoted above, is strictly accurate. Can any of the readers of the 'Zoologist' throw any light on this very curious subject?—*J. H. Gurney*; 24, Kensington Palace Gardens, July 16, 1859. [I cannot avoid feeling a doubt as to the exact site of these larvæ, which are probably those of the dipterous genus *Cestrus*.—*E. Newman*.]

Contributions to the Natural History of the British Vespidae.

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IN the summer of 1856 I procured, through the kind and able assistance of my sisters, a small swarm of *Vespa britannica* with their nest, which for some weeks hung in full view outside my study window. I propose, in the following pages, to present a summary of the chief observations made on this and other swarms, which I owe to the kindness of different friends. For most valuable assistance in identifying the various species, as well by his papers in the 'Zoologist' as by personal communication, I am much indebted to Mr. F. Smith, of the British Museum, who has made the subject of the British Hymenoptera so peculiarly his own. I trust that these observations, however imperfect, may not be entirely without interest to the student of Natural History, as a contribution to a subject not less curious, though certainly less generally attractive, than the economy of bees.

The swarm, in the regular narrative of whose history my disjointed observations on other swarms have been interpolated, was discovered in the middle of June, in a hedgerow in Gloucestershire, where this species of wasp is not uncommon. The nest was then about three inches in diameter, of a globular form, very smooth, and showing few loose edges of paper on the outside, and, with the exception of one or more entrance-holes, it was completely closed at the bottom; and it was hung on a single spray, offering great facilities for its removal to a more convenient situation for daily observation.

This was effected very neatly by my sisters on a dull day, a piece of soft wet paper having been carefully applied, previous to the operation, over the entrances. In two or three days the wasps recovered themselves, and set to work to repair the injuries which their habitation had sustained. The nest grew rapidly, all the while retaining its globular form, and being always closed in at the bottom, however the form and position of the entrance-holes might vary. The ragged ends of paper, which the rain and wind loosened, were always laid down again or pared off, so as to keep the outside smooth. The nest had very much the form of a large half-blown summer rose.

With a view to its safe transmission from Gloucestershire to Brighton, the nest and its inhabitants were now transferred to a box of perforated zinc. The process, I am assured, was very exciting to

those engaged in it, and the chief steps may be related here. First, the nest was enclosed in a muslin bag, and without delay removed from the dangerous neighbourhood to a room with an open window, out of which the wasps flew as the bag was taken off. The nest was then, without further difficulty, fastened in the box, and thus returned to the place whence it had been taken half an hour previously, and where the houseless family were sitting on the hedge waiting for it. I need not add that their tempers on this trying occasion were truly waspish. However, they returned to it at once, and immediately set to work to repair the slight damage it had sustained. There seemed to be altogether about three or four dozen wasps in the swarm: they were always at work, and, in spite of the injury done to the nest and the loss of some of the workers by the two journeys it had undergone, it increased an inch in diameter in the course of three weeks.

It remained only to close the box at night on the eve of its next journey, and the swarm was secured. The last step, which fell to my share—namely, to transfer the nest from its travelling case to a box outside my study window, where it could be easily and safely observed—was effected, without much difficulty, by the aid of an old gauze veil, a long pair of polypus forceps, and a large bell glass.

The wasps which were left behind in Gloucestershire claim a few lines to complete their history. When the nest was first removed from the hawthorn hedge, the stragglers which had been left there immediately set about replacing it by a new one. These stragglers were only four in number, and no wasp distinguishable by her larger size was seen among them. At first they made a rough patch of paper, adhering to the bough from which the former nest had been suspended. As this grew into a hood, of an irregularly circular form, a small tier of cells was hung from a pillar in the centre of the hood. These cells, at first four in number, were multiplied to eight during the ten days of the existence of the nest, and they had distinct eggs in them. The eggs came to nothing when the nest was brought to me at Brighton; and the four wasps, deprived of their second home, made no effort to construct another nest in this place.

Again, when the original nest was taken away from the second branch to which it had been fastened, the stragglers, who were more numerous than on the previous occasion, built another, thus making the third nest built by one colony. In less than a fortnight after its removal they had constructed, on the branch to which it had been tied, a new nest, of a flattened spherical form, measuring four inches in height, and three by four inches in width. A storm, about a week

after, destroyed much of the outer case, exposing two tiers of cells, the upper one full of grubs. Unfortunately, I was unable to have any more observations made on this nest, which soon after was entirely destroyed.

But to resume. The wasps were soon reconciled to their change of quarters, and after the nest had been slung they established a sentry. But they were still tired and frightened, for they made no objection to the bottom of the nest being cut off to gain a clearer view of what was going on inside; even the sentinel paid no attention to my operations, if I was careful only to work when her back was turned. The lowest comb which was thus exposed consisted only of rudimentary cells, in which no eggs had yet been laid. Rudimentary as the cells were, still their tops were in close contact with the outer case, which must have been cut away to allow the cell-walls to be built up to their full height. Round the edges of this comb, and much more on one side than on the other, the cells of the comb above could be seen, filled with grubs, which the workers were busily engaged in feeding.

It did not appear that any distinct order was observed in feeding the grubs, but none were neglected; for not only did the little heads which were greedily thrust out from the cells receive a supply, but the nurses themselves put their heads down into all the cells to see if any nourishment was wanted by the less clamorous embryos, and the greater part of the morning was spent in running from cell to cell in this occupation. For a day or two this seemed the sole business of the swarm; for though they made themselves at home at once in Brighton, yet probably the novelty of the situation threw some difficulties in the way of obtaining a sufficient supply of food for their young, and so prevented them setting to work at once to repair the nest.

The food which was brought in was not intended exclusively for the grubs. I often saw a wasp impart the fluid contents of her stomach most amicably to her sister, directly, mouth to mouth. I could not, however, make out how the solid food which was brought in was divided, for it was carried up at once, out of sight, to the top of the nest, where the wasps usually lived.

The first duty of the day was to feed the grubs. This done, they proceeded to close in the bottom of the nest. Day by day we watched the gradual extension of a hood, shutting off the comb from observation, and closely applied over its surface, being apparently a prolongation of the innermost sheet of the case. Some of the cells in

the lowest comb were lengthened and attached to the case, but these were not otherwise materially altered, and were never further adapted for breeding-cells. Sheet after sheet was added on, to the number of five, and the nest finally was completely closed in, leaving only one small entrance-hole. But, now that the nest was protected from wind and rain by a wooden box, the wasps did not seem so careful about cutting off loose ends from the outside as they had been in the Gloucestershire hedgerow. They made all the repairs that were absolutely necessary at the bottom, but to the rest of the outside of the nest they added nothing all the while it hung outside my window.

When the nest was closed in we could of course make out little of what was going on inside, though the scraps of paper and building-pellets which lay about, and the interminable nibbling and scratching which we heard, attested to the industry of the little creatures, which kept flying in and out as busily as ever. Some insight into their proceedings, however, was obtained by the expedient of marking particular wasps, and the interest of watching the nest only ceased with the extinction of the entire colony.

Marking a wasp, like many other things, only wants a little practice to be very readily accomplished. Réaumur used to catch his wasps with a rod pointed with some glutinous matter: I made use of a glass tube, with a few inches of vulcanized India rubber and a glass mouth-piece attached to one end. In the tube was a stop to allow a free passage of air, and to prevent my sucking down the wasp. With a very little practice it was easy to catch any wasp with this instrument, and, gently blowing it out on a glove, to hold it safely while some distinctive mark in white paint was put on the thorax between the wings. By this means I often caught a wasp on the wing, or picked one out of a cluster, without disturbing the rest. But any attempt to remove the sentinel, however cautiously, was followed by a commotion which drove me for safety to the dark corner of my study.

There were ample opportunities for observing the process of paper-making during the repairs of the floor of the nest. It was precisely that which has been described by Réaumur as witnessed by him in the ground nests. Thus, a wasp, previously marked with paint between her wings, was seen to fly to the nest with an appearance of having her jaws projecting forwards. A practised eye readily recognized, by this position of the head, a wasp laden with a pellet for paper-making. On one or two occasions the wasps thus laden set to work at once, without entering the nest; but generally they flew in

with their load. By marking different wasps it was shown that they did not stay more than half a minute in the nest, as if for orders; and when they emerged, after a short preliminary examination, they laid on their paper. The pellet was gradually attached to the free edge of the sheet, the wasp pressing it down with her jaws, between which it all passed. As she walked backwards, a broad black line, about three-quarters of an inch long, marked the extent over which the pellet had been spread; then she ran hastily forwards, and again walked deliberately backwards, flattening out the new soft paper into a frill; and this process was repeated some four or five times, till the pellet had been flattened out to the same thinness as the adjoining paper, from which, in a few minutes, when it had become dry, it was quite undistinguishable. Then the wasp gravely walked into the nest again.

During the process of paper-making one could approach quite close to the wasp, and even touch her without driving her away from her work. It did not appear that each wasp had her own place for paper-making, or her own end to piece on to, for we repeatedly saw one going on where a wasp had left off so short a time previously as to render it very improbable that she was the same wasp, and could have collected another pellet in the interval.

Generally speaking, the nature of the materials employed in building is almost as characteristic of the species as the form of the nest. Whatever other materials may be at hand, still each uses its own by preference, one species using bits of wood and sand gummed together, while another makes a tougher and lighter structure of vegetable fibres. I am not acquainted with the nests of *V. rufa* and *V. borealis*, but, of the other species, *V. Crabro* and *V. vulgaris* use wood and sand, and *V. britannica*, *V. germanica* and *V. holsatica* herbaceous filaments.

Though the materials used by the three last-named species are the same, yet the paper of *V. germanica* is not so firm and tough as that of the other two, apparently from the mucus employed being less adhesive. The small nests of *V. holsatica* and *V. germanica* which I have in my collection are of a singularly uniform texture, differing much in this respect from the nests of *V. britannica*, and giving more completely the impression of having been built by one insect, which had collected the fibres from the same source as long as the supply lasted.

Under the microscope the paper of these three species is seen to be composed of vegetable fibres of all kinds, just such as a botanist

might select as specimens of the different tissues. These have apparently been all pulled singly from plants, either growing or still retaining their sap; for the paper made by these wasps strikes a dark colour on being boiled in an alkaline solution to dissolve the mucus by which the fibres are held together. An irregular kind of felting of the component fibres gives the structure additional tenacity.

The fabric of *V. Crabro* and *V. vulgaris* is made of minute fragments, not filaments, cut, rather than torn, from dry and rotten wood. With this material *V. vulgaris* makes a light yellow, brittle paper, which feels harsh and gritty, and crumbles under the hand into powder. *V. Crabro* fastens together large grains of sand and wood into a structure which is, in general arrangement, a coarse exaggeration of the paper of *V. vulgaris*, and owes its strength almost entirely to the dark gummy secretion in which these fragments are set, like stones in concrete. Where the structure is thick, as in the pillars, it possesses very considerable strength, but hornet paper is very friable.

The case of the nest of *V. britannica* is well adapted to the circumstances under which it is usually placed. Being of a dull mottled brown and gray colour, it is unlikely to attract notice; and being formed of separate sheets overlapping one another, composed of a substance not indeed impervious to water but insoluble in it, the structure is well calculated to protect the enclosed comb from any injurious effects of rain. The underground nest of *V. germanica* is, in its turn, equally fitted to resist the injurious influences of a wet or crumbly soil, to which it is most likely to be exposed. In the tree-wasp's nest we have unconnected sheets, overlapping one another like the capes of an old-fashioned box-coat. In the ground-wasp's the wall is made of large flattened cells, built one upon another to the thickness of half an inch or more, not affording equal facilities for drying, for indeed probably they never are dry, but capable of sustaining a greater pressure than the case of the tree-nest could bear, and giving more points of support by which the nest may be attached to the irregularities of the cavity in which it is usually built. Instead of a smooth ball, resembling a half-blown rose or a cabbage, the nest of *V. germanica* forms a rough dirty-looking mass, covered over with shelly patches, laid on without the slightest pretension to order or appearance. When it builds in roofs, a less usual situation, it retains the cellular mode of construction, as instinct guides it; and indeed, in a situation protected from rain, this cellular structure would answer the purpose intended quite as well as a laminated one. But the form of these cells undergoes certain modifications, according

to their position in the nest and to the immediate object for which they are designed; the upper part of the case, for instance, is made of a close, compact set of cells, into which any roots or stones are worked; while the sides are made in longer channels, as being less liable to pressure, and sustaining less traction.

In a nest of *V. germanica* which I had under observation, where the object of the work was merely to close in a large hole which I had cut in the wall of the nest, I thought that the cells were wider and longer, and the wall altogether much slighter, than when any more substantial enemy than light had to be excluded. These wasps worked in the same way as *V. britannica*, and used the same materials, only, being larger, they got on faster. When making the shelly patches which closed in the cells or channels of the wall, they worked indifferently to the right or left, but always from without inwards, forming an irregular spiral, which tended towards a little hole, just big enough for the passage of the jaw of the wasp which put the finishing stroke to the work.

Réaumur, speaking of ground-wasps and hornets ('*Mémoires pour l'Histoire des Insectes*,' vi. p. 226), says that the nest remains open at the bottom till it has attained its full size. From my own observations of nests of *V. britannica* and *V. germanica*, of all sizes, I should say that the nest is always closed at the bottom except at quite the earliest period. No doubt this is effected at a great expense of labour, the walls having to be altered continually; but economy of labour is no object with wasps, which, like the other Hymenoptera, seem to know no rest but sleep, and, whether in the way of construction or destruction, must always be doing something.

Much perplexity has arisen from the different forms which wasps' nests assume at different periods. At an early period there is no specific mark to distinguish the nests of *V. germanica* and *V. britannica*, for they are both alike formed of overlapping sheets and open at the bottom. It is only in the cellular structure of the walls that specific differences appear. I do not know the form of the nest of *V. vulgaris* through all its stages, but only as the perfect nest, when it resembles the structure of *V. germanica* diminished in all its parts. Hornets do not seem to form the case of their nests on any uniform plan, but rather to seek such extraneous protection as may obviate the necessity of making any case at all, the numbers being fortunately fewer in the colonies of this species than in the smaller Vespidae, and the necessity of finding something to do being consequently not so pressing.

But besides the different mode of construction of the walls of the finished nest, there are two distinct types which are displayed most characteristically in the embryo nests of tree-wasps. One of these types is illustrated in what we may call the rose-nest belonging to *V. britannica*, which is a rose-nest through all its stages, and the other in a bell- or bottle-nest, which I only know in the embryo form, and can only conjecturally assign to *V. holsatica*. These little bell-nests are very beautiful objects. The manner in which one bell hangs loosely within another, and the comb, like a clapper, inside the two or three envelopes, is very peculiar. So neat and complete are they in all their parts, that it might seem as if the little architect never designed any further enlargement of this pretty nest.

As to the internal structure, it may be said generally of all the species, so far as I have had opportunities of observing them, that they follow the same rule. The walls of the breeding-cells are made of the same material as the case of the nest, but all fresh-gathered, the cuttings of one part never being made up again into another part. The building goes on irregularly enough, a bit being put on here or there, according, as it might seem, to the taste of each builder; but the work is very regular, and hangs well together when finished; for the cells are not made separately, but each pellet is always applied in three continuous lengths, namely, on two sides of one cell, and on one side of an adjoining cell. This mode of construction may always be traced in the finished comb, and was very distinctly seen in a nest of *V. germanica*, where I had a large surface of comb exposed to observation. The cell-wall is single, but each cell is by this mode of construction worked into the adjoining cells, each having a distinct mucous lining of its own, the work of the grub and the plaything of the adult wasp.

But to return to our colony. As soon as the nest was closed in at the bottom, a regular watch was established at the entrance. The same wasp was often on duty for a long time together, but it was not always the same; and once, having caught the sentinel at her post to mark her, before the operation had been completed I found that the place was filled by another wasp. There she stood, with her jaws extended, just inside the door-way, running forwards to exchange compliments with each fresh-comer, or occasionally, when work was slack, taking a walk on the outside of the nest. At night I generally found one or more lying out on the nest instead of at the door, apparently on guard.

Yet all this time I believe that the swarm had no queen, the only

female brought from Gloucestershire having died on the journey. Under whatever form of government, *V. britannica* seems much more vigilant and irritable than *V. germanica*, for in a nest of these I did not notice any regular system of watching. The wasps which performed the part of sentinels were commonly crippled in their wings, and very crabbed in their tempers. They ran over the nest instead of staying at the door, and seemed rather to hinder than to regulate the stream of business. But, to the credit of the working part of this swarm, it should be said that the crippled wasps were as fat and well fed as the rest; and though *V. germanica* be not as vigilant as *V. britannica*, yet it is directed by the same instinct. The workers fly straight out and straight in again, and never straggle near home. I hope my wasps were no trouble to any one else; they were never seen or heard of inside my own house, except when they entered it in pursuit of their master on some excessive provocation.

I believe that societies of wasps have no other law than the necessity of the case, except where the love of their young or such-like instincts are concerned. So in my small colony of *V. britannica*, where one opening was sufficient they made no more, but used this one for ingress and egress alike, contrary to what has been reported of larger swarms.

Besides those passing out on business, from time to time a wasp appeared at the door-way, merely to discharge her excretions, with which the floor of the box was generally wet. This was, as one might expect, most commonly observed in rainy weather, when the workers stayed more at home. The cleanly habits of these wasps contrasted strongly with those of a nest of *V. germanica* which I had at the same time in confinement; but it was the circumstance of living underground in the first instance, and subsequently of their confinement, which determined this, and not the nature of the wasps themselves; for nothing could be cleaner than a deserted nest of *V. germanica* which was brought me from a roof at Warbleton. I have on several occasions analyzed these excretions, but found no sugar in them, even when the insects lived entirely on honey. In this latter case they were composed of uric acid; but this is not always a constituent of the excretions of wasps.

On the 7th of August the drones began to make their appearance, but I looked in vain for any queens; though the numbers kept up, and indeed, for the safety of my neighbours, who might not feel so great an interest in wasps as I did, needed occasional reducing; and still, till September 4th, grubs of different sizes were thrown out daily.

After a very violent demonstration on the part of the wasps one sultry afternoon, their numbers were reduced by twelve, caught in the usual way by the tube ; but this was the last reduction which they needed. Henceforth the numbers seemed insufficient for the duties of the nest ; and, a sudden change of weather adding to their other misfortunes, the active exertions of the whole colony seemed paralyzed.

They were transferred to a new case, where they were better protected from the rain ; but they seemed feeble, and now they fed on anything which was placed for them outside the nest, while when in full vigour they had rarely if ever touched anything laid in the immediate neighbourhood. Two wasps in particular, smaller than the rest, were actively employed in filling themselves with honey and flying into the nest, and from their frequent re-appearance I thought they must be employed in feeding the weaker wasps, which did not venture out.

It does not require a very long observation of wasps to feel that the general opinion concerning them is not strictly just. We know them mostly as voracious creatures, spoiling our fruit, threatening us in our beer, and on cold days crawling up the legs of our trowsers or getting into our slippers. We see them in our windows, the tyrants of the pane, if we spare them long enough, cutting up flies and daddy-longlegs, and dancing about with the dismembered trunks. But we must observe them in their nests to learn their better qualities,—their affection for their young, and their untiring industry. They do not idolize their queen as bees do, but they never neglect her, and always bring food into the nest for her. With caution and practice they may be managed to a certain extent, though their less close relation to their queen deprives us of that authority over them which we may exercise over bees. On fitting occasions they are very ready with their stings, but these are rarely used in the nest even in anger. The jaw was the favourite instrument of offence with which they assailed strange wasps, and with which they met the attacks of any wires when I wanted to do anything to the nest. I fear, however, that it might not be always safe to calculate on this habitual preference of their jaws when one's fingers are concerned.

Difference of size is very characteristic of the Hymenoptera, and is not therefore entirely to be connected with difference of age. But I think it may be said generally that the younger the fully-developed wasps are the larger they are ; and, in connexion with this, it is worthy of observation that the task of building is entrusted almost exclusively to the larger wasps, as if, with their younger organs, they

had a more abundant supply of the mucous secretion which binds the fibres of their paper together. To the smaller wasps are assigned the duties of nurses and police. In the nest whose history I am endeavouring to keep in view amid all these digressions, it seemed that the post of sentinel was usually allotted to small, old, experienced wasps; and in the cold, wet days, which brought the colony into the straits I have described, the two little, busy, active old wasps seemed the nurses of those that shrunk from facing the wind and rain.

In the first instance the newly-hatched wasps look small, whitish and shrivelled; but when the mealy appearance which they wear at their birth has passed away, as their down rises and exposure to the sun brings out their colours, and when they have taken their place with the other wasps, they are distinguishable by their larger size as well as brighter hues, and the smooth edges of their wings.

The difference in size of different workers of the same swarm is, however, not so considerable as it appears at first sight to be. Age or infirmity, hunger or cold, will shrink up the abdomen, on the size of which so much of the apparent size of the whole wasp depends; and a good meal, or a warm sun or fire, will make many a decrepit wasp look young again. But a real difference may be proved to exist by measuring parts which are not capable of such great distention or contraction. By the aid of the microscope I have found the limb of one wasp longer by more than a twentieth part than the corresponding limb of another wasp; and a still greater difference may be found by measuring the heads of different wasps of the same swarm.

A few more lines will suffice to convey all that remains to be told of the history of this nest. The few remaining wasps, judging from the continual nibbling and scratching, very very busy inside, but they rarely came out of their own accord, and even when the nest was shaken only a few wasps flew lazily out. On the 8th of September I cut away the front of the nest, and discovered nine wasps only, the last remains of the colony, all workers, living a kind of bachelor or rather old maidish life between two tiers of comb. They were very sluggish, and made no attempt to oppose my operations on the nest. The warm sunlight thus let in seemed, however, to revive them, and they went on at once with their work of destruction of the comb. Moved into a box, they lingered on, fewer in number and smaller in size day by day, till September 25th, when the last of them died, having been about two months under observation.

It was interesting now to see the changes that had been going on out of sight within the nest. The lowest comb had never been

completed, but had been covered in with five successive sheets of paper, the space between the comb and the case being very small and quite choked with fragments of paper. The other stages, contrary to the habit of the British *Vespidæ*, had been connected at their edges to the outer case, quite firmly all round, leaving only a gallery by which the wasps might mount from one stage to another. Lastly, nearly all the cells had been cut down or cleared entirely away, not merely, as is generally observed, in the upper, but in all the stages.

A very probable explanation of these deviations from their ordinary habits is to be found in the absence of a queen, and in the rough usage to which this nest had been subjected. The latter circumstance gave every inducement to strengthen the general plan of the nest in the course of repairing its frequent damages. The former not only gave a definite limit to the enlargement of the nest, but to a great degree relieved the workers from the duties of nurses, and set them at liberty to build or destroy according to their individual tastes. Not that the builders and destroyers are always two separate classes : a wasp, after building, will immediately set to work to destroy with equal zeal, cutting away some ragged end or some inconvenient projection.

All the British *Vespidæ* construct the interior of their nests on the same general plan ; that is to say, they all build their cells, with the mouth downwards, in flat combs hanging horizontally one from the other. But the form of the cells is a little different in the comb of *V. britannica* from what it is in the nests of *V. germanica*, *V. Crabro* and *V. vulgaris*, involving certain modifications in the form of the comb. In these three the upper surface of the comb rises uniformly all round to a little central point which marks the insertion of the main support, and the direction of all the cells is parallel and vertical, or very nearly so ; but the cells of *V. britannica*, and particularly in the small combs at the top of the nest, are made larger at the mouth than at the other extremity, so that at a short distance from the centre the radiating direction of the axis of the cells becomes very perceptible. The wasps correct this in a certain measure by elongating the cells and bending their mouths down, like a horn. Notwithstanding this correction, however, the upper surface of the comb assumes a concave form, and the cells at the circumference are sometimes directed quite horizontally, at right angles to the cells which were first built in the centre.

As the nest increases in size and weight the pillars or supports are made proportionally stronger, and their number is increased. But as

each comb hangs from the one immediately above it, none of the pillars, not even the central one, being regularly continuous throughout, the increase of weight necessitates a great change in the mode of suspension of the uppermost comb from which all the rest hang. So, in a large nest additional bearings are formed for the two or three highest combs by working them into the outer case; the highest is worked entirely into the cap of the nest; the succeeding stages are only worked in at the edge, and, the cells being cut away, room is gained here for a general place of assembly for the swarm. In these large operations the little delicate egg-shell in which the colony first was housed is almost lost; but I have sometimes been able to discover its remains in the apex of the nest.

I have already expressed a doubt of the correctness of the opinion that the nest is always built and the colony founded by a single female, as far as concerns *V. britannica*. This doubt rests in part on some observations on a colony of this species which rebuilt their nests and laid eggs in the cells three times within periods far too short for any of these eggs to have produced wasps, and at a season too early for new queens to have been developed or impregnated. Several wasps, larger than the rest, were seen engaged in building the nests; but no single wasp was seen so much larger than all the rest as to be considered as the queen *par excellence*. These wasps had the faint rufous stains distinguishing queens of this species; and the ovaries were distinct, though not distended with eggs. So that, as far as these observations go, we may conclude that these queens were of the former year, and joint founders, though not evidently mothers, of the new colony.

I am still further inclined to accept this conclusion from the circumstance, already alluded to, of the embryo nest of *V. britannica* not being of an uniform colour and structure, as if it were not exclusively the work of one individual; and also from the very large number of queen grubs which are to be found in the lower combs of this species, as compared with *V. germanica*.

The observations thus far recorded were made on wasps in a free state, either outside my study window at Brighton or by my sisters in Gloucestershire. The strong attachment of wasps for their young makes them disregard annoyances and changes which would render similar experiments on other insects quite fruitless. But liberty is indispensable to the exercise of a wasp's faculties; and my observations on wasps in cages, for want of this, proved very unsatisfactory. Yet these negative results are not altogether without interest.

Early in the summer I placed several queens of *V. germanica* and *V. vulgaris* in a tall case, made with a division half-way down, across which a turf was laid; the spaces above and below ground being provided with all that wasps could wish for, and a free access from the lower to the upper regions being secured by notches cut in the edge of the turf. But to no purpose: the wasps flew about and fed freely, and were very sisterly one to another; but they would not build. And when they died, one after another, by a natural process or by the help of chloroform, I found a diseased condition of the respiratory organs, all the air-tubes of the abdomen being thick and opaque, matted together, containing very little air, and wholly unlike the loose transparent structures which dissection of a newly-caught wild wasp displays; but the ovaries were for the most part distinct, and distended with developing eggs; and I suppose that only liberty was wanting for a free use of their wings to have converted each of these queens into the mother of a thriving colony, could I only have been sure that they would have built in the place I had prepared for them; but I never saw any more of one which I released after having familiarized her with the spot. With no family cares to recall her to my study window, she preferred to seek a home elsewhere.

It was not to be expected that they would undertake the charge of a nest already begun, and nurse the young grubs. In the absence of such care I have never succeeded in rearing wasps from grubs, or even from nymphæ. The grubs will eat honey and water readily enough; but after a few days their movements become less active, and they die. This might be due in part to the less regular and later hours of the artificial feeding; but there was something in the nursing of the wasps which the grubs needed, and which I could not supply. It does not seem to make much difference in the hatching whether the cells are in the natural position; for a broken comb, laid with its face upwards, under the care of its rightful owners, became a very thriving colony. But the care displayed in covering in the exposed comb seemed to show that an uniform temperature and the exclusion of light were necessary to the well-being of little wasps; and for want of these attentions nymphæ which had just finished weaving the silk caps of their cells died inside them, and others which were almost ready to hatch died without coming forwards. The grubs, however, do hatch often enough to make it very unsafe to leave a fresh piece of comb lying about the house.

My attempts to study wasps in confinement at a later stage were more successful. A small nest of *V. germanica*, with six stages of

comb, was got out of a bank at Cheam, and safely transferred to the glass case. By the time that the nest had been slung, and a large piece cut away so as to display the inside of the nest, the swarm was reduced to three, namely, two workers and one queen. However, they soon began to multiply, and before long I could count as many as sixty at once, a large number of them being drones, which appear to be hatched at a later period by this species than by *V. britannica*.

But wasps in confinement are very dull and tame compared with wasps in a wild state. They lingered on till the end of January, when the last survivor died; but they never made any paper; they merely vegetated. They seemed always made comfortable by having the glass case in which they lived washed out, and never molested me in doing this, though the process was repeated almost daily for several weeks.

I thought that they knew me; perhaps it was that I knew them, and was very careful never to shake the nest in my operations; for, gentle as they seemed at other times, even allowing me to handle them, the true waspish spirit came out on one occasion, when the nest had been accidentally displaced from its fastenings by a fall. They were so furious against the wire with which I was replacing it, that I was very glad that the glass had not been broken by the fall, and my angry pets turned loose into the room to find me occupation for a long winter evening in catching sixty wasps.

E. L. ORMEROD.

Proceedings of Societies.

ENTOMOLOGICAL SOCIETY.

July 4, 1859.—Dr. GRAY, President, in the chair.

Donations.

The following donations were announced, and thanks ordered to be given to the donors:—‘*Proceedings of the Royal Society*,’ Vol. ix. No. 34; presented by the Society. ‘*Farm Insects*; being the Natural History and Economy of the Insects injurious to the Field-crops of Great Britain and Ireland, and also those which infest Barns and Granaries; with suggestions for their destruction.’ By John Curtis, F.L.S., &c. Part I.; by the Author. ‘*The Zoologist*’ for July; by the Editor. ‘*A Manual of British Butterflies and Moths*,’ No. 33; ‘*The Entomologist’s Weekly Intelligencer*,’ Nos. 141 to 144; by H. T. Stainton, Esq. ‘*The Athenæum*’ for June; by the Editor. ‘*The Journal of the Society of Arts*’ for June; by the Society. ‘*The Literary Gazette*’ for June; by the Editor. ‘*Exotic Butterflies*,’ Parts 30 and 31; by W. W. Saunders, Esq.

The following works were announced as having been recently purchased for the Society's Library :—Olivier, 'Entomologie,' 8 Vols. Boisduval and Guenée, 'Species Général des Lepidoptères,' 7 Vols. and 7 Fasciculi of Plates. Fabricius, 'Systema Antliatorum.' MacLeay, 'Annulosa Javanica,' Part I. Martyn's 'Spiders.' Walckenaer, 'Faune Parisienne, Insectes,' 2 Vols. 'Zoological Journal,' 5 Vols. Spinola, 'Essai Monographique sur les Clérîtes,' 2 Vols. Guérin-Ménéville, 'Iconographie du Règne Animal, Insectes.' Redtenbacher, 'Fauna Austriaca der Käfer.'

Election of a Member.

W. D. Crotch, Esq., Uphill House, Weston-super-Mare, was balloted for and elected a Member of the Society.

Exhibitions.

Mr. Jeakes exhibited a specimen of *Arrhenodes maxillosus*, *Oliv.*, a North-American Curculio of the family Brentidæ, but which had been found flying in a garden at Camden Town by Miss Jeakes.

Mr. Bond exhibited some Lepidoptera taken at Freshwater, Isle of Wight, amongst which were beautiful varieties of *Setina irrorella*, a series of an apparently new species of *Coleophora*, *Cochylis flaviciliana*, &c.; he also exhibited a splendid living specimen of *Calosoma sycophanta*, found on the coast at Freshwater a few days previously, and had since been fed on the larva of *Biston hirtarius*, of which it devoured three or four full-grown examples daily.

Mr. Shepherd exhibited specimens of *Deleaster dichroa*, lately taken near London.

Mr. A. F. Sheppard sent for exhibition two specimens of *Erastria venustula*, taken near Loughton, Essex.

Mr. Janson exhibited the following species of Coleoptera, hitherto unrecorded as British, viz., *Stenus opticus*, *Grav.*, from Mr. Jeakes' collection, taken by Mr. Squire in Horning Fen; *Conosoma pedicularium*, *Grav.*, from Holme Fen; and *Scolytus Pruni*, *Ratz.*, taken near London.

Mr. Mitford exhibited a fine series of *Psyche fusca*, which he had lately bred from the larvæ taken near Hampstead; and a specimen of *Carabus intricatus*, found near Bath, being a new locality for this fine species.

Mr. Holdsworth exhibited the nest and eggs of *Hydrous piceus*, from the aquarium of the Zoological Society, in the Regent's Park.

Mr. Gorham exhibited specimens of *Anchomenus livens*, taken near Eltham, in Kent, on sugar placed on trees to attract Noctua.

Mr. Stevens exhibited an apparently new species of Phycita, taken near Mickleham; and some beautiful Lepidoptera, chiefly Tineina, sent from Moreton Bay, by Mr. Diggles; also the drawing of the larva of a species of *Gastrophasia*, *Guén.*, and the moth reared therefrom.

Mr. Stevens also exhibited both sexes of the splendid Ornithoptera alluded to by Mr. Wallace in the letter read at the last meeting of the Society; and also both sexes of the beautiful Papilio allied to *P. Ulysses*, for which Mr. Wallace proposed the specific name of "*Telemachus*," which had arrived in this country since the last meeting. He observed that the Ornithoptera, although allied to *O. Tithonus*, *DeHaan*, was by no means identical with that insect, as had been conjectured by Mr. Westwood, from the description given in Mr. Wallace's letter.

Mr. Westwood exhibited, and read the description of, a new and beautiful species of Phasmidæ, for which he proposed the name of *Donelytron Batesianum*, and to publish a coloured figure in the 'Transactions' of the Society, it having been forwarded by Mr. Bates, from the Amazon River, too late for representation in Mr. Westwood's monograph on the family, published by the Trustees of the British Museum.

Mr. Westwood also exhibited a fine *Papilio*, collected in New Caledonia, by Mr. MacGillivray, of which the following are the characters:—

PAPILIO (ULYSSES, var.) ULYSSINUS, Westw.

Alis nigris dimidio basali cœruleis, corpore et basi alarum viridi irroratis, venulis tribus venæ medianæ macula holosericea nigra singulatim indutis, incisuris marginalibus albido maculatis; alis subtus fuscis, luteo-variis striga transversa areæ discordalis, lutea; posticis lunulis 6-maculaque anali luteis, squamis cœruleis supra marginatis. Expans. alar. unc. 3½.

Mr. Westwood, in describing this insect, called attention to the state of the question as to the views of the modification of species entertained by different recent writers, and observed that it appeared to him to afford an additional proof of the fact that, whilst many species of insects seemed to be free, under any changes of time or place, from more than occasional and slight *individual* variation, other insects evidently exhibited decided modifications of higher than individual character, wherever they existed in distinct localities. Of the former of these kinds of species he quoted *Cynthia Cardui*, which maintained its pure specific character almost all over the world (to which Mr. Douglas added *Deiopeia pulchella*); whilst of the other kind *Papilio Paris*, and apparently *P. Priamus* (to which *P. Ulysses* might now be added), might be cited. Hence Mr. Westwood considered that the fine *Papilio* exhibited that evening was another local variety of *P. Ulysses*; and he suggested for it the sub-specific name of "*Ulyssodes*." He added that in the British Museum collection is another geographical sub-species, also from New Caledonia, in which the male has scarcely any trace of the silky patches on the fore-wings, although agreeing in size with *Ulyssinus*. For this he proposed the name of *P. (Ulysses) Ulysellus*. This diversity in the modificational powers of certain species had, he believed, not been sufficiently noticed in treating upon the question of the modification of species. He considered it would be advisable, however, to give to each decided geographical modification of a species a separate specific or sub-specific name.

Mr. Waterhouse admitted the existence of decided and well-marked geographical races amongst certain insects, citing certain species of *Philippine Pachyrhynchus*. He had not, however, deemed it necessary to give to these races distinct names. He also noticed the fact that whilst certain species seemed never to vary (*Coccinella 7-punctata* for example), other species in the same genus were so variable, in the same locality, that it was scarcely possible to obtain two specimens alike.

Mr. Westwood also observed that he was not sure whether the grand new *Ornithoptera*, for which Mr. Wallace proposed the name of "*Cœsus*," might not be a local variety of *O. Priamus*.

Mr. Pascoe stated, with reference to his papers on the Longicorn Coleoptera, published in the 'Transactions' of the Society, that he had ascertained his genus *Blemmya* was identical with *Euryarthrium*, *Blanch.*, and that *Anomæsia* was referrible to *Eunidia*, *EricA.*, which is also the *Erethis* of Dejean. His names therefore,

being the most recent, must be suppressed. He also mentioned that *Sophronica, Dej.*, was synonymous with *Dasyo*, and that his *Pachypeza implex* appeared to be the *Cacostola leucophæa* of the same author.

Mr. Smith read some notes on the economy of the Ichneumonons constituting the genus *Pezomachus* of Gravenhorst, with observations on *Pezomachus fasciatus*.

Mr. Waterhouse read two papers, intituled "Notes on the British Species of *Donacia*," and "Notes on the British Species of *Cissidæ*."

Part 2 of the current volume of the Society's 'Transactions' was on the table.
—E. S.

Notes on the Mountain Birds of Jamaica.

By W. OSBURN, Esq.*

"Freeman's Hall, Jamaica,

"June 7, 1859.

"My dear Sir,—It may be as well to preface my remarks on the mountain birds of Jamaica by defining briefly what I understand by mountains. The centre of this portion of the island is occupied by what may be termed the central ridge; but in truth it is a series of ridges, succeeding each other so constantly that in crossing it is difficult to say when the highest point is reached. However, regarding them as a whole, the summit of the chain may generally be recognised, as far as my observations go, by the greater tendency of the limestone to spread into clay-covered flats, often interrupted by gullies, but which still render the forest which shrouds them much more accessible than it is among the ridges and 'cock-pits' which furrow in every direction both the northern and southern slopes. The red conglomerate here constantly appears from beneath the limestone, as is the case in the little valley which includes the pastures round this house. I have, unfortunately, no means of ascertaining the exact height of any point in this immediate neighbourhood; but we may, I think, attain to an approximation. On my last journey across the island I ascended the Bull's Head, a lofty point of the red conglomerate, near the boundaries of Clarendon and St. Ann's. The view from the summit was magnificent over the sugar-estates and hills of Clarendon and Vere, and far out to sea beyond Old Harbour, and eastward over St. John's to the Blue Mountains, and westward along the flanks of the many ridges of Manchester and St. Elizabeth's. But the lofty, unbroken ridges of Trelawny and St. Ann's prevented any very extensive prospect northward, so that it was

* Communicated by P. H. Gosse, Esq., F.R.S.

quite impossible from this point to catch a glimpse of the sea on either shore as from the Dolphin's Head in Westmoreland. Indeed, the Bull's Head is very improperly represented in the map as an isolated peak; for from its summit it is very difficult to say whether many other points in the same ridge are not even a little higher. Now, its altitude in Wyld's map (1851) is given at 3140 feet. Assuming this to be correct, the height of these middle ranges hereabouts may be estimated at about 3000 feet. They are characterized by forest scenery peculiarly their own. The forest is largely composed of Santa Marias (*Calophyllum*), whose gigantic size make the long thatch-palms beneath them seem pure underwood. Besides these and the arborescent ferns there is little undergrowth to mask the interminable colonnades of gray trunks. The hog-hunters' paths wind among them for miles, and for immense districts are the only roads. This I would call the central range. In this district, which includes the Black Grounds, Freeman's Hall is situated. Between this and the northern coast the slope is interrupted by abrupt ridges, also of limestone, so broken and precipitous that large portions of their surface are inaccessible, and rendered still more so by the forest, which clothes all but the precipices, and whose dense underwood and general aspect is such as covers the mountains of St. Elizabeth's and Westmoreland, so well described in your works. Many plants, for instance a species of *Begonia* common in this district, do not penetrate into the mountains above, nor into the cultivated hills nearer the coast. These I would term the lower ranges. The cultivated hills still nearer the coast, though they attain to considerable height, as the magnificent views of the Carribbean Sea, which so constantly burst upon the traveller, prove, Trelawny being one of the oldest and most assiduously cultivated of the sugar parishes, the eminences have long been cleared, the soil in consequence washed off, and only the intervening valleys planted in canes.

It is some points in the Ornithology of the two first districts I propose to consider. That the distinction I have drawn between them is, even for this purpose, important, there are abundant proofs. One of the most remarkable is, that while *Aramus* *Scolopaceus* abounds in the lower ranges so that I never cross the woods towards evening without hearing or seeing these birds, I have not met with a single instance of the species in the upper range; and the negro sportsmen confirm this observation. When I first proposed to visit the central range, the general remark from persons well acquainted with it was, "You will find very few birds there" during the months of January and February.

And so far as the forest was concerned (and here it comprises all but the small cleared patches), I found the observation much more accurate than I supposed. I often rode for miles, carefully on the look out, without seeing a single bird. Indeed, these vast wilds appeared like mid-ocean, destitute of life, save at the edges and along the banks of streams. It was not, however, silent, for it was rarely the long-drawn bell-like note of the solitaire (*Ptilogonys*) was not audible at a greater or less distance. I was already acquainted with it in the lower mountains round Mahogany Hall; but here it abounded, especially towards the edges of the forest. I soon procured specimens, and saw others sitting on branches, in the puffed, absorbed posture you describe. On my return, in April, they were completely gone; so that I have never heard the nuptial notes or seen the summer dress of this interesting bird. It seems that we are not sufficiently elevated here for their constant residence. Equalling the solitaire in its love of solitude is your little *Sylvicola pharetra*, but not in sedentary habit; for if at rare intervals I came across an unusual bustle and flutter among the twigs and leaves of the lower branches of some forest giant, it generally proved this little bird. I have never met with it but in the woods, and then quite alone. It was, however, at that time far from abundant; for, though constantly on the look-out, I only got a single specimen in January, and another in the first two weeks in February. But on my return, in April, a marked change had taken place: the forest was no longer silent, but resounded with the differing notes of myriads of birds, of many different species; and in none was the accession in numbers more marked than in this *Sylvicola*. Their cheerful, busy flutter occurred over head at every few yards in some districts. I easily procured several more specimens. My impression is, so far as observations made in the two last weeks of April go, that it migrates here in the spring, and that those met with during the winter are only stragglers left behind. Since my return, a few days ago, the rains have been so constant and heavy that I have had no opportunity for ascertaining whether they are still here, though I have little doubt of it. Very similar in habit and habitat is the other species you discovered (*S. pannosa*). I procured one a year ago near Grand Vale, but never met with it again till I arrived here. I only procured a single specimen, hunting quite alone in the undisturbed recesses of the forest. It proved, as yours, also a female. The most careful search never procured me another, though I was anxious to ascertain the plumage of the other sex. However, in crossing the mountains between Clarendon and St.

Ann's, on Greenock estate, during the middle of April, I met with them in considerable abundance. Though they gave me the opportunity of a pretty close examination, I was unfortunately unable at the time to shoot one. The colours then seemed brighter, and the yellow on the breast especially more decided. I expected to meet with them at Freeman's Hall (here), only ten or twelve miles westward on the same ridge; but, to my disappointment and surprise, I could not fall in with them. I have in my own mind no doubt as to the reality of this distinct species.

"Towards the end of last year, whilst riding through the lower mountains, a perfectly black bird alighted on a wild pine growing at some height in a vertical position; and as I watched it I observed it climb about the stiff leaves with great agility, and eagerly search their sheathing bases. Your surmise as to the black banana bird instantly occurred to me. I did not then procure it, but the negroes assured me they were abundant higher up, and the investigation was one of the chief objects I proposed to myself on coming here. I did not find them very common, and procured only four specimens during the first six weeks of the year. They are to be met with especially in those deep damp hollows which the forest growth seems striving to conceal, and where orchideous parasites and wild pines luxuriate in abundance. It may there be seen climbing among them, as mentioned above, or flying from tree to tree in short flights; or, if not visible, its very peculiar call is audible far over head. I would imitate it by 'kep-chur-r-r,' the first a loud, clear note, followed by a rattle reproduced with sufficient exactness by a long, rough 'r.' The whole bird is coloured black, and that of the plumage has the purplish gloss of our Quiscalus. The hind toe seems rather more developed than with *Icterus leucopteryx*; and it has, I think, a corresponding increase of climbing power, oftener assuming the vertical attitude. One I shot hung head downwards for some time, exactly as the common banana bird will do. Another very marked distinction is, that the culmen, or upper ridge of the bill, is flattened and broad, dividing the frontal feathers like a plate, but does not expand. The following are the dimensions of two specimens; the second was a female, and the first, I believe, a male, though the part was much injured:—

Length	8½.	Exp.	13.	Flex.	4½.	Tail	2½.	Rictus	1.	Tarsus	1.	Mid. toe	¾.
"	7½.	"	12.	"	4.	"	2½.	"	1.	"	1.	"	¾.

Hallux ¾, not therefore so long as the tarsus. Intestine 8. The stomachs of all four contained fragments of insects, Coleoptera chiefly; I found no traces of seeds. On the 11th of February the

ova of the female were still minute ; and in skinning them I noticed a rank odour common to many Corvidæ. A female was brought to me still alive, and apparently uninjured except a fracture of the leg. It showed not the slightest pugnacity when handled, and lived several hours. It had not any notion of applying the uninjured foot to a flat surface, but kept it grasped. I put it on a perch : whether from pain or weakness I do not know, but it immediately slipped round, and hung suspended head downwards by its sound foot for some time, and then fell. I do not regard this as a satisfactory proof that the bird habitually rests in this position ; but it is not impossible, because, according to the ordinary theory of perching, that in which the weight of the body is brought to bear is, with most birds, the easiest position ; whereas this bird made no effort to keep upright, but immediately slid round, as if that were the most available posture for holding on. Of its nidification I have as yet learnt nothing. Should this species prove new to Science, as well as an addition to our Jamaica list, I would propose '*nigerrimus*' as the specific name, if it is not already appropriated.

"I have discovered nothing with regard to the second, and I presume smaller, black species you allude to. Had you any particulars about it ?

"A second bird, rather abundant in this district, and not included in your list, is a sober-suited olive-coloured little fellow, that keeps pretty much to the higher branches of lofty trees, though I have not unfrequently met with it on less elevated positions. From its strong, compressed, deeply toothed bill, I was at first inclined to suppose it might belong to Mr. Swainson's extensive genus *Thamnophilus* ; but a better acquaintance with its habits and structure has convinced me that it should probably be classed among his *Ampelidæ*, and somewhere near *Pteruthius* perhaps, though I am unable to refer it satisfactorily to any of his genera. Not to fill up my letter with a detailed description, which I propose forwarding with the specimens, I may add that the head is a gray dubious olive, which becomes greener on the back. The quills and tail smoky black, with olive edges and the under parts dingy yellow. But its chief characteristics are the disproportionate size and thickness of the head, which seems only owing to the arrangement of the feathers, for it would not be suspected from the dried skin. I hope to forward an outline taken from a specimen when quite recent. The gray-blue of the beak is singularly in contrast with the prevailing tints of the plumage. The bird is tame and fearless, and, if perching low, may be easily approached ; and is

another of the lovers of profound solitude in the forest. I shot two in the earlier part of the year, and in the spring two more. They were then more sociable, and not uncommon. They hunt insects with considerable bustle. It will give an idea of their movements if I add that on shooting them at great heights I mistook, before firing, one of them for *Vireosylva*, and the other for *Sylvicola pharetra*; but I never saw it distinctly catch an insect on the wing. The stomachs contained several large seeds, a plant-bug, elytra of beetles, &c.

"But the species which chiefly contributed its numbers to make these lofty woods, during the winter so silent, resonant with the cheerful sounds of spring, was *Merula Jamaicensis*. They were not at all uncommon during the winter, coming at early dawn to the edges of the forest, with the solitaires and *M. leucogenys*, to feed; but in the spring I found them abounding. The little river, or rather brawling brook, that runs through this property, finds its way further down to a deep, dark gorge, where the mountain forest gathers its thickest gloom, and then disappears, like so many of our Jamaica streams, with a rush down a chasm or 'sink-hole,' to reappear, say the negroes, as the Rio Bueno, ten miles nearer the coast. Here these beautiful birds are in great numbers; the valley and hill-sides resound with their 'quank, quank;' and they have, besides, a loud, imperious call, uttered on the wing, very 'merulaceous'. I constantly hear there a beautiful, low song, with a note or two in it that reminded me of the solitaire, and with which I am unacquainted. I cannot but think it will prove to belong to this bird; but I hope, as soon as the weather will permit, to make further observations. I find it so numerous almost everywhere in the woods hereabouts as to suggest migration hither in this season. Just as with *Sylvicola pharetra*, I would take *M. leucogenys* as a standard of comparison. These last were abundant here in the winter, especially about orange trees. They are now common, but more dispersed, as a greater abundance of food and the necessities of the breeding-season would suggest; but there is no unaccountable change, apparently, in their numbers. With *M. Jamaicensis* they seem to me to bear no proportion; this is, however, only a suggestion.

"I see my limits preclude my adding, on this occasion, some notices on the nidification of *Tyrannus crinitus*, *Myiobius tristis* and others, as I had intended; for I would not conclude without some notice of an opportunity lately afforded me of observing the habits of one of our magnificent pigeons, namely, *Columba Caribbea*. While lately on a visit to Windsor Pen, on the leeward or western side of

this parish (Trelawny), situated among the mountains I have described as the lower range, I was surprised to hear that the ring-tail was very abundant in a neighbouring pasture. I immediately went there, and found that the pasture occupied only the bottom of a narrow valley of small extent, the thick mountain woods closely investing the steep hills all round. About the centre was a fine tree, loaded with bunches of the semi-transparent scarlet fruit the negroes call cherries; but I have not yet ascertained what it is. On approaching the tree, to my great satisfaction I observed one of these birds reposing on a thick branch near the centre, 'sitting down' as the negroes say, evidently resting on the whole tarsus. I watched it for some time, but it was quite motionless. Another flew from the neighbouring woods, and alighted on the topmost twig of a lofty cedar. It was followed by a third bird, which immediately commenced feeding it, as usual with pigeons. I fired in a short time, and one only fell, a young bird with the down still adhering to the tips of the feathers. The old bird soon returned, and I secured it; it proved a male, thin, but in the very finest plumage. On dissection the contents of the crops of both birds proved the same, a pulp composed of a species of small fig. Their structure illustrated some interesting particulars. The lower mandible is remarkable for the wide divergence of its rami, which bifurcate only about one-third its length from the tip. The feathers thus come far forwards under the chin, and give the bird a peculiarly gallinaceous aspect, lost in a measure in the skin. This is succeeded by an œsophagus so distensible that I found I could thrust three of my fingers into it. The proventriculus is rather conical than globose, as the lower end is not narrowed by a stricture outwardly visible at the cardiac entrance; it is sparsely studded with glands. I found a sweet-wood berry in the interior in one case, the seed-vessel reduced to a green pulp, and the large seed whole. The stomach is capacious, but so slightly muscular that a vertical section of its muscles nowhere gives more than one-fourth of an inch. I was surprised to find no trace of gravel or grit within. The sweet-wood berries were simply denuded of their fleshy seed-vessels, the large seeds remaining quite uninjured. I understood the significance of this on uncoiling the intestine, sixty-nine inches in length. Throughout its whole length it presented the appearance of a necklace, from the succession of these kernels passing down the canal, the spaces between filled with green pulp, which was alone digested. I pushed some out at the cloaca quite uninjured. I found seeds of figs and cherries in the same state. Thus it can be seen of

what deep significance is this peculiar form of beak. The whole alimentary canal undergoes an adapted change, and the mode of nutrition materially differs from that of other Columbadae. The white-belly (*Peristera Jamaicensis*) feeds greedily on the fallen seeds of *Laurus*, which its powerful gizzard reduces to pulp; while the ring-tail digests the soft seed-vessel only. The influence of these two species on the vegetation around them differs still more widely. While the white-belly destroys hundreds of the plants on which it feeds, the ring-tail scatters them abundantly over the forests it frequents. I must reserve some further notes on this bird for a future occasion.

“W. OSBURN.

“To P. H. Gosse, Esq.”

A List of the Birds of Banffshire, accompanied with Anecdotes.
By THOMAS EDWARD.

(Continued from page 6637.)

Carion and Hooded Crows (continued). The eyes of dead animals, perhaps living ones too, seem to be a very favourite morsel with them; for if one is cast ashore, or met with elsewhere, those organs are always sure to disappear first. And if a fish should be stranded (the larger the better), oh! what a glorious prize it is!—what a treat!—how they seem to revel in it! Like many others, however, in a higher grade of society, they can't always keep all the good things of this life to themselves; for the gulls generally come in and claim a share, if not the whole; and here too, as in higher life, many are the disputes and tough battles they have in consequence. Besides all these, I have seen them attack other game. Whilst walking one morning along the Doveran, with a friend, and just as we arrived at the mansion-house of Eden, our attention was attracted to the other side of the water, by what seemed to us to be the faint cries of a child in distress. On looking in the direction we beheld two crows (whether hooded or carion crows we could not tell from the distance) pursuing and tormenting a hare, by every now and then pouncing down upon it. Each blow seemed, as far as we could judge, to be aimed at or about the head; and each time that one was given the poor animal screamed piteously. These blows had the effect of stupifying the creature, so much so that she would whirl round and round for several minutes like a top. At other times, again, they

would fell her to the ground. On these occasions the crows, cowards that they were, always seemed to attack her with greater vehemence than they did at other times. These onslaughts, however, had generally the effect of bringing the hare to her senses, if I may so speak ; for she always sprang up as they were being inflicted, and seemed to redouble her efforts to get away. But it was all in vain. Another blow or two, and again she would become stupified, and either squat or reel about, and scream. We eventually lost sight of them, in consequence of their coming too close to the edge of the field, the wall of which hid them from our view. I was well aware, from what I had many a time seen, that crows destroyed leverets, young rabbits, &c., but was quite surprised to see them attacking an old one. I remember, whilst out on the hills at Boyndie, witnessing another, though less daring, attack. Concealed amongst some trees and bushes, waiting for a cuckoo which I expected to pass, I observed a half-grown rabbit emerge from some whins, and begin to frolic about close by. Presently down pops a hoodie ; not a mischievous, murderous hoodie, as it seemed, but friendly, courteous and humoursome. Far away he went along the green sward, or rather approached the rabbit, frisking, pranking and jumping about just like a Merry Andrew : no one so merry as he. All of a sudden, however, as if he meant to finish the joke with a ride, he mounts the back of the rabbit. Up springs the latter, and away he runs ; but short was his race. A few sturdy blows about the head, from the bill of the crow, laid him dead in a few seconds.

Rook (*C. frugilegus*). O yes, we have rooks, plenty of rooks, despite the murderous warfare carried on against them ; and I am sure a more persecuted race does not exist. The time, however, will come when they will be more respected and cherished, and the valuable services which they render more correctly appreciated. As I have already said, despite the war carried on against them, we have several pretty large rookeries throughout the county. One at Forglen is said to be the largest in the district, and to have been one from time immemorial. As many as from twenty to twenty-six nests I believe have been counted here on a single tree at one time ; and I am informed that the noise made during the breeding-season is so tremendous that it is often heard, on still evenings or quiet mornings, miles away. We have a small rookery here, amongst a few trees in the grounds belonging to Banff Castle, situated in the centre of the town, the occupiers of which seem to be in nowise incommoded by the traffic going on in the streets beneath them. Pied varieties of the

rook are sometimes met with, as well as white and of a cream-colour. I have in my possession a live one of the latter colour; and as he is a most wonderful bird, this rook of mine, I must tell you something about him. Well, then, he was born at a place called the Torr of Traup; his parents were both black, as well as his brothers and sisters; but how he came to be whitish I leave you to judge. It so happened that when he was about two or three weeks old a young urchin chanced to alight on the nest, and, no doubt thinking he had gained a wonderful prize in a white rook, bore him off in triumph. A friend of mine residing near, having heard of the affair, succeeded in procuring the rarity for me. On his first appearance amongst us he did not seem at all pleased, and would have picked all our eyes out if we had been foolish enough to let him. My children, a pretty good swarm, flocking round him, he pecked at them most furiously, as in fact he did at all strangers; but to my friend who brought him, and with whom he had been living a short time previous, as well as to all my family, he became quite gentle; and when my friend asked him for a paw, he held out one of his feet, and shook hands as it were with him. In a short time he became as one of ourselves, and strutted about the floor like a soldier on parade, making friends with all but one, and to that one, a large tom-cat, he could not and never did become reconciled. The cat no sooner put his nose in at the door than he was flown at, and one blow from the bird's bill was enough for him. Away he flew like lightning, whilst Jack, as we call the bird, shouted victory by giving a loud "caw." A stranger could not enter the room without being attacked. A bare foot was a most glorious object for him to peck at. For the first six months he lived in the same room as ourselves. It so happened that we had a baby at the time. Now, the youngster was always put into its cradle shortly after breakfast. Jack, after he had been with us a short time, began to give us a song of a forenoon; so that the baby could get no sleep. The consequence was that we were obliged to keep him in an old garret till dinner time, when he was generally brought down. If he was not brought down then, and the door was shut, his trumpet was set going, and continued until he was released. One day, when we were all seated at the table, just about to begin dinner, a rap-tap was heard at the door. "Come in," cried one of the children, thinking it was some stranger. "Caw, caw!" roared Jack, for it was none other, and he continued to rap with his bill until the door was opened. There is one most extraordinary trait in his character, namely, when he has more food than he can consume he

invariably hides it beneath a chair or such-like place until he is hungry. As to food, no choicer bit can be given him than a dead mouse; beetles and worms appear to be favourites, but a mouse is above all. He is also very fond of butchers' meat. On the broth-pot being taken off the fire one day shortly after we had him, down comes Jack from his roost, and marches to and fro the room several times in his own peculiar way, apparently taking no notice of the pot, when all of a sudden dab goes the bill right in the boiling soup, and out comes a piece of beef. Whenever the children had anything which he liked, it was a rare case if he did not, by some means or other, secure it for himself. If anything fell on the floor, and Jack was near, it was useless attempting to pick it up, for he would be there before you. I have said he sings; and so he does. But perhaps you never before heard of a rook singing; it is nevertheless a fact that this one does; and a most splendid noise he makes, by no means sweet I can assure you, being similar to the gruntings of a pig and the cackling of a hen, copiously intermixed with "Craw-wa-craw-wa," and generally ending with "Curr-warr-curr-war-war-warr." One more fact, and I have done. One day some neighbours heard the baby crying rather loudly; presently Jack came to the door, roaring "Craw, craw, craw," with all his might. Wondering what was the cause of it all, one of the neighbours went to ascertain, and found that the youngster had been left in the house with no one but Jack.

Jackdaw (*C. monedula*). This rock and chimney species is sure to be met with wherever favourable localities occur,—in our towns, amongst the higher rocks along our shores, as well as on precipices inland; and an old castle, or any place of that sort, is sure to have its colony of "kaes," with not unfrequently a mixture of starlings, &c. The jackdaw is another species that is very easily domesticated; and a very tricky, amusing fellow he is too. One almost of a pure white is now in the Banff Museum; it was killed near here, about two years ago. I once possessed a "kae," and I must tell you something about it. Well, I was down one day at the Middens, a place already referred to, seeing the boys catching sparrows, when a person chanced to pass with a gun. The boys, being very much annoyed by jackdaws, requested him to shoot them. This he did, at least he fired one shot, killing one and wounding another. The latter drew my attention at once, as well as excited my covetousness. After a little trouble I managed to obtain the bird. Away home I ran like a lamplighter, proud, happy and joyful. Well, I enter the house,

and, holding up my prize to my mother, roar out, "See, mither ! see, mither ! I've got a kae !" "O, ye rascal, ye little nickern," said my parent ; "did yer father na' tell ye that ye was to bring na' mair creatures here ? Ye ha'e the hoose in a perfect swarm already." "Only this ane, mither," I says. "Na," she replies ; "it canna be here. Besides, it's past ten o'clock, an' time that ye was awa at yer school. Sae awa wi' ye, an' dinna bring the bird back here again." And out I was bundled, kae and all. Part with it, however, I could not ; and I durst not take it to school with me, for I had introduced enough of this sort of Natural History there as well as at home. What was to be done ? I will tell you, as near as I can remember. I had on a pair of trowsers much too large for me, especially in a certain place, and in them I put the bird, little thinking of the consequences. Away I marched to school, which was only a short distance. Up stairs I got, though with some difficulty, but, as was often the case, found the door locked. Prayers, however, not being begun, I was admitted, but gained the "fool's corner" for being late. This was a sort of narrow, raised platform, which placed those who had the honour of being elevated to it in full view of all the scholars. It had only one seat, an old, rickety, trembling chair ; so that two were all that could be accommodated at one time. The school was kept and conducted by an old maid, and was attended by girls as well as boys. We all kueeled on the floor during prayers, our arms resting on our seats. Well, here I was, crowned like any king, having a great thing on my head about six times as high as any nightcap, and nearly the shape of that article. All was silent as death, save the half-moaning, half-groaning voice of the mistress, Bell Hill, as we called her. The devotions, however, such as they were, had not proceeded far when whisperings and stifled laughter rose audibly above the voice of prayer. These becoming louder and more frequent, I looked about to see what was going on ; but to my great surprise I found more than one finger pointing, and all eyes turned, towards myself. I wondered what it could mean, as they had all seen me in the same dress and place before ; but as I knew my trowsers would have been none the worse had they been in the hands of a tailor, I dreaded lest the bird had made his appearance ; so I put my hand round to ascertain, and found that to be the case. Fearing the result, as I knew his doom if detected, I gave him a squeeze, in order to make him draw in his head. Poor fool that I was. No sooner did he feel himself pressed than he bawls out, "Cre-waw, cre-waw ;" and

the more I squeezed him the louder he roared. "The Lord preserve's a'! Fat's this, noo?" cried Bell, starting to her feet. "It's Tom Edward again!" shouted the scholars *en masse*; "an' noo wi' a craw stickin' out o' his breeks!" To crown all, down went the old chair, which broke into fragments. Never shall I forget the uproar and confusion which took place, nor Bell's look as she stood, with both arms raised at full length above her head, addressing me nearly thus, "Well, master Edward, you are at your old work again. Did I not tell you only yesterday that I would not have my school annoyed in this way any more? Take the beast from him, Willie," she said, pointing to the largest boy, "and throw it out of the window." "No, I winna gie my bird t' nean; an' gin onnay one dares t' tak it, I'll brak his skull!" I cried, trembling all the while for the fate of the bird. Picking up a fragment of the old chair, I was determined, if any one did make the attempt, to put my threat in execution rather than lose my prize. This had the desired effect; for Bell, seeing how matters stood, and perhaps fearing mischief, said, "Well, you'll leave this immediately; and never come back, for you and your vermin are complete pests. Where and how you get them all, the Lord only knows. You cannot be here." This was glorious, as I had no taste for being confined in school; besides the joy of getting away scot free, bird and all.

Magpie (*C. pica*). Very sparingly distributed, and in some places scarcely known. Our keepers both shoot and trap them whenever opportunity offers. The magpie is one of the most bashful birds we have. When, however, they take up their abode beside farms, &c., they are by no means so shy, and, being generally held sacred by those near whose place they may be, frequently occupy the same tree or bush for many years. I knew of a pair myself that nestled in this fashion for thirteen years successively. Their young always disappeared towards winter each season, and never returned, but left the parent pair in quiet possession of the solitary tree.

Greater Spotted Woodpecker (*Picus major*). Several pairs of this showy bird have been procured within our district. Some, in fact, say that it lived in the higher parts of the county. Be this as it may, it is very rare, and its known occurrences few and far between. A most splendid pair, male and female, were killed about twelve years ago on the hills of Boyndie. It has also been obtained at Traup, Whinty, Park, Cullen, Auchintaul, Garden Castle, Kingervie, and doubtless other places.

Lesser Spotted Woodpecker (*P. minor*). Far more rare, I should suppose, than the last. One sent me, fourteen years since, from Mayen, where it was shot, and another seen on the Lodge hills, are all that I am aware of; but very probably others have occurred.

Wryneck (*Yunx torquilla*). The late Professor Macgillivray, of Marischal College, Aberdeen, informed me that one was taken at or near Portsay, by an old pupil of his.

Creeper (*Certhia familiaris*). Wherever there are suitable woods these birds are sure to be found. We sometimes read and hear as extraordinary occurrences that nests have been found in the hearts of trees that have been sawn up. Now, to those acquainted with the facts these occurrences are easily accounted for. I know a tree myself which contains *two* nests, both with eggs. About seventeen years ago there was in the side of this tree a small aperture, about six feet from the ground, which led downwards to a cavity in the centre of the trunk. The opening was so narrow outwardly that it only admitted two of my fingers, but widened as it proceeded to the bottom, a distance of about eighteen inches. In this hole, at the time referred to, a pair of creepers built their nest and laid eggs, after which they disappeared. Next season a pair of blue titmice acted in a similar manner; and they also disappeared, doubtless in consequence of being tormented by boys, and of the narrowness of the entrance. I believe no more attempts were made to breed there after this, for the growth of the tree caused the hole to get less and less every year, and it is now, and has been for several years, so completely closed that the point of the finest needle could not be inserted. The tree, a sturdy beech, has the two nests and eggs in its very core. It is thus evident how easily these "extraordinary occurrences" may be accounted for.

Wren (*Troglodytes europæus*). The dear little wren, the lion of small birds, with his short, jerking little tail, I have known and admired from childhood. Who that has trod the woods in spring or summer has not heard a very loud, though by no means inharmonious song, proceeding from some bush or bank, and not admired the same?—and who is there, if he did not know the bird, that would not be surprised beyond measure at such a small creature being able to make such a loud noise? Of all the deserted nests I have ever met with, those of the wren would, I am sure, count twenty per cent. over any other species. I am unable to account for this, but perhaps it arises from their building several before they get one to please them. I once found one of their nests in an old tin kettle, which had become

fixed amongst the branches of a holly. The bottom was out, so that the nest could be all seen. There were young in the nest when I found it. The wren, like other birds, does not sing so well in confinement. When in their native haunts, there is a pathos in their voice and a music in their melody that make the heart thrill with pleasure.

Hoopoe (*Upupa epops*). Three or four of these pretty birds have occurred here: one was taken at Duff House, in 1832, by a Mr. Mackay, in such a state of exhaustion as to allow itself to be captured by hand; another was seen by myself, a few years back, in the same place; and two others are said to have been since obtained in other parts of the county.

Cuckoo (*Cuculus canorus*). This is another sweet and darling gem. Well do I remember, when only a little fellow, rummaging about the Den of Rubislaw, near Aberdeen, how surprised I was on hearing the sound of "Cuckoo, cuckoo," from a small plantation close by, and how overjoyed I was when I obtained a sight of the bird; and now that I am old the sweet voice of the harbinger of sunny days still cheers me. They are not very numerous with us along the sea-coast, but are more frequent towards the higher districts. They generally appear about the end of April. It is said that they can retain their eggs for a number of days after they are ready for extrusion. I will relate, without comment, a circumstance of this sort which came under my own observation:—A female specimen, shot in a garden here, was brought to me to be preserved. On dissecting it I was agreeably surprised at finding in the oviduct an egg as perfect as if it had been obtained from a nest.

Roller (*Coracias garrula*). I am only aware of one specimen of this pretty and rare bird being obtained in our county; it was a most splendid specimen, killed on the hills of Boyndie, by Mr. J. Brown, gamekeeper to R. C. Nisbet, Esq.

Bee-eater (*Merops apiaster*). I give this species a place here from having heard that a greenish bird, somewhat less than a thrush, with a longish bent bill, and with two feathers of the tail longer than the rest, was killed in a garden between Huntly and Duff town, about seven years ago.

THOMAS EDWARD.

(To be continued).

"On Hereditary Tricks in Animals."

By the Rev. ALFRED CHARLES SMITH, M.A.

THAT in every tribe of animals a fine progeny may be expected to spring from a good stock, is a fact which none will deny: indeed, that acute observer of nature, Aristotle, was wont to assert, ages ago, "Ἐξ ἀγαθῶν ἀγαθοὶ;" and Horace, too, sang, as every school-boy knows,

"Fortes creantur fortibus et bonis:
Est in juvenia, est in equis paternus virtus."

This is all plain enough, and we can easily understand it. Nor do I find much difficulty in perceiving how *bodily* peculiarities may become hereditary, even when such peculiarities are not natural, but the result of the interference of man. Thus it is notorious that from the long-practised habit of cutting off the tails of sheep-dogs (or, rather, of biting them off, which I believe is the detestable method of performing that operation generally in vogue) there is now a race of tailless sheep-dogs, which come into the world without any caudal appendage whatever, or at any rate with tails so little developed as to be generally considered wanting. And Mr. Waterton, in his second volume of 'Essays' (page 161), speaking of the strange custom which prevailed in this country not very many years ago, of removing the whole of the tail of horses, says, "You would have thought that Dame Nature herself has 'taken smittle,' as we say in Yorkshire, for I knew a farmer's mare in the county of Durham, about the year 1794, that produced three foals successively without any tails at all." So far we see how Nature, accommodating herself to existing circumstances, endeavours to produce in the offspring a *fac simile* of the parent; and this comes under our notice so often with respect to bodily defects and blemishes, as well in the human race as in other branches of the animal kingdom, that it causes no surprise, and we have learned in a manner to expect it. But when we pass from bodily to *mental* peculiarities, if I may so call them, and note the tricks and individual habits which are likewise sometimes hereditary and transmitted from generation to generation, the question assumes a very different aspect, and appears to me extremely remarkable, and well deserving of investigation; for neither Aristotle nor Horace, nor any one else, as far as I know, has attempted to explain to us the cause and origin of these strange tricks which are practised in certain families, and, like the gout and madness in the human race, seem to descend from father to

son, in the most unaccountable manner ; and I repeat that amongst the many remarkable traits of instinct and natural peculiarity which the diligent observer of the various tribes of animals meets with at every point, there are perhaps none which are so difficult to explain as these *tricks*, not peculiar to the whole class or species, but only to individuals, and which in many instances seem to descend as heir-looms from generation to generation. Any one who has at all studied the Natural History of animals will have observed in many cases such "hereditary tricks" as I have mentioned ; but to take an instance or two selected from those animals which daily come under the notice of most of us, and which we have already taken as examples of the transmission of bodily peculiarities, let us examine the point in regard to dogs and horses. Every one at all versed in the mysteries of the kennel knows that hounds frequently inherit from their father or mother certain tricks ; thus one hound has a peculiar manner of coming up to be fed, another walks across the kennel with an unusual gait, while a third has a method peculiar to himself of running up to his keeper ; and all these tricks are precisely such as the fathers or mothers of these hounds had before them : so that the huntsman will often pick out such and such a puppy, and confidently predict him to be a good one, because his father was before him, and he has inherited his tricks ; from whence he infers, and generally rightly, that with his peculiarities he has inherited the good qualities of his sire too. Again, I need only mention the well-known fact that the pointer's puppy, when but a few weeks' old, will begin to point of its own accord. And so with regard to horses, how often are we surprised to find that the colt will inherit the peculiarities of his mother : either he jerks his head in some strange fashion, or he stands in the stable in some quaint manner, or he has some unaccountable trick, just as one of his parents had before him : and Dr. Prichard has stated that young horses will frequently adopt the artificial paces which have been taught to their sires (see Zool. 1100). But to come down from generalities to a particular example : a curious instance of hereditary trick once came under my notice in a mare that was driven in harness : she had a strange habit of constantly licking the bit ; she was very high-couraged, and this was her way of showing her impatience : at length her work was over, and she became a brood mare : in course of time her colt was broken into harness, and lo ! he had the very same trick, and licked his bit too, and in precisely the same manner, rolling his tongue round the lower bar, as his mother did before him. Now, one would be naturally disposed to refer the

tricks of animals which run in families, not to descent, but to imitation: we know how clever many animals are in imitating many things, and we should be disposed to attribute these tricks to that head: perhaps in some cases we should be right in so doing, but in the matter of the mare and foal the thing is impossible, since the foal never had the opportunity (even if we would grant him the inclination) of imitating his mother in this point, for he never saw her with a bit in her mouth.

Many similar hereditary peculiarities will doubtless have presented themselves to the experience of others; and, presenting as they do fresh subjects of interest, and fresh sources of admiration at the wondrous lessons which Nature contrives to instil into individual members of the animal kingdom, I would express a hope that they may be communicated through the pages of the 'Zoologist,' and thus form additional links of evidence on a subject with which we are as yet but imperfectly acquainted.

ALFRED CHARLES SMITH.

Yatesbury Rectory, Calne,
July 21, 1859.

The doubtful Eggs.—I have read Mr. Smurthwaite's "suggestion" (Zool. 6638) as to the eggs mentioned by me (Zool. 6563). It is not satisfactory to me. I certainly do not lay claim to a power of discrimination like Mr. Smurthwaite's, which enables him not only to determine that certain eggs, unseen by him, are blackbird's eggs, but also that a person, of whom he knows as much as he has seen of the eggs, is unable, from lack of experience or knowledge, to tell one "small bird's" egg from another, even when he has them before him. Still, while admitting this, and expressing my extreme admiration of Mr. Smurthwaite's remarkable gift of clairvoyance, I cannot quite put on one side the fact that the man who gave me the eggs declares that the bird he saw go off the nest that contained the eggs was neither a ring ouzel nor a blackbird, but that his impression at the time was that it was a "May thrush." With the eggs before me, in their nest, I ventured the opinion—a very decided one, too, it is, and I repeat it—that they were not the missel thrush's. However, I will forward those which I have loose to the Editor, if he will permit me, that others may judge by sight as well as myself. As to the sites selected for nidification by the redwing, I find that Yarrell and Selby both mention trees, of different sorts, as the usual ones. Perhaps Mr. Smurthwaite's "gift" enables him to decide that it is fir trees only which are "never selected" for that purpose by the bird in question.—*J. C. Atkinson; Danby, August 8, 1859. [Please to send them.—Ed.]*

Showers of Feathers.—On arriving in this country a few days since, my attention was drawn by a friend to a note on "showers of feathers," by Mr. P. W. Greene (Zool. 6442). As that gentleman has intimated that he wishes a further communication from me in regard to some feathers of waterfowl I had mentioned in a letter which found its way into the 'Zoologist' (Zool. 6324), I must say that such a simple fact

(not a "theory") as that of feathers scudding in a breeze, which even a closet naturalist may witness any day by extracting a handful from his bed, without disturbing that of "the goddess Holda," and letting them loose at a window, I should have thought could have been called in question by none. And as to mistaking feathers for snow, I answer by asking, was the latter ever seen floating on water? I can hardly agree with Mr. Greene, that it requires specimens of goose-down and feathers to be sent "by post to England," some thousands of miles, in order to settle "the matter beyond doubt or dispute," when the experiments can be made, as I have described, so near at home.—*Thomas Blakiston; Woolwich, July 24, 1859.*

A Kite (Milvus regalis) flying over London.—On Friday, June 24th, between 5 and 6 o'clock P.M., I saw a large kite, with very long wings and a forked tail, flying at the height of about a hundred yards above Piccadilly (opposite the Green Park), in a north-easterly direction. As the bird moved slowly, it might have been easily shot at that time. Its appearance excited a good deal of attention among the passengers in Piccadilly, and probably it was seen by other readers of the "Zoologist."—*J. Altham; Manchester Street, Manchester Square, June 30, 1859.*

Note on the Cuckoo (Cuculus canorus).—I do not know whether the following note on the cuckoo is worth recording; but it appeared to me to offer presumptive evidence of a love of offspring which I had never before witnessed; neither had I any very settled opinion of cuckoos possessing any share of natural affection for their offspring. On the 7th of June I was collecting insects on Hampstead Heath, about 7 o'clock in the evening. On arriving at that part which is contiguous to North End, I started two birds, which flew from the middle of some dense furze-bushes; they rose with a sharp, snapping sound, and, after taking a wide circumvolution, again flew close to me, uttering the same sharp, snapping sound, which was immediately followed by a quick repetition of the call of "cuckoo, cuckoo;" this was repeated three or four times, the birds each time dashing within two yards of where I stood. They then flew together into an oak tree, and continued to "cuckoo," apparently in a state of great excitement. The impression on my mind was, that I had disturbed and frightened them away from a nest which contained their young, or that they were in attendance upon a young cuckoo which had not acquired sufficient strength to take flight. I searched, hoping, but in vain, to find either a nest or young bird, and so more satisfactorily arrive at the object of the anxiety of the pair of old birds. The snapping sound resembled that made by the goat-sucker when hawking in the evening after fern-chaffers.—*Frederick Smith; British Museum, June 27, 1859.*

The Crab and its Allies.

By C. SPENCE BATE, Esq., F.L.S., &c.

(Continued from p. 6630.)

The Crustacea, in the tabulated idea, consists of twenty-one distinct segments, of which that furnishing the organ of vision is the most anterior.

Sight is not the only sense with which these animals are endowed: senses of hearing and of smell are more or less perfect in most of

them. The organs adapted for these senses are those which are developed as antennæ. Of these, in Crustacea, there are two pairs; the one internal, or anterior; the other external, or posterior. These organs differ both in form and relative length in different families and genera; but throughout the class they are adapted, the anterior to hearing, the posterior to smelling.

The anterior pair are always erect and on the watch,—jerking, moving and in play. They are universally formed of a peduncle supporting one, two or more filaments. In the lower forms these filaments are generally long and thread-like; in the highest they are very short, but the shortness consists in the decreased size of each segment, rather than in the number of the segments. Through the many forms of antennæ there appears to be one persistent scheme, however varied the aspect of the individual structure may be. The peduncle consists uniformly of three joints or segments. The first, that is, the one nearest the head, carries the acoustic apparatus, which consists, in the crabs, &c., of a bony cell that is circular, with depressed sides, and attached at one point only to the internal surface of the walls of the antennæ. The apparatus is supplied with nerves direct from the supra-œsophageal ganglion. In the lobster species the apparatus is long instead of round, and not so large in its relation to the organ; and Dr. Farre says it is always filled with sand, which, he presumes, acts the part of otolithes. The sand I believe not to be constant, and where present it is the result of unintentional deposit; but it affords evidence that there is an orifice, small, though connecting the internal structure with external condition. Professor Huxley has discovered an apparatus of a similar character to that which Dr. Farre found in the lobster; but I have failed to perceive anything of the kind in the antennæ of the amphipod and isopod species. This probably arises from the less perfect development of the part both in size and structure, rather than from an absence of such apparatus. Again, upon the anterior antennæ—so that the absence is a circumstance to be commented upon—there exists, upon one of the filaments, and one only, however numerous they may be, a series of organisms that look like transparent hairs, but differ in construction from the true hairs with which they are mixed. They are not more slight, but are formed of a tissue that is evidently membranous and very thin; they are often divided, sometimes branched, and assume many different forms often characteristic of genera or species. The Crustacea on which they have not been perceived are few, the most conspicuous of which are those of

Talitrus and its allied genus *Orchestia*: these respire air, and we may presume that has something to do with the circumstance.

That these animals have the power of hearing, we think there is abundant evidence. It is told by Mr. Bell that at the report of a cannon they throw off their limbs; and in the same book we read that whole cargoes of lobsters have thrown off their limbs in a thunderstorm, to the great detriment of their marketable value; and we are informed that the following pleasant instance of maternal affection has been observed, which also illustrates the faculty of hearing:—One day, upon the coast of Cornwall, a fisherman, going the round of his crab-pots, saw a number of young lobsters swarming together. He watched them for some time before he attracted the notice of an old one lodged in a corner of a rock. This, from its post of security, kept guard over the young ones at play; and as soon as it perceived there was danger near, rattled its claws together, and they all fled to their holes. We know from observation in other species, and we see no reason to imagine it different in the lobster, that the young are torn out of the egg-cases in a very crude manner. The waves and the winds carry them far beyond the protecting reach of the parent. The number that are hatched would defy the most anxious mother to watch. The youngest are not mature when the oldest quit the egg; and I doubt if two or more weeks may not elapse between the freedom of the first and the hatching of the last. As I before stated, the spawn of a moderate-sized edible crab consists of about two millions of eggs. The manner by which I arrived at this conclusion was as follows:—I tore off about three hundred and weighed them, and then weighed the whole mass; and, after deducting the appendages which held the spawn in its position, I found, as near as possible, that there could not be less than two millions of eggs. We perceive, then, that in the foregoing anecdote the parent watching over the welfare of the young can scarcely be correct. But this, we think, is no reason why the statement of the fisherman of Goran Haven may not be true. Lobsters are known to be very gregarious, and seldom ramble far from their favourite hunting-ground.

We know the instinct of more familiar animals that live together will induce them to set a sentinel to watch, and give notice of approaching danger. The starling and lark among birds, and the wild horse among animals, are ready instances. We would therefore interpret the anecdote of the lobster by our knowledge of instances of instinct among these. And the fact stated, that those which played around the old one were young, corresponds with the history of other

animals : they were protected because they were young, not because they were offspring.

But perhaps the fisherman of Goran Haven will not consent to this interpretation, but claim that instinct to protect the young will be greater in the parent than in any other, and of the two millions born some thousands die, as many more are killed, and they that are watched over are the youngest hatched, the proverbially most loved by mothers. To support the idea I would give an instance in a much lower form of the same class. It is told by Mr. Goodsir that on one occasion, while examining a female spectre-shrimp (*Caprella*) under the microscope, he found that her body was thickly covered with young ones, being carried about from place to place by the parent. And we know that the *Arcturus*, among the *Isopoda*, carries its offspring about attached to their long antennæ. Again, in the leech we find the same maternal instinct ; and therefore, by parallel reasoning, it is not impossible that the lobster may know its own offspring.

But these statements have drawn us off from the point we had in view, which is, to show that lobsters have the faculty of hearing ; thus, according to the fisherman of Cornwall, the old lobster *rattled* its claws, and the young ones fled at the signal to the protecting crevices of the rocks.

Whether sound, as known to the human ear, is appreciable to the organs of animals that live in the water, is a thing much to be doubted. Water is said to be a very excellent conductor of sound, which it travels four times faster than it does air. A bell struck in a diving-machine sounds with increased power ; but then the sound is made in the compressed air, and not in the water ; and, as far as my experience goes, no sound at all equalling that which we recognise as such is capable of being made in the water. Knock two hard substances together as you dive when taking a bath, and these will be not heard.* Sound is a vibration of air : can it be supposed that the vibration of water will produce the same result ? Sound, therefore, purely as such, is a questionable occurrence producible in water. That an analogous phenomenon does take place is morally certain ; but that it is a modified occurrence is evidenced from the altered condition of the organs belonging to animals that live in water. The otolithe in fish is not found in the ear of an animal that lives out of water, and the true cochlea is not known in any that

* Since this has been written, I have been informed that Gay Lusac rang a bell, under water, that was distinctly heard nine miles across the Lake of Geneva.

live in it. In Crustacea the anterior antennæ supply the place of the ears.

The antennæ which carry the acoustic organs surround and enclose the entire apparatus with its bony tissue, leaving, as far as our experience goes, no aperture in the crab, and a very insignificant one, in the lobster; and, as far as this part is concerned, the apparatus that receives impressions of sound is protected from the influence of external agencies by the stout integumentary tissue,—a circumstance that must preclude it from being at least a very effective organ under ordinary conditions. To obviate this and render it useful to the animal, the external walls are prolonged to a very considerable extent, the greater in comparison with the lessened perfectibility of the internal structure. Upon the slender and lengthened continuation of the integument, intermixed with the numerous more or less strong hairs, are placed the membranous ciliæ of which I have spoken.

These organisms are present, I believe, in all the higher orders of aquatic Crustacea, from the most perfect to the most immature forms, from the youngest to the oldest stage. In the larva of the crab the organ, in the earliest condition, is scarcely observable except by careful examination, by the aid of cautious dissection and a good microscope; yet it can be clearly defined from any of the other organs by the presence of these delicately-structured ciliæ, which assume a size, in relation to the antennæ, that gives them a preponderating importance. This agrees with observations made on the lower forms. In the sessile-eyed Crustacea the antennæ have no internal structure that I can detect that assimilates with the apparatus found in the higher animals, but exists as a member developed to support these membranous ciliæ, which appear to me to assume a high importance in their relation to the sense of hearing, particularly in embryonic and lower forms of Crustacea.

As sound is a minute vibration given by percussion to air, so a parallel result probably is excited by the same means in water, the difference between the two being equal to the difference of the density of the media. Thus, to make the vibration of the more dense material readily perceptible to the consciousness of the animal existing in it, long and delicate organisms, such as these ciliæ, must considerably facilitate the power. The term of auditory ciliæ appears to be very applicable to them. And in the Amphipoda we have traced what we believe to be a nerve traversing the lower side of the organ to the extremity of the peduncle, and to the root of the

first of these appendages, which are repeated throughout the length of the filamentary continuation, which appears as an extended base for their support. The number of these ciliæ bears no relative proportion to the length of the antennæ: they crowd together where the limb is short; upon the more extended organ one is present at the distant extremity of every articulation.

Hearing is given to us for a twofold reason: it is a source of enjoyment, and a power that protects us from danger. Music is a pleasure that cannot be surpassed by that derivable from either of the other senses. And the eye, though it may more directly point to an approaching danger, is scarcely so extended in its consciousness in conveying its approach as the ear. Ever since the mermaids have ceased to sing, and the destroying hand of Science visited with the dredge the secrets of their magic caves, deep in the bottom of the ocean,—ever since the syrens of the Greek poets have been found out to be but painted and hired viragos,—the idea of a lobster or a crab listening to soft music has not entered into the most wild poet's fancy. The note that can "soothe the savage breast" cannot tame the fish: it cannot be struck beneath the waters. The breath of mighty winds and the heavy lashing of the shore-broken serges are the only sounds that can penetrate the deep. These have been fancifully termed the *music* of the sea by those whom a generous license of humanity has permitted to alter the meanings of words, that they may awaken a pretty idea at the expense of truth. Birds and animals may enjoy the concerts of the air; but where there is an eternal silence an organ formed for enjoying sounds must necessarily be a work of supererogation.

The organ in this class of animals is formed for protection only, to animals beneath the sea: this is evidenced by the fact that in those Crustacea which are purely terrestrial the organ is never developed. This is evidently no (erroneously so called) freak of Nature, but a persistent law, since we perceive that the importance of the organ is gradually decreasing. In the sub-terrestrial amphipods, the sand-hoppers (*Talitrus* and *Orchestia*), the upper antennæ are rudimentary; in *Ligia*, among the isopods, we perceive the same degenerated state of the organ to exist; but in the land Crustacea, which are mostly isopods, the upper antennæ are microscopically present in the adult stage, and this although they are more proportionally important in the young. This argues, I think, that the antennæ developed to convey impressions by sound are organs adapted for the water only.

But in Crustacea there are two pairs of antennæ; the first, or anterior pair, is that to which is attributed the sense of hearing; the posterior is supposed to have the power of smell.

It would scarcely be fair to those who have not given much attention to the subject, and consequently take for granted the unproved assertions of the writer, to let it be supposed that these opinions have been and are universally adopted, — that the senses here given to the antennæ belong respectively to each.

The subject was first introduced by Professor Milne-Edwards, who attributed the sense of smell to the anterior pair of antennæ, and that of hearing to the posterior. This opinion, taken upon so great an authority, was universally accepted and taught by naturalists, until Dr. Farre threw doubt upon it in a paper read before the Royal Society in 1843, wherein he showed strong reasons for believing that the opinion of Edwards should be reversed in relation to the lobster. But here the subject hung fire. Few saw the paper of Dr. Farre, and of those who did there were fewer still who cared to verify the fact; and so the old notion of naturalists still retained its place in the works of those who wrote upon the subject. One who at the age of twenty-three was elected fellow of the Royal Society, in his capacity of assistant surgeon in the navy was attached as naturalist to an expedition to the southern hemisphere, where, obtaining some very transparent stomapod shrimps, he examined them with his microscope while they were yet in a fresh state, and thought he detected a strongly refracting otolith in the basal joint of the upper antennæ, and stated it to be his opinion that the anterior pair was the seat of the acoustic apparatus. This corroboration of Professor Huxley's I have more recently traced in the crab,—the relation of the senses to the respective antennæ,—in a paper published in the 'Annals of Natural History' for 1855, in which I showed that there existed an internal structure that bore no very distant analogy to the cochlea in the mammalian ear. Thus observations in three persons arrived independently at the same conclusion, and these in distinct divisions of the same class. I think, therefore, we are not rash in accepting the idea thus aimed at to be the truth, even though so recently published a work as the 'Conspectus' of Siebold adheres to the opinion of Edwards; but Siebold does not appear to have been aware of the researches of Farre, Huxley, &c.

But this is evidence upon structural grounds only, aided by inductive reasoning. The vivarium is a modern instrument in Science, that, when carefully watched and studied, will be found a valuable

assistant in the pursuit of Natural History. The water is not so clear, the animals are not so happy and natural, as the same water and the same animals in their original position. Few are the animals that will not pine in prison; and those that do not, soon put on appearances that are unknown in the free state. But still, with all the drawbacks, the vivarium is invaluable to naturalists; and it is only in them that the habits of the frequenters of the ocean can be studied as living animals. The shrimp and the crab, out of the vivarium, and their congeners, are but known to many when boiled red or dressed in a salad; and those that may have been seen alive were in a frightened condition, as they ran from the cover of one stone upon the beach to that of another, or struggling to escape from the fisherman's trap. But, thanks to Mr. Warington and Mr. Gosse, the awkward, hopping prawn, that was always jumping it knew not where, and falling it knew not how, and so difficult to hold, is found to be among the most graceful animals that float through the element in which it lives. Under the posterior portion of the body, long, sweeping, plume-like, feathery legs (pleopoda) beat the waters more gracefully than fish's fins, as the proud beauty traverses the ocean many fathoms deep.

In a paper published in the 'Annals of Natural History' Mr. Warington tells us that he has observed the hungry prawn watching for its food; and when it has been given to him, a piece will occasionally fall to the bottom without being perceived by the animal, which might perhaps have been more attracted by some other object at the moment. But the long, sweeping antennæ (the posterior pair) are always on the watch; they slowly beat the waters in every direction; and Mr. Warington says that the moment one of them cuts the column of water through which the piece of food had fallen to the bottom, the animal becomes cognizant of the fact, and turns and hunts it up, or chase it through the water as Mr. Warington drew it forwards on a piece of stick. My friend Dr. Dansey has recently assured me that in his vivarium all the smaller fish fall a prey to the prawns, who hunt and chase, giving them no rest until they capture them. The instructed scent of the harrier and foxhound is pointed out as a wonderful possession; and so it is; but is it less wonderful or less true that the prawn can chase its prey at the bottom of the sea? What has been proved with respect to the imprisoned animal in the confined water of the vivarium, is more than probably increased in force in the free creatures of the sea. In shallow estuaries whole shoals of different species darken the stream in their

rapid passage up, in full cry, probably after some fast-swimming prey; the prawns hunting near the bottom, the opossum-shrimps near the surface. Mr. Couch tells us (Zool. 5616) that the nipper-crab in his tank gave chase to a fish that was put in with it, soon seized it with both its claws, and killed it; it devoured the belly and lower part of the head, and, being satisfied, rejected the remainder. The same crab took a fly that chanced to alight on the water. How astonished a sportsman would have been if his artificial caricature had been so taken! He would be catching crabs with a truth.

Here we have, upon the testimony of Mr. Warington, evidence of the possession of smell exhibited in the shrimp. Smell it could only be; for the piece of meat passed to the bottom unnoticed and unattended to by the hungry animal on the watch for food, until the long antennæ swept the track through which it fell; it then immediately began to hunt, and hunted until it found it. There can be no doubt, I think, that consciousness of the presence of food was obtained through the long antennæ, and this by the scent left from the food in its passage through the water. This organ is always present in Crustacea, both in terrestrial and aquatic species; it consists of a peduncle or base, and flagellum; the latter, in land species, generally have the joints fused together.

There is but one sense more belonging to animals; and there is no reason to suppose that taste is less likely to be present in those of a low type than when the general organization is more complete. The chief object of taste is to recognise between the food which nourishes and that which is injurious. Even in the pampered appetite of civilized man the meal that is enjoyed is more generally nutritious than that which is not agreeable to the taste. The Crustacea seek their own food, and choose that which they prefer. The crabs, or short-tailed Crustacea, devour only fresh, wholesome animal diet, and prefer living animals that they can overpower to that of other food; this they carry sometimes even to cannibalism, eating others of their own or nearly-allied species, but only when hunger is very sharp. The lobsters, or long-tailed Crustacea, feed generally, it is said, upon carrion, and, as far as I am aware, are free from the charge of cannibalism. The shrimp and its near allies feed voraciously on animal refuse, and are as active as ants in clearing the bones of a drowned puppy or cat. It is for the latter supply of food probably that they frequent the shallow waters and muddy banks of estuaries, and the shore-line of sandy inlets. The sessile-eyed Crustacea are

mostly carnivorous, and sometimes cannibals : I have seen the *Orchestia* gluttonously feeding on an earth-worm, and others have observed, when quantities abound, that the stronger prey upon the weaker ; and my friend Mr. Swain tells me that once, at a picnic, in Whitsand Bay, where cart-loads of *Talitri* were seen upon the shore, a handkerchief which a lady dropped for a few minutes among them was picked up completely riddled with myriads of tiny holes. This would lead us to infer that they are vegetable as well as animal feeders,—a fact that is confirmed by the observations of the American naturalist Say, on a fresh-water amphipod of Philadelphia, which is not, he says, “very choice in selection of food ; it tore out of the shell a young *Lymnæus calascopium*, and also ate some vegetable food.” The latter we may also infer, to a greater extent, may be the food of some species among the isopods. We find that the *Idotea* partakes of the colour of the weed among which it is found. Not perceiving that it has the chameleon-like power of changing its colour at will, I am inclined to believe that it is a vegetable feeder, and that the colour of the animals is dependant upon the colour of the food made use of. The *Idotea* taken among the green *Ulva* is of a complexion scarcely distinct ; while that found among the dark *Fuci* partakes of the same brown hue as the weed. But the general habit of these is to hunt among the tall zoophytes and the creeping weeds for infusorial animals that dwell among the branches.

But whether they prey on living or dead, either animal or vegetable food, they seek and choose out that which they prefer,—an evident sign that the pleasure of taste is sought to be gratified as well as hunger appeased ; for the hungry crab will refuse the tainted meat which the lobster devours.

The sense of taste has no especial organ. Even in the higher animals it is only a developed feature in the consciousness of the surface upon which the food is brought into contact ; and we can scarcely expect to find it other in that of lower forms of life, where probably it is present in a considerably less perfect state.

The food which the animal devours remains not in the mouth, but, after being torn off by the powerful mandibles, is passed instantly through the short *œsophagus* into the stomach, where it undergoes the different processes of trituration and digestion. The food is swallowed eagerly, sometimes one extremity of a piece being in the stomach before the other is in the mouth. I recollect once feeding a poor little fellow that appeared to be very hungry, having been neglected probably for some days. The food I gave him, a piece of

fresh mussel, he gluttonously endeavoured to bolt; but it was too large and too thick; he got one half into his stomach, but the other he could not get into his mouth; he struggled and pulled and tugged in vain; the piece was too large to swallow, and his mouth was so widely stretched that he could not bite it in two; so he tried to pull it back again, but failed to do so, pull and tug as much as he would. He tried and tried in vain; and repeated failures evidently produced alarm. His eyes began to stare, and he tossed about his arms. He raised himself upon his hind feet, and, beating the water with the others, he ran away erect. He strained himself to that extent that he fell upon his back a struggling, choking crab! and if he had not been already green, he would most assuredly have gone black in the face. He was in such a fright! I came to his rescue, and pulled the piece of meat from his greedy mouth, to his great comfort and greater relief. He took care not to eat so fast again, and to bite meat before he swallowed it, all the rest of his life, unless a crab is like some individuals among a higher order, who never learn by experience.

The crab is not a daily feeder; few carnivora are. Having satisfied his appetite, the greatest dainty may live in peace within his reach, as a nipper-crab of Mr. Couch's did with a Montagu's sucker for several days, although it fell a prey to him at last.

The stomach in Crustacea is very complicated. It is formed for grinding up the food. Three calcareous plates, with serrated surfaces, meet together at a common point, and do the work of mastication. Digestion then goes on, and the altered food mixes with the bile as it passes out of the stomach, when it is ready to be taken up as a repairing-supply to meet the general wear and tear of the tissues of the body.

The stomach differs not much in Crustacea generally; it is more strong, and with calcareous plates and teeth, in the larger kinds, but has ciliated plates and fine hairs in the smaller and weaker forms.

The mouth of the crab is protected by several pairs of limbs that overlie the mandibles, and the outermost are formed into a broad operculum that encloses and protects the whole. In the lobster and prawn the operculum is less perfect, and the leg-like character of the appendages more apparent. This increases the lower we proceed, until the leg is developed in all its proportions, as seen in the Edriophthalmic Crustacea, where there are present two pairs more than belong to the higher types. The Gnathopoda, which in the higher

forms merely brush and protect the mouth, in the lower fulfil the office of hands, and supply the mouth with food.

The hands of the crabs belong to the third pair of legs, and but little fulfil the duty of such, except when climbing over some uneven rock or surface. They are developed into a finger and thumb claw, and have the power of firmly grasping any substance. In supplying themselves with food the claws are very efficient organs; but they are somewhat differently used by some than others: the crab is more gluttonous in its character, and snatches the food to its mouth and greedily devours it; not so the graceful prawn and curious soldier-crab.

Look in the vivarium, and see the transparent prawn. Look how it holds the mass of food in one hand, and tears off small pieces with the other, which it lifts to its mouth and eats, not in a crab-like manner, but in a quiet, easy, comfortable way, as if it knew how to enjoy an agreeable occupation; nor is it so selfish but that another, without raising its anger, may snatch a piece away; but the stranger must not take too much. What gentleman likes to lose his dinner?

But the soldier-crab I have most watched, and look upon as a particular pet. It lives in the shell of a dead mollusk, which it occupies and carries about as a tenant-at-will. It has one of its claw-formed arms longer than the other; with the shorter, which in most species is the left, it holds its food, and with the right he tears it away piece by piece and puts it into his mouth. But this sociable individual does not often dine alone: Mr. Gosse, in one of his pleasant sea-side books, tells us how his meal is shared by a beautiful nereid worm. The soft and serpent-like annelide smells the repast that the master of the house is enjoying, and, like a wily guest, takes care to be present at the meal, even though unbidden. See! beneath the crab the beautiful head glides out. While the self-confident owner is devouring one piece, and in his full enjoyment looking round and perhaps admiring the submarine scenery, the worm attacks that which is in the other hand; by little and little the crab feels it going, and makes an effort to stop it on the way; but it evidently can be seen, by his manner, that he cannot believe that any one would be so rude as to steal his dinner out of his very mouth, and does not think much about the undevoured food, but which nevertheless is slowly, gradually and surely taken away.

Did the reader ever hold a handkerchief or any other thing firmly in his hand, determined that the object should not be lost, and after some time has looked down and perceived that it was gone?

Just so with the crab : he feels it going, and he grasps it tight ; after a time the hold relaxes, the meat is pulled again, and the hand is grasped the tighter ; but confidence in its security again loosens the grasp, and the cautious thief steals more gently, but perseveres until the meat is procured, and then quietly retires, and within the shell devours the meal that his friend procured for himself. Having eaten his first mouthful and found the food most palatable, the crab looks down and finds his dinner gone. He knew he had it in his firm grasp, and will not believe his eyes. He looks and turns and twists about. It must have fallen down ; he looks, and, like a human being, looks everywhere but where it is ; and evidently you can see it in his face that the last suspicion in his mind is that his friend has stolen his dinner. He would not do it, sir ! Poor, confiding crab !

In these cases we perceive that the food which they have eaten has been brought within their reach by some fortunate circumstance ; but occasionally hunger tempts them to go in search of prey ; and herein they frequently exhibit considerable ingenuity : we have it upon the authority of a correspondent in the 'Magazine of Natural History' for 1831, that a crab has been observed to make an effort to attack an oyster in its strong recess ; but the cautious oyster, by some instinctive perception, knew that an enemy was near, and invariably closed his shells whenever the crab tried to insert his claws between them. But the crab was hungry ; he made several attempts, and met with the same result : the oyster had an objection to be eaten.

It may be in the memory of others besides myself, that in the Natural History instruction of school-days we were told how a famous fox would catch a crab. The sly and clever Reynard knew that to catch him in his mouth the crab had claws to bite, and that he might catch him by his nose, of which he was very careful, besides his objection to dipping it into the salt water, which in itself is not pleasant. So to prevent any disagreeable consequence, as well as to succeed in his desire, he teases the poor crab with his soft, bushy tail, which in weak revenge the crab firmly grasps in his strong nip-pers and there holds firm. The wicked and cunning fox then runs away, and pulls the crab ashore, where he destroys and devours him at his will. Gulliver, in his Brobdignagian travels, tells us how birds of prey, in that remote country, have the same habits as those of more known lands ; and when they have a mollusk of which they cannot crack the shell, fly with it in their mouths to the higher regions of the air, and let the poor thing fall. The bird then descends to the earth, and devours the animal yet writhing in the broken shell.

Every one knows how the thrush carries the snail to a favourite stone and smashes the shell, and what a charnel-house the spot looks like with the remains all strewed about. But these may not be thought to rank as cases analogous to the task which the lobster has before him, to dine upon his marine neighbour; although they are each respectively examples of instinct peculiarly apposite to the required circumstances. But nearer the mark, and founded upon the authority of Carreri Gamelli, we are informed that the orang-otang (*Simia Satyrus*) feeds upon a large species of oyster, fresh taken from the water; and that, fearful of inserting his paws into the shell, lest the oyster should close and crush them, his custom is to insert a stone between the valves as they are peacefully opened in the calm enjoyment of the incoming tide. He then drags out his victim with safety. Ever since the veritable history has been written and painted of the selfish ape that used the cat to draw the burning chesnut from the fire, few things have been thought beyond a monkey's wisdom, and some metaphysicians allow them a certain degree of reason on account of the superiority of their instinct; and therefore it appears not strange or new. But few will perhaps be prepared to learn that this is the plan the crab pursued. When he found that the oyster was too wide awake, he watched in patience until his prey, supposing all things to be safe, opened the valves again; he then quickly inserted a stone. Alas! for the poor oyster; it never closed its valves again.

But it is not always that the devourer comes off so successful as the crab in this instance. My friend Mr. Barlee once dredged a mussel holding tight the claw of a crab. I think the history is evident. The crab, as in the former instance, wished to dine at the expense of his neighbour, but was not experienced enough to get off scot free. The mussel did not close the shell in time to keep out his claw. He must have been a very young crab, without doubt a green one; for when he put in his claw the mussel closed, and held it tight. Anchored to the spot by the byssus, the mussel grasped the arm of the crab, and never let it go again. We can only judge the sorrow of others by imagining ourselves in similar conditions. Fancy the boy that is tempted to steal apples finding his arm caught in a trap; but how much worse if that trap should never let go again. Such was the trap that caught the crab. What would the boy do? Not all man's boasted reason or grand philosophy could make him equal the instinct and power of the crab. After every attempt to free it from the shell had proved how useless was the effort, the crab went away and left his arm behind,—a capability he has at will.

These observations upon the instinct that Crustacea exhibit in procuring their food are exhibited from species that belong to the shores of Great Britain. But the power has been as strongly exemplified in exotic tribes, as may be seen by the habits of a species of *Grapsus* upon the small islet of St. Paul's. The noddy, a species of tern, builds a simple nest with sea-weed. "By the side of many of these nests," says Mr. Darwin, in his pleasant '*Naturalist's Voyage*,' "a small flying fish was placed, which, I suppose, had been brought by the male bird for its partner. It was amusing to watch how quickly a large and active crab, which inhabits the crevices of the rock, stole the fish from the side of the nest as soon as we had disturbed the parent birds. Sir W. Symonds, one of the few persons who have landed here, informs me that he saw the crabs dragging even the young birds out of their nests, and devouring them."

I have before alluded to the Crustacea as being fond of vegetable food as well as animal. A striking example we have, upon the same authority as the preceding. A crab, closely allied to, if not identical with, the *Birgus latro* (a genus near to our soldier-crab), is found on all parts of the dry land, and grows to a monstrous size, on the islets around Keeling Island: they live upon the cocoa-nuts that fall from the trees which flourish there. "The first pair of legs terminate in very strong and heavy pincers, and the last pair are fitted with others weaker and much narrower. It would at first be thought quite impossible for a crab to open a strong cocoa-nut covered with husk; but Mr. Liesk assures me that he has repeatedly seen this effected. The crab begins by tearing off the husk, fibre by fibre, and always from that end under which the three eye-holes are situated; when this is completed, the crab commences hammering with its heavy claws on one of the eye-holes till an opening is made; then, turning round its body, by the aid of its posterior and narrow pair of pincers, it extracts the white albuminous substance. I think," continues Mr. Darwin, "this is as curious a case of instinct as ever I heard of, and likewise of adaptation in structure between two objects apparently so remote from each other in the scheme of nature as a crab and a cocoa-nut tree." "It has been stated by some authors that the *Birgos* crawls up the cocoa-nut trees for the purpose of stealing the nuts: I very much doubt the possibility of this; but with the *Badanus* the task would be much easier. I was told by Mr. Liesk that on these islands the *Birgos* lives only on the nuts which have fallen to the ground." "To show the wonderful strength of the front pair of pincers, I may mention that Admiral Morseby confined one in a

strong tin box, which had held biscuits, the lid being secured with wire ; but the crab turned down the edges and escaped. In turning down the edges, it actually punched many small holes quite through the tin !”

But Crustacea, upon the whole, must be viewed as carnivorous animals ; and, as I have before remarked, they are occasionally cannibals, but this only, I believe, when in an extreme state of hunger. Like most Carnivora, the crab does not feed every day ; and perhaps occasionally when it wants food it cannot get it ; then it is that it attacks its own species. In this way generally the smaller forms fall a prey to the greater ; but sometimes an attack is made upon one that, though weaker, is big enough to show fight, and can greatly annoy with the powerful nippers the one that is feeding upon him ; it is then the instinct is exhibited by the stronger in biting or so wounding the claws of the weaker that they are thrown off, and the foolish creature that has thrown away his only protection easily becomes the prey of his stronger brother ; at least so infers Mr. Gregson in the ‘*Zoologist*’ for 1857, from observations on *Carcinus Mænas* in his own vivarium.

These several observations in different species all exhibit a higher amount of instinctive power than animals so low in the scale of beings are supposed to enjoy ; and, moreover, it shows that in the procuring of their food they are not simply the sea-scavengers, and are no more to be considered as such than many fish. It is probable that the smaller tribes of Crustacea come more under this appellation, since the *Talitri* feed upon the offal that is found beneath the festering weed thrown up by the sea, which they generally devour where they find it ; but upon being disturbed they run off to their holes in the sand, and, like careful purveyors, carry away with them some food, that they may devour at their more convenient pleasure.

The opossum-shrimp (*Mysis*), which abounds in such numbers in most estuaries, forming a band many feet wide, is a very greedy feeder “seizing and eating every animal substance which the current or tide carries along with it, and contending like vultures for the possession of large masses. When confined together in a vessel of sea-water they will even act the cannibal, killing and devouring one another.” (*Mag. Nat. Hist.* iv. 258). The unhallowed creatures !

(To be continued.)

How to cure Grease in Insects. — Nothing can be more disfiguring to a collection of insects than grease, a single *oily* specimen being sufficient to spoil the appearance of an entire drawer. The usual method of removing it is, to immerse the insect for a certain period in camphine, rectified spirits of turpentine, borneote of petroleline, &c., according to the fancy of the respective operators; and, after having dried it with blotting-paper, to envelope it in magnesia or finely-powdered chalk, which is afterwards removed with a camel's-hair brush. But, however well this may be done, the insect rarely possesses, after the operation, its original fresh and downy appearance; it is always liable to become again greasy, and not unfrequently, especially in the case of the *Geometræ*, the wings become hopelessly crumpled; at any rate, I have experienced all these misfortunes. But irrespective of these objections, whether well or ill-founded, "prevention is better than cure;" and as an unfailing means of procuring the former desirable result, I submit to your readers the subjoined method, which I have tried, with complete success, for some years past. As the *Bombycæ* are especially liable to grease, let us take *Notodonta dictæa* (male) as an illustration of my system. When the insect has been on the setting-board a sufficiently long time to render the contents of the body firm and viscid (not *hard*), remove it. Take a pair of fine-pointed, sharp scissors, and cut, from the under side of the body, a small slip, *i. e.*, beginning at the extremity of the abdomen, on the left-hand side, cut up to the thorax; and having done the same with the right side, remove the slip thus made. Care of course must be taken not to cut too deep. Take now a penknife, and, inserting the point at the thorax, draw it gently down each side of the body. This can readily be done if the contents are not *hard*, and in most cases the whole can be picked out in one lump with the point of the knife. This being prosperously effected, carefully break off the body *immediately* (otherwise the grease will run into the thorax, and your labour be in vain); and having done this, take a fine pin, and run it through one *side* of the empty body, for about one-eighth of an inch. Let it remain for two or three days, and then immerse it any of the above-named fluids for about six hours. Afterwards dry it on blotting-paper, which in most cases will be found sufficient. Very feathery bodies, however, will be improved by covering them for a day with magnesia, after having been dried for a quarter of an hour or so upon the blotting-paper. After this process the body will be found wholly free from grease, and may be re-united to the insect with a little strong gum. If kept for years it will never grease; and a second advantage is, that, all moisture being removed, the pin can never be crusted with verdigris. The object of running a pin through the side is, *first*, that by means of it the body can be removed from the camphine, with a pair of scissors, without injury; and, *secondly*, for the purpose of attaching a little paper label to it. It would obviously be a troublesome business thus to wash out each body as it became ready. Having therefore, suppose, twelve pupæ of *N. dictæa*, which emerge at different times during a fortnight, I clean each as it is ready, and, having broken off the body, attach to the pin a little paper label, numbered 1, 2, 3, 4, corresponding with a similar label attached to the insect. This is of course that each insect may obtain its own "corpus." The number must be written in *pencil*, as, if in ink, it will be obliterated. The body will sometimes (for what reason I know not) be filled with a dark fluid. In this case take a little roll of blotting-paper, and fix it in the body. This will absorb the moisture. Afterwards immerse it in the camphine, &c., as above. The method may appear elaborate, but in reality is as simple as possible. It demands a little trouble, no doubt; but what of that? The result more than

repays you. It may also be objected that this is "patching" an insect. I can only say that I am willing to mix up, patched and unpatched, the above dozen insects, and to challenge any eye to detect the difference. The only drawback to my method that I am conscious of is that sometimes the body *contracts*. This, however, may almost always be obviated by not "operating" too soon, and by letting the body remain some days before immersion into the camphine. A little practice and perseverance will soon make perfect, and no one deserves the name of entomologist who will not devote a little of each to make his collection worthy of inspection. Though my plan, be it good or bad, applies of course chiefly to insects taken or bred by myself, I adopt it, whenever I can, with those I obtain from my correspondents. In this latter case the operation is much more difficult, owing to the *hardness*, and in some instances the *antiquity*, of the specimens sent. I "clean out" *all* my own insects, even the little "pugs." I may remark here, however, that females seldom grease. If the wings of the insect, when removed from the setting-board, are not thoroughly dried, the insect can of course be replaced. It may perhaps have occurred to some of your readers (as it has to me) that when an insect has been taken at sugar, it (the sugar) will exude, and spoil the body. In this case I also break off the body, and soak it for half a day in water, and then place it on blotting-paper before a fire for some hours. This completely removes it. I shall be happy to give any further information to any one who may think it worth his while to apply to me for it. — *Joseph Greene; Cubley Rectory, Dovedge, Derby.*

Capture of Pieris Daplidice on the Kent Coast.—Mr. H. J. Harding, whose name as a most assiduous collector is so familiar to us all, has been fortunate enough to take two specimens of this, the rarest of British butterflies. They were taken at Kingsdown, close to the sea-coast, and had probably just been blown over from the coast of France. The days of capture were the 1st and 18th of August. — *Edward Newman.*

Deilephila Galii.—An unusual number of the larvæ of this insect have been found near the south-east coast, feeding on the lady's bedstraw. I have heard of more than seventy; thirty-six have fallen to the lot of one entomologist. Other examples of the same insect have been found on Fuchsias near London. — *Id.*

A Ray of Light on the Food-plant of Sphinx Convolvuli.—A friend of mine, long resident in Paris, has, year after year, found the larvæ of *Sphinx Convolvuli* feeding on cultivated balsams in the gardens of the Luxembourg. I have seen the moths bred from them, and there is no doubt whatever about the species. Balsams are now in perfection, and entomologists will do well to look under them for the very conspicuous droppings of this huge caterpillar. A chrysalis has been dug up in a potato field near Brighton, and sold for *Acherontia Atropos*. — *Id.*

Gastropacha ilicifolia.—On looking for larvæ on the Moors, with Mr. Baker, of Heeley, we found some larvæ very like *potatoria*. On returning home we called on Mr. W. Green, who was the original discoverer of *G. ilicifolia*, and who informed us of our good fortune; he also, the day before, received some larvæ from off the Moors, amongst which he was very glad also to find *G. ilicifolia*. — *W. H. Smith; Ecclesall New Road, Sheffield; August 15, 1859.*—[*Intelligencer.*]

Another Specimen of Sterrhia sacraria.—I am indebted to Mr. Button, of Peckham, for the sight of a living specimen of this rare British insect: he took it at a lamp on Clapham Common, on Thursday evening, the 11th of August, and brought it to me the same evening, purposely to afford me the pleasure of seeing it alive. — *Edward Newman.*

Capture of Noctua flammatra in the Isle of Wight.—I am happy to announce the capture of a new Noctua, by Mr. Rogers, in the Isle of Wight. I was in company with him at the time, and saw the insect alive. At that time I was unable to determine the species, assigning it a place between *N. triangulum* and *N. rhomboides*. Mr. Rogers kindly allowed me to make a drawing of his specimen, which I took with me to Loudon, and was enabled, through the kindness of Mr. Bond, to compare it with specimens of "*N. (ochroleura) flammatra*" in the British Museum, with which it proved to be identical. This species is widely distributed, occurring in India and throughout Europe, and, with very slight difference, in Brazil. It will be instantly recognised by the intensely black collar, more conspicuous even than that of *T. pastinum*; otherwise the resemblance to an indistinctly-marked specimen of *N. triangulum* is great, but it has a black central dash from the base of the fore wings. It is rather singular that this is the third new Noctua which has occurred in the Isle of Wight within the last few months.—*W. D. Crotch; London, August 26, 1859.*

Heliothis scutosa near Poole.—On Monday, the 11th inst., as I was out with my pupils collecting in this neighbourhood, one of them (Mr. D. A. Neilson) had the good fortune to capture a specimen of this insect, which is now in my possession.—*C. R. Green; Parsonage, Hamworthy, near Poole, July 25.*—[*Intelligencer.*]

[What is the *Heliothis scutosa* of British authors? and who named the Rev. Mr. Green's capture? The celebrated specimen called *Heliothis scutosa*, belonging to the late Mr. Heysham, of Carlisle, and lately sold with the collection of that gentleman at Mr. J. C. Stevens', for 28s., had no resemblance whatever to the *Heliothis scutosa* of continental authors. Would it not be well for Mr. Green to submit his supposed *H. scutosa* to Mr. Doubleday's scrutiny? No one will question that gentleman's decision. But when the genus and species of a moth really unknown to us as British are thus given by a gentleman whose very name we have not the privilege of knowing, I feel that it is allowable to entertain some fears of a mistake.—*Edward Newman.*]

Description of the Larva of Eupithecia pimpinellata.—I am inclined to suspect that this insect has been wrongly named. I have constantly and most closely examined both flowers and seeds of *Pimpinella magna* and *P. Saxifraga*, but could never detect the slightest trace of the larva. I have repeatedly beaten it from the flowers of the golden rod (*Solidago Virgaurea*), and from that plant alone, though both species of *Pimpinella* are common in the locality. The larva is fulvous, with a series of black dorsal triangular spots, becoming confluent towards the head, and faint or altogether evanescent on the caudal segment. On either side a row of conspicuous, slanting, whitish or yellowish stripes, forming a sort of margin to the dorsal spots. Belly dusky, reddish in the centre, and having a dusky central line running the whole length. Body studded with various-sized white tubercles, and thinly clothed with short hairs. Feeds upon the flowers of *Solidago Virgaurea*, in August and September. I have found it by no means rare in the Kentish woods, where the underwood is from one to two years' growth, and the golden rod has room to grow and flower freely. In confinement the larva will feed freely upon *Senecio Jacobæa* and *S. palustris*. The pupa, which is enclosed in a slightly-spun earthen cocoon, is very distinct from all the rest of the family. The thorax is yellowish green, with a very accurately and distinctly-defined border, and looks almost as if set in a frame. When examined with a glass some singular dark spots and markings are seen, which give it very much the appearance of a skull. The abdomen is yellowish red, with two indistinct interrupted dorsal,

and two more distinct subdorsal, dusky lines. Wing-cases yellowish olive, streaked with dusky markings, and having the nervures very prominent. The perfect insect appears in May and the beginning of June. The larva is rather slender, and tapers towards the head; in general appearance it resembles *E. castigiata* and *E. vulgata*.—*H. Harpur Crewe; Fernhill, near Oswestry, August 8, 1859.*

Description of the Larva of Eupithecia vulgata.—Common as this insect is everywhere, the larva seems to be but little known. I have never myself beaten it, but have several times reared it from the egg. It so closely resembles that of *E. castigiata* that it requires a very practised eye to distinguish it. It is slender, and tapers towards the head. Its general colour is reddish brown or dusky olive; along the centre of the back a chain of dirty, greenish, lozenge-shaped spots, becoming confluent at the capital and anal segments. Spiracular line waved, yellowish, occasionally interrupted with black. Segmental divisions orange. The whole body studded with minute white tubercles, and sparingly clothed with short whitish hairs. Feeds on whitethorn; full-fed the middle of July. The pupa is enclosed in an earthen cocoon; it is slender and delicate. Head, thorax, and wing-cases olive. Abdomen reddish, sharply pointed.—*Id.*

Note on the Larva of Eupithecia assimilata.—The Rev. H. H. Crewe proposes (Zool. 6579) to give us an accurate description of some one species of *Eupithecia* larva each month, as he may be able, and commences with *E. assimilata*. Few people could be found better pleased than I was when I read his proposal, and few more disappointed when I read his professed accurate description of the larva of the above insect. In some running notes on the genus *Eupithecia*, in the 'Intelligencer,' I gave a rough description of this species, which all who run might read. This description is so much at variance with Mr. Crewe's "accurate" description that one of us must be wrong. Mr. Crewe tells us that the larva of *E. assimilata* is three-quarters of an inch in length. I gave no size; but perhaps Mr. Crewe will excuse me if I now say that a full-fed larva of this species will almost measure twice the size he gives; hence he has evidently been describing poor, half-grown, sickly larvæ. The time he gives, "October 13—15," would also mislead any one who wished to breed fine specimens; for though no one will doubt that he took his larvæ at that date, still I hope those who wish to breed this species will give themselves a full month's margin, else they will not breed any males worth setting. Some of Mr. Crewe's remarks are right, and others wrong; the first and last are certainly correct. When he speaks of a dorsal line, no one would suspect that he was describing the lozenge- or diamond-shaped markings which are so conspicuous an object in one or two groups of this genus, and particularly so in *E. assimilata*. Perhaps I ought to apologize to Mr. Crewe for venturing to dispute his accuracy; but as I have made the genus *Eupithecia* my especial study for many years, I think he will excuse me, particularly as my only object is to ensure accuracy for the future. On the 29th of March, 1856, I exhibited this genus, re-arranged according to my ideas, at the Northern Entomological Society; and at the following June meeting I read a paper on the food of the larvæ of the genus. At the following meeting I exhibited about fifteen species of this genus in the larva state, alive. Thus Mr. Crewe will see that I know a little about the genus *Eupithecia*, and this may perhaps incline him to excuse my seeming presumption. In conclusion, I hope that more than one of the promised descriptions will be given each month.—*C. S. Gregson; Stanley, Liverpool, June 26, 1859.*

Larvæ, or Descriptions of Larvæ, earnestly desired.—As I am now engaged in

describing the British moths and their caterpillars for the monthly numbers of 'Young England,' I consider it most desirable to make the descriptions directly from specimens, without any reference whatever to prior descriptions. The rich collection of moths in the cabinet of the Entomological Club affords me the means of describing with the most painstaking accuracy all the perfect insects; and the equally rich collection in the British Museum, always accessible for such an object, is the source to which my friend Mr. Willis has gone for his admirable figures of each species. But it is not equally easy to obtain the characters of larvæ. Those published in this country, I regret to say, are often most inaccurate, a fact arising from their being copied (avowedly) from continental writers, and these continental writers not having sufficiently respected the law of priority: thus we find that the names employed by Guenée and Doubleday, and now universally adopted in this country, continually differ from those of Duponchel, Hübner, Freyer, &c.; and the descriptions, however accurate as applied by these authors, become useless if transferred to other species now bearing the very same names. Under these circumstances the readers of the 'Zoologist' cannot render a greater service to entomological science than by sending me minute descriptions of all the larvæ that fall in their way; or, should they consider this too troublesome, I shall be obliged for the larvæ themselves, from which to make my own descriptions. As a guide to what are more immediately wanted, I may state that the September number will contain the genera *Trichiura*, *Pæcilocampa*, *Eriogaster* and *Bombyx*; the October number, *Odonestis*, *Lasiocampa*, *Endromis* and *Saturnia*; the November number commences the *Geometræ*. I wish most distinctly to state that I have no interest whatever in the sale of 'Young England;' but I do most sincerely desire to make my contributions to it as accurate as possible, with the sole view of conferring real utility on a work that has already attained a circulation which I believe to be fully tenfold that of any entomological writings ever before printed. I shall, with scrupulous exactness, give every contributor either of larvæ or descriptions full credit for his assistance.—*Edward Newman*.

Notes on Wasps.—I was much pleased with Dr. Ormerod's paper (*Zool.* 6641). It is there shown that wasps (or even hornets) are not the very irascible insects most people suppose. Apart from their nests and young they never act offensively; and I have noticed, many years ago, that when wasps are in a predatory mood they are always great cowards, and never attack any one. The whole of the Hymenoptera with stings are the same. Walk into a field of Dutch clover (*Trifolium repens*), with fully-developed blossoms, where tens of thousands of bees of all sorts are congregated: they make a great buzz, and appear angry at being disturbed at their pasture; but not one will ever attack an intruder. But to return to wasps, I do not remember a season in Gloucestershire with so few wasps as up to this day (August 3); the queens were numerous about the end of April and beginning of May, and I killed a great many; perhaps the cold easterly winds destroyed most of them. Last year they were so numerous as to be troublesome, but plums and wall fruit were in abundance: this year pears, plums and peaches, the principal food of wasps, are few and far between; and the same cold winds and ungenial weather seem to have destroyed both the wasps and their food. I am of opinion that the three most common British wasps begin with a single queen.—*H. W. Newman; Cheltenham, August 3, 1859.*

Ants store the Seeds of Violets.—Is it quite well known, and therefore a “mare’s nest” of mine, that the common garden ants collect violet seed in and around their subterranean galleries? I have a large bank of violets facing the “sweet South,” and all the ants’ nests within some yards are covered with the violet-seeds (which ripen about this time). The seeds are white, hard and shining, and very like the pupæ of the insect. I watched the insects bringing out the seeds from their holes on fine days, as they do their pupæ. Can this be a case of mistaken instinct? They collect them so abundantly as to be a convenient source from whence to preserve the seed if wanted.—*J. B. Spencer*; 9, *Kidbrooks Terrace, Blackheath, July 2, 1859.*

A Fortnight at Hornsea, Yorkshire.—In the immediate vicinity of Hornsea, a small village on the coast of Holderness, Yorkshire, there is a large sheet of water called Hornsea Mere. This Mere is two miles long and three-quarters of a mile broad; one side is wooded to the water’s edge; the rest is surrounded by pasture-land and meadows. Though this attractive spot is almost unknown to the entomologist, it has not produced so many rarities as perhaps might have been expected, which may be attributed in a very great measure to the weather, the month of July being one of those least prolific in insect life, especially Coleoptera. That part which is wooded is by far the most productive, the margin being lined with quantities of cut reeds, which when turned over can scarcely fail to present to the view something worth having. The coast, with its cliffs and sand-hills, has also received some attention. The latter, overgrown with *Arenariæ*, *Zostera marina*, and *Ononis vulgaris*, harbour several local insects, which are to be obtained by uprooting the plants. The soil of the whole district is exceedingly sandy. I will proceed to enumerate those beetles which were taken at the Mere, including a few species and specimens which fell to my lot when over for a day in the middle of June. The following are the Geodephaga, exclusive of common species:—

<i>Elaphrus riparius</i> .	<i>Anchomenus pelidnus</i> (60).
<i>Oodes helopioides</i> (10).	<i>Pterostichus anthracinus</i> .
<i>Chlænium nigricornis</i> . <i>C. holosericens</i> is	“ <i>gracilis</i> (2).
said to have been taken here, but	“ <i>minor</i> (10).
probably in the spring months.	“ <i>erythropus</i> .
<i>Synuchus rivalis</i> (2).	“ <i>strenuus</i> .
<i>Anchomenus viduus</i> (4).	<i>Bembidium obliquum</i> (1). Rare.
“ <i>piceus</i> . Abundant.	“ <i>assimile</i> .

As the geographical distribution of the Brachelytra is yet but little known, nearly all the species taken are mentioned:—

<i>Homolota graminicola</i> , Grav.	<i>Philonthus micans</i> , Grav. (10). Local.
“ <i>elongatula</i> , Grav.	“ <i>atterrinus</i> , Grav.
<i>Deinopsis fuscatus</i> , <i>Matthews</i> (2). Rare.	“ <i>cinerascens</i> , Grav. (4). Local.
<i>Tachyporus chrysomelinus</i> , Linn.	<i>Quedius impressus</i> , Payk.
“ <i>pusillus</i> , Grav.	“ <i>fuliginosus</i> , Grav.
<i>Conosoma littoreum</i> , Linn.	“ <i>maurorufus</i> , Grav. (3). Rare.
<i>Tachinus marginellus</i> , Fab.	“ <i>ruficollis</i> , Steph.
<i>Mycetoporus longulus</i> , Mann.	<i>Lathrobium elongatum</i> , Linn.
<i>Xantholinus punctulatus</i> , Payk.	“ <i>sulvipenne</i> , Grav.
<i>Philonthus umbratilis</i> , Grav. (6). Local.	“ <i>brunnipes</i> , Fab.
“ <i>corvinus</i> , <i>Erich</i> . (2). Rare.	“ <i>quadratum</i> , Payk.

Stenus bimaculatus, Gyll.„ *Juno*, Fab.„ *bupthalmus*, Grav.„ *vafellus*, Er. (1). Rare.*Stenus plantaris*, Er. (6). Uncommon.„ *latifrons*, Er. (2). Rare.*Oxytelus rugosus*, Fab.

All worth mentioning belonging to the other divisions is *Donacia impressa*. The sand-hills and cliffs have yielded in *Geodephaga* :—

Nebria livida.*Calathus flavipes*.„ *mollis*. Abundant.*Synuchus vivalis* (10).

Anchomenus elongatus, Dej. ? The insect which is supposed to be this species was taken at the base of the cliffs, under some dead thistles. It was sent off by post the following day ; but before it reached its destination the box came open, and the insect disappeared. It is a great misfortune that this new British species should have thus been lost. I have not yet seen a genuine *A. elongatus*, Dej. ; when I have I may write more confidently. The following description is what I remember :—Greenish brass. Narrower than *A. viduus* or *A. lævis*. Antennæ black, basal joint red. Elytra having on each a series of six distinct punctures, four in close succession on the third interstice, and two either on the second stria or second interstice. Legs black ; tibia and tarsi testaceous. Length $3\frac{1}{2}$ or 4 lines. A single individual of *A. elongatus* is said to have been taken, twenty-eight years ago, near Lowestoft (vide 'Annual,' 1857).

Broscus cephalotes. Several.*Amara acuminata*.„ *fulva* (40).„ *convexiuscula* (12).„ *Trechus discus* (2).*Bembidjum æneum*.

„ *littorale*. Four or five of a singular variety which has been taken in several parts of the Yorkshire coast, by the Rev. William Hey and myself. It differs from typical *B. littorale* in being smaller, narrower, and having the spots much more widely spread and conspicuous.

„ *tibiale*. Several.

I found *B. concinnum*, *B. affine* and *B. gilvipes* at Withernsea, a little lower down the coast. The *Brachelytra* found on the sand-hills at Hornsea are not worth recording. I captured *Anobium molle* in a window of the Marine Hotel. The fortnight commenced July 7th.—*W. K. Bissill*; August 12, 1859.

Proceedings of Societies.

ENTOMOLOGICAL SOCIETY.

August 1, 1859.—J. O. WESTWOOD, Esq., F.L.S., in the chair.

Donations.

The following donations were announced, and thanks ordered to be presented to the donors :— 'Proceedings of the Royal Society,' Vol. x., No. 35 ; presented by the Society. 'Journal of the Proceedings of the Linnean Society,' Vol. iv., No. 13 ; by

the Society. 'Proceedings of the Zoological Society of London,' Nos. 370—391; by the Society. 'Catalogus Hemipterorum, Herausgegeben von dem Entomologischen Verein zu Stettin;' by the Society. 'Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien, Jahrgang 1858;' by the Society. 'Erinnerung an Mitglieder der Mathematisch-Physikalischen Classe der Königlich Bayerischen Akademie der Wissenschaften, von Dr. Carl Friedrich Philipp von Martius, Secretari der genannten Classe;' 'Monumenta Secularia, II. Classe;' 'Almanack für das Jahr. 1859;' by the Königlich Bayerischen Akademie der Wissenschaften. 'Farm Insects,' No. 2; by the Author, J. Curtis, F.L.S., &c. 'The Zoologist' for July; by the Editor. 'The Literary Gazette' for July; by the Editor. 'The Journal of the Society of Arts' for July; by the Society.

The following works were announced to have been recently purchased for the Society's Library:—Mulsant, 'Coleoptères de France,' 8 Vols. Silberman, 'Revue Entomologique,' 5 Vols. Erichson, 'Naturgeschichte der Insecten Deutschlands,' Vol. i. Fas. 1—3; ii., 1—6; iii. and iv., 1 and 2. Ratzeburg, 'Die Forst Insecten,' 6 Vols. Germar, 'Zeitschrift für Entomologie,' 5 Vols. Koch, 'Arachniden,' 16 Vols.; and 'Uebersicht des Arachniden Systems,' 5 Parts.

Mr. H. W. Bates, Corresponding Member of the Society, who had lately arrived in England, was present, and very cordially received by the Meeting. He has devoted the last thirteen years to the investigation of the Entomology of the Valley of the Amazons; and the collections which he has from time to time forwarded to this country sufficiently attest his energy and perseverance under the dangers and hardships to which he has been exposed.

Exhibitions.

Mr. M'Lachlan exhibited specimens of *Cochylis Francillana*, with the pupa-cases from which they were bred, projecting from a stem of the wild carrot, in which the larva feeds; they were found in February last, at Forest Hill. Also specimens of *Rhodophæa rubrotibiella*, taken recently at Forest Hill, in the same locality as the two specimens exhibited by him at the meeting of the Society in September last, and then new to Britain.

Mr. M'Lachlan also exhibited an example of *Ochsenheimeria vacuella* found at Lewisham, on the 28th ult., in a most singular situation for the imago of a Lepidopterous insect, namely, under close bark on the stump of an old alder tree, about three feet from the ground.

Mr. Bond exhibited the larva of *Drilus flavescens*, found near Folkestone.

Mr. Lewis exhibited a living example of *Chlœnius Schrankii*, of which he had lately taken about sixty specimens near Luccombe, Isle of Wight.

Dr. Wallace exhibited a specimen of *Deilephila lineata*, taken by Dr. Burkill, in 1856, at Tremeri, in Ireland; and *Agrotis valligera*, from the same locality. He also exhibited examples of the following species, which he had lately found on a recent visit to Waterford, namely, *Leucania littoralis*, *Mamestra abjecta*, *Cidaria populata*, *Larentia salicaria*, *Eupithecia denotaria*, *E. constrictaria*, *E. satyraria*, *Acidalia immutaria*, and *A. inornaria*. *Euchelia Jacobæ* and *Cetonia aurata* were in great plenty in the neighbourhood; the latter species, he was informed, had been very rare till late years.

Mr. Mitford exhibited fine specimens of *Trochilium Chrysidiformis*, *Timandra prataria*, and *Spilodes palealis*, taken near Folkestone.

Mr. Westwood exhibited a mass of the empty cocoons of *Ilythia sociella*, forwarded to him by Professor Harvey, of Dublin, of which the Irish naturalists had failed in determining the nature, which had been taken from the stomach of a cow. The only explanation which he could give of so unusual a situation was, that, as the social caterpillars of these species frequent the nests of humble bees in considerable numbers, it was probable that the cow, whilst grazing, had come upon the nest of a moss-carder *Bombus*, and had chewed it together with the grass, the stomach not having had the power to dissolve the mass of cocoons. Mr. Bond confirmed this opinion, having found the mass of cocoons of the *Ilythia* in the nest of the moss-carder bee.

Mr. Westwood had observed, last season, some elm trees near Oxford, which were infested by the *Scolytus destructor* in the heat of the summer, exuded sap, and attracted large quantities of insects. One of these, this season, has died off, still emitting small patches of extravasated sap: this had attracted vast quantities of *Cetonia aurata*, the tree from the base of the trunk to the topmost branch being covered by hundreds of specimens, in clusters of a dozen or score together, producing shining masses visible at some distance, and which had attracted Mr. Westwood's attention to the insects. Many had become so stupified from the fluid they had imbibed that they had fallen down helplessly to the ground. Their sense of smell must have been extremely acute, and the odour of the sap (in very small quantities in each place) very penetrative and diffusive, in order to have attracted so great an assemblage of beetles.

Mr. Douglas remarked that an almost imperceptible exudation from the trunks of trees was often caused by the young larva of *Cossus ligniperda*.

Mr. Tegetmeier described a practical application of Shirach's discovery respecting the power of bees to raise a new queen from a neuter or worker grub; by means of which the contents of old hives can be taken without destroying the bees or sacrificing any brood. The plan consists in driving out the queen, and about half the bees, in the spring, and establishing them as a new swarm, when the bees remaining in the old hive have to rear a new queen from a worker grub. From the time required to accomplish this, it follows that no eggs can be laid for about three weeks; by this time the workers producing eggs laid by the old queen will have been hatched out, and the cells filled with honey, when the whole of the bees are to be driven out, and the honey, which will be found perfectly free from brood, retained for use. The plan had been very successfully worked at the beehouse of the Apiarian Society, and specimens of the results were submitted to the Meeting.—*E. S.*

Addendum to the Paper on Bovine Animals: the Cattle of Egypt and Nubia.—"In the upper countries the cattle are of a peculiar and probably distinct species of ox, very much like our own, but with a hump on the back; and the females are, as milch cows, good for nothing, being always nearly dry; so that we could scarcely ever procure cow's milk, even when meeting with large herds of them, much as we should have preferred it to that of goats. Our common breed or species is also seen in Nubia, &c., but more rarely. In most parts of Egypt, but especially in the lower pro-

vinoes, the common and hump-backed cattle are in a great degree supplanted by the buffalo, to which we were indebted for some of the milk obtained in Egypt, and all the abominable mass of indigestible fibres sold for beef. The buffalo has not made its way very far beyond the second cataract, or into Nubia. It is an excellent swimmer; thousands may be seen on the banks and shallows of the Nile during the heat of the day, luxuriously reposing, with only their heads, or even the tips of their hippopotamus-like noses, visible above water; the stream that is continually passing over them bringing renewed coolness with it. At times one envies them their position." (The late Dr. W. Arnold Bromfield, in the 'Zoologist.') As contrasted with the buffalo, of course the humped cattle are "very much like our own;" but the hump is only one of many distinctions, as already noticed in detail. We learn, however, something of the present range of the domestic Indian buffalo in the valley of the Nile. The ox of Cochin China, as noticed in Crawford's 'Embassy to Siam and Cochin China,' p. 479, "is a small animal, uniformly of a reddish brown colour, and destitute of the hump so remarkable in the Indian cattle." It is not identified by this author with the humpless cattle of Siam, which he also notices. From Johnson's 'Indian Field Sports' (p. 24) it would appear that the gaour (*Bos gaurus*) inhabited the hill districts bordering on the Damooda so late as about half a century ago; nor would it appear to have been then of rare occurrence. Describing a "hunquah," or grand hunting party, when the game had been driven from all quarters to a particular jungle, he remarks, "If any credit could be given to the assertions of the people, there were very few of them who had not seen tigers, leopards, gours (a species of wild bullock), and all sorts of wild animals in the course of the day." The banteng (*B. sondaicus*), we have lately been assured by our late and much-lamented friend Major Bedmore, is found in the southernmost part of the Tenasserim provinces in large herds; the animal so much resembling the humpless domestic cattle that our informant, at the time of his personally observing them, was not aware that it constituted a peculiar wild species. We have also learned that "feral" humped cattle are numerous in parts of the province of Mysore, where their beef is held in the highest estimation, and very justly so, according to the judgment of our informant, who speaks from practical experience.—*Editor of the 'Indian Field.'*

Birds of Canada observed near Kingston during the Spring of 1858.

By Captain HENRY HADFIELD.

Cedar Bird (*Ampelis americana*). March 3rd. Saw two of these beautiful birds feeding on the berries of the mountain ash. It was a frosty day, with about six inches of snow on the ground; but the latter end of February had been mild, and the sun so powerful that most of the snow had disappeared, which may account for their early arrival. I subsequently observed a flock of about fifty in a large willow by the road-side, and close to some houses. They did not seem to be in the least disturbed by the foot passengers; but on the approach of a cart or carriage they would all rise together with amazing rapidity, and, wheeling round the buildings, disappear in an

instant. The return to their favourite ash, for there was but one covered with berries, was as sudden as their departure; at one moment the tree might be empty, the next it was seen crowded with these elegant birds, their glossy silk-like plumage glistening in the sun. Their every attitude is graceful; and as I stood within ten yards, gazing at them, I thought them the most gentle creatures I had ever beheld. Nevertheless, I am bound to say that they are voracious feeders, having found the throats of the specimens examined literally crammed with berries. "Lesser Waxwing" would perhaps have been the more appropriate name.

Song Sparrow (*Fringilla melodia*). March 3rd. Procured two. On the 22nd of April observed one carrying building materials.

American Shrike (*Lanius excubitor*). March 8th. Having walked through the snow to a very secluded spot about a mile from the town, my attention was attracted by the plaintive and subdued notes of a bird apparently concealed among the foliage of the fir trees over head; but, after vainly endeavouring to discover it, on emerging from the wood I perceived it on one of the topmost branches of a lofty tree, fully a hundred yards distant. Having to pass over an open space, I was seen, and the shrike disappeared; but I had observed that on a small bird flying by he darted after it, but did not pursue it to any great distance, speedily resuming its post of inspection. Although I revisited the spot on the following day, I did not succeed in finding it, but subsequently saw one or two which proved too shy and wary to be approached. I had observed one, rather late in the autumn, taking a southerly course; its flight was direct, but undulated.

American Siskin (*Fringilla psaltria*). March 8th. Observed a few feeding among the topmost branches of the pines; they were restless, and, like the tits, in constant motion. Secured two specimens.

Snowy Owl (*Strix nyctea*). March 18th. On passing through some enclosed fields skirting the "bush," I was surprised and somewhat startled at seeing one of these noble-looking birds suddenly rise from off the snake-fence, within a few yards of me, where it had sat secure and unobserved, its plumage assimilating with the bleached and weather-beaten palings: it was over the fence in an instant, before I could get my gun to my shoulder. Knowing the sluggish soporous nature of owls, and forgetting that this was the day-owl, I momentarily expected to see it alight; but on it went with buoyant flight, never stopping till it had gained the shelter of a distant clump of trees, among which it disappeared. Although in rapid pursuit, I

had not cleared half the distance when I discovered that I was not the only enemy it had to contend with: some crows sallying from the neighbouring wood attacked the poor owl, which was soon driven from its position, and, being sorely harassed in its retreat, endeavoured to avoid its persecutors, who had the advantage in speed, by gradually rising until it had attained a considerable elevation. This order of flight being unsuited to the pursuers, they gradually relaxed their efforts; and there now remained but one crow in pursuit, which, having momentarily succeeded in gaining the ascendant, made a pounce at the owl, but whether a real attack or a feint the distance prevented my seeing; but, soon relinquishing the chase, it rejoined its companions, and the persecuted bird was allowed to pursue its course, and was soon lost sight of in the distance. The scene was an exciting one, and I greatly coveted the prize, which I should probably have secured had it not been for the untimely appearance of the crows.

Migratory Pigeon (*Columba migratoria*). March 20th. At about 5 P.M. saw a flock of about forty or fifty, flying rather low in a north-easterly direction. Though these are the first I have seen, I am informed that on the morning of the 19th some were observed. On the 21st, between 6 and 7 A.M. (there being a heavy gale from the south-west) a vast number of pigeons passed over the suburbs of the town, their flight low, in consequence of the violence of the wind. Several small flocks were seen during the day, following the same course. I understand that they have made their appearance some weeks earlier than usual, which may be accounted for by the extreme mildness of the season. On the 20th of May, on the passage from Kingston to Toronto, when standing on the deck of the steamer, a little before sunrise, a pigeon, coming from the American side of the lake, passed close over my head, between the fore-mast and the funnel. The rapidity of their flight is almost beyond belief: they no sooner appear than they are gone; and should the unwary gunner be standing at ease, very possibly the pigeons may be a quarter of a mile off before he has his gun to his shoulder. Having shot one in the head, it towered to a considerable height, and then fell dead. Though the length of the adult male is $17\frac{1}{4}$ inches, the body, exclusive of the neck, measures but $4\frac{1}{2}$ inches.

Rusty Grackle (*Gracula ferruginea*). March 20th. In passing through a wood my attention was attracted by notes somewhat resembling those of the guinea-fowl. Following the direction of the sound, I descried, among the branches of a large tree, a flock of

grackles. They were in perpetual motion, all singing together, if their monotonous notes might be styled a song; but in the solitary wood it had a pleasing effect. They frequent the marshes, and, like the redwinged starling, roost, I believe, among the reeds, having observed them assembling in great numbers of an evening in such localities.

Bluebird (*Sylvia sialis*). March 20th. Observed one of these beautiful but common birds, so like the redbreast in figure.

Snowbird (*Fringilla nivalis*). March 29th. Observed one of these common little birds, its black and white plumage making it remarkable.

Robin (*Turdus migratorius*). March 29th. Observed the first robin. On the 21st of April saw one picking up shavings in a garden. This is the first bird that I have noticed preparing its nest; for although the season has been an unusually mild one, the weather has been rather cold for some days. On the 23rd found the robin's nest in the forked branch of a leafless willow, at about eight or nine feet from the ground. It is composed externally of coarse grass, intermixed with a few shavings, and has in its unfinished state a rough lining of clay. The shavings being placed near the bottom, the nest must have been almost wholly constructed between the morning of the 21st and noon of the 23rd.

Black Hawk (*Falco niger*). March 30th. Saw what I believe to have been one of these handsome birds, perched on the top of a lofty tree on the border of a marsh, but failed in my endeavours to get a shot at it.

Pewee Flycatcher (*Muscicapa nunciolo*). March 10th. Saw two or three on the banks of a stream, in a very sheltered situation; secured one specimen. On the 17th of April observed several at the entrance of the Rideau Canal. They were taking flies from off the surface of the water; and I also noticed that they occasionally dropped on it for a second or two with expanded wings. After capturing a fly, they would turn to a branch overhanging the water.

Canada Goose (*Anas canadensis*). March 31st. When about a mile from the town, saw nine geese, flying very low in a north-easterly direction. I subsequently heard that they had been seen on the lake, but none were killed.

Goldfinch or Yellowbird (*Fringilla tristis*). April 1st. Observed the first. April 6th. Procured two specimens, both males, one in perfect adult plumage.

Black and White Creeper (*Certhia maculata*). April 1st. Shot one of these rather rare birds; on the 18th of May procured another.

Length 5 inches 8-tenths ; extent of wings $7\frac{1}{2}$ inches ; from flexure, 2 inches 7-tenths.

Yellowbellied Woodpecker (*Picus varius*). April 5th. Shot a handsome male. Believe it to be rather an uncommon species in this part of the country.

Barn Swallow (*Hirundo americana*). April 6th. Saw several ; shot three. This species, unlike the purple martin, avoids towns and villages, and frequents isolated barns and out-buildings. Its tail is forked ; and this bird, in shape, colour, and manner of flight, bears so strong a resemblance to the chimney swallow of Europe that even an ornithologist might be excused for mistaking it on the wing.

American Crossbill (*Loxia curvirostra*). April 6th. Procured a specimen. They are, I believe, permanent residents, though I did not fall in with them during the winter ; but unless specially sought for they might not be noticed, as they feed on the upper branches of the pines, among the dense foliage that crowns the perpendicular trunks.

American Snipe (*Scolopax gallinago*). April 7th. Shot a bird of this species, weighing five ounces. Although darker, and I think somewhat larger, it closely resembles the common European snipe.

Redwinged Starling (*Icterus predatorius*). April 7th. Procured a specimen. Had observed one on the 3rd. Although a common bird it is one of the most beautiful in the country, the glossy red and black plumage of the male making it very conspicuous. It is to be seen perched on the reeds and bull-rushes. Its constantly-reiterated song is plaintive, but monotonous. They are restless, and perpetually flitting about, making short excursions into the bush bordering the marsh, where they are easily approached.

Purple Finch (*Fringilla purpurea*). April 7th. Shot a handsome male. This is a common species, occasionally frequenting the gardens in the town.

Blackcapped Titmouse (*Parus atricapilla*). April 7th. Observed a few of these common birds, which are, I believe, winter residents.

Goldwinged Woodpecker (*Picus auratus*). April 9th. Found two of these splendid birds, male and female ; secured them both, but the latter, being merely winged, ran up a tree, and was caught with difficulty. It was put into a room with a few logs of wood, up which it was constantly climbing, but when disturbed would conceal itself between them. It fed well, and I was in hopes of preserving it, but after a few days' confinement it pined away and died, when I found it had been wounded in the body as well as in the wing.

Wood Duck (*Anas sponsa*). April 10th. Obtained a handsome male specimen of this by no means common species, but which is said to breed in the woods, constructing its nest in hollow stumps and trees.

Scaup Duck (*Anas marila*). April 10th. Procured a specimen.

Meadow Lark (*Alauda magna*). First week in April found three of these gigantic larks, which appear to be common hereabouts.

American Wigeon (*Anas americana*). April 14th. Examined a fine specimen recently killed.

Green or Whitebellied Swallow (*Hirundo viridis*). April 14th. At 6 P.M. observed a number of these birds in a sheltered situation in the marshes. Had previously seen one on the 1st, about the same hour; and I believe they resort there to roost among the reeds. On the 5th of May I noticed that a pair had been for some days constructing their nest under the eaves of my house, on a projecting quoin; and I observed them picking up straws from the street, to mix with the clay.

Shore Lark (*Alauda alpestris*). April 16th. Saw a small flock, out of which I shot one; though by no means common. I subsequently fell in with a few; and a male being slightly wounded in the wing, it was placed in a cage, where it thrived, but continued shy. It had a plaintive but not prolonged note. They occasionally alight on the fences, but never on the trees.

Rubycrowned Wren (*Regulus calendula*). April 17th. Shot a handsome male.

Goldencrested Wren (*Regulus cristatus*). April 17th. Procured a specimen.

Belted Kingfisher (*Alcedo alcyon*). April 26th. Found a few of these birds in a marsh about two miles from the town. One I saw balancing itself over the water, being kept well nigh stationary by its quivering wings before making the plunge. On emerging from the water I observed it occasionally resort to a stranded log, but taking care to keep out of gun-shot. Others I saw alight on the branches of trees overhanging the swamp, but were far too wary to be approached, so I failed in my endeavours to procure specimens.

Crow (*Corvus corone*). April 26th. Found a crow's nest at the top of a rather lofty fir tree. On shouting out the bird never stirred, but on striking the trunk with a stick it flew out. My companion having ascended the tree with some difficulty, the nest was found to contain five eggs, but one was broken in the descent (Wilson says the crow has four). As they vary somewhat in size, I give the exact dimensions, which are as follows:—First, 1 inch 7-tenths in length, by 1

inch 1-tenth in diameter; second, 1 inch 6-tenths, by 1 inch 2-tenths; third, 1 inch 5-tenths, by 1 inch 1-tenth in diameter; fourth, 1 inch 5-tenths, by 1 inch 1-tenth. On the 13th of May found another crow's nest in a moderate-sized fir, at about forty feet from the ground. It was very imperfectly concealed, and contained four half-fledged birds, apparently about ten days old.

Field Sparrow (*Fringilla pusilla*). April 26th. Found a small nest in a stunted bush near the ground; it contained four eggs. Saw the bird leaving the nest, and believe it belonged to this species.

Great Northern Diver (*Colymbus glacialis*). April 28th. Procured a splendid old male, by far the largest that I saw during my stay in Canada; it measured 36 inches in length, by 60½ inches in extent of wings; wing, from flexure, 15½ inches; bill, along the ridge, 3 inches 4-tenths; lower mandible, from plumes, 3 inches; bill, from gape, 4 inches 9-tenths; upper mandible exceeds the lower by 1-tenth of an inch; mouth, 1 inch 4-tenths wide; diameter of eye, 4½-tenths; tarsus 3 inches 7-tenths; middle toe, 4 inches 4-tenths, claw 6½-tenths; inner toe, 3 inches 8-tenths, claw 5½-tenths; outer toe, 5 inches, claw 4½-tenths; back toe, 8-tenths of an inch, claw 3-tenths; tarsus, 3-tenths of an inch wide, 1 inch 1-tenth deep; tail, 3 inches long; black band or collar, 1¼ inches wide; depth of bill, 1 inch 2-tenths; nostril, ½ an inch in length; circumference of head, 10 inches; round the body, beneath the wings 18½ inches, over the wings 21½ inches; circumference of the neck, 7½ inches; length of thigh, 8½ inches; humerus or arm, 8¼ inches; weight, 11½ lbs. Wilson remarks (vol. iii. p. 259), "the best and largest has been described for this work; weight, 8½ lbs.; length, 34 inches; extent of wings, 54 inches," proving my specimen to be a gigantic one. Macgillivray, in describing the northern diver, says the male is 31 inches in length, and 49 inches in extent of wings. Both Wilson and Montagu seem to agree in thinking that the size of the European specimens has been exaggerated. I have no doubt, notwithstanding all that may have been advanced to the contrary, of their being one and the same species. On the 19th of May I observed three of these divers on the Lake (Ontario).

Purple Martin (*Hirundo purpurea*). April 30th. Saw two of these beautiful birds. Though not a rare species, they are by no means common in the neighbourhood of Kingston; so that I failed in obtaining specimens in the autumn; but I occasionally observed them in the town, frequenting the houses near the Lake, but never fell in with any in the country; so almost despaired of getting specimens. But this spring

I determined to secure some, if possible; consequently, sallied forth at day-break into the streets, before the inhabitants were stirring, and got a fair shot at one flying round the corner of a house near the cathedral, but missed it, owing, I fancy, to over-excitement; but as it would have been imprudent to have ventured another shot I had to return home disappointed; and it was not until the 19th of May that I succeeded in getting one. On walking through the streets on my way to the steamer to embark for Niagara, perceiving one on the roof of a house, I could not resist the temptation of shooting it. It fell dead, almost on the heads of some children at play. This, together with the report of the gun, proving too much for their nerves, they set up a yell that might have alarmed the whole neighbourhood; so I was glad to walk off with my prize, which proved to be a handsome cock bird; and I secured a female on the following day, near Hamilton. By the 5th of May they had, I think, commenced building, as I noticed them coming from under the eaves of the houses.

Carolina Nuthatch (*Sitta carolinensis*). May 8th. Shot one of this very common species, which is permanently resident. Length, 6 inches; extent of wings, $11\frac{1}{2}$ inches; wing, from flexure, $3\frac{1}{2}$ inches.

Savannah Sparrow (*Fringilla Savanna*). May 8th. Shot one of these rare and beautiful sparrows, which, according to Wilson, are rarely found inland, or far from the sea-shore. Length, $6\frac{1}{4}$ inches; extent of wings, $8\frac{1}{4}$ inches.

Chimney Swallow (*Hirundo pelagica*). May 9th. Observed the first. On the 14th shot three; average length, 5 inches 2-tenths; extent of wings about $12\frac{1}{4}$ inches. In appearance, manner and rapidity of flight, this bird greatly resembles the common European swift, although not much more than half the size. The peculiar, bare, sharp-pointed shafts of the tail-feathers, like those of the woodpecker, doubtless support and assist them in climbing. Wilson says, "It is never seen to alight but in hollow trees or in chimneys;" is the "latest out in evening of all our swallows." Like the European swift, it is the last to arrive, but the first to depart. In describing the nest, the same author states that the materials of which it is composed are "fastened together with a strong adhesive glue or gum, which is secreted by two glands, and mixes with the saliva." Macgillivray informs us that the "materials of the nest of the swift are confusedly felted and agglutinated," and that the gelatinous matter is probably derived from the salivary glands. He also remarks that the claws are "very strong and acute." And Wilson tells us that the feet of

the chimney swallow are extremely muscular, and the claws very sharp. This being little more than a list of species observed, I cannot carry out the comparison; but I am convinced that the chimney swallow of America is closely allied to the swift. I failed in procuring specimens in the autumn, though I saw vast numbers, but almost invariably at a great height. Long after the rest of the swallows had retired they might be seen congregating about the tower of the cathedral, their common roosting-place.

Redbellied Blackcapped Nuthatch (*Sitta varia*). April 16th. Observed a few of these small nuthatches in a fir wood; secured two. Length, 4 inches 3-tenths; extent of wings, $7\frac{3}{4}$ inches; wing, from flexure, 2 inches 6-tenths. This species is said to be migratory.

H. W. HADFIELD.

(To be continued.)

Notes on the Mountain Birds of Jamaica.

By W. OSBURN, Esq.*

"Freeman's Hall, Trelawny, Jamaica,
"July 7, 1859.

"My dear Sir,—I resume my notice of the mountain birds of this portion of Jamaica, by continuing my remarks on Columba Caribbea. I may first observe that the cherry tree on which they were feeding I have since had good cause for supposing to be the clammy cherry (*Cordia collococca*), though I have no botanical work at hand to verify the surmise. From the two birds brought to me for sale in the winter I had put down the colour of the iris as bright yellow, but I saw on the present occasion that it was composed of two very distinct circles, the inner hazel, the outer blood-scarlet. I was wondering at the difference in a male bird I had winged, but which seemed otherwise uninjured, when, on laying him on his back and applying severe pressure to the ribs, so as to produce suffocation, I was surprised to observe the colour of the outer circle of the irides change rapidly during the agonies of death from blood-scarlet to bright yellow. After death they slowly resumed their first colour. In this young bird, which was dead when it fell, the irides were bright yellow, and exhibited no change. As all three adult specimens I procured were alike in this scarlet ring, I would suggest that the natural colour of

* Communicated by P. H. Gosse, Esq., F.R.S.

the iris is yellow, but can be coloured by the corpuscles of the blood, which, by some muscular effort, voluntary or involuntary, of the bird, can be withdrawn, when the blood circulates as usual colourless. The next evening I returned to the pasture for the purpose of watching them only. It was about sunset, and there were at first no birds visible; but, after watching a little, one here and there appeared at a considerable height from the tall forest that covered the steep hills around. The ring-tail, even at a great distance, is easily distinguished from our other Columbadae by the slow strokes of its wings, its heavy flight and the disproportionate length of the tail; they have, too, a habit of setting off in a wide circle, pausing as if they had not made up their minds where to go, and then returning to the perch they had left. My firing at them the preceding evening had probably alarmed them, and these might be reconnoitring excursions. At length a pair perched on the topmost twigs of the clammy cherry, so that I had them *en silhouette* against the glow of the evening sky. After eyeing me suspiciously a little (for there was no shelter near for concealment) they descended to the lower branches, and I then remarked that the ring of the expanded tail is much more obvious than I should have supposed from the dead bird. They reminded me oddly of our green parrots, in the heavy business-like way they almost tumbled in among the twigs, and at once began to pluck and rapidly swallow the large berries, quite regardless that the twigs behind raised the tail straight up, or the leaves prevented a wing from closing; but they soon took other positions, and the object of the large tail, the strong feathers of which it is composed, and the vigorous muscles which move it, seemed very apparent in its constant requisition as a balancer,—continually in violent action as the heavy bird stretched and tugged at the ripest berries, the twigs swaying and shaking with its weight and exertions. It is remarkable that in our large Cuculidæ, birds which also obtain their food by leaps, in positions when often the wings cannot be expanded, the same contrivance is resorted to. They jumped from twig to twig, as the berries were finished, with a good deal of commotion. A sidling movement along a branch was a very common manœuvre for changing the bunches above, not foot over foot, like a parrot, but moving one foot sideways and then the other up to it, and very quickly. I approached nearer, and just as I stopped I observed the female bird, on a thicker twig, try to reach a tempting bunch below; she stretched but could not reach it, sidled a little further out, but it was still beyond her; she then turned completely over, so that she clung to the twig *back downwards*. A half turn of the neck brought

the head in the natural position, and she thus easily picked out four or five: she then recovered herself, making a great commotion by flapping against the leaves with her powerful wings. The male bird had finished, and took the sitting posture on a thicker twig, but the female seemed as voracious as ever. I now approached slowly still nearer. The male observed me attentively, stretching his neck, not rising from his crouch, but uttered a moan very like a person in pain, constantly reiterated. I believe this to be analogous to the much shorter, quicker snort the tame pigeon and others will give when partially frightened. My distance from them was not now more than ten yards. As they flew past me their wings produced a slight winnowing sound, but nothing like most other pigeons. They perched on the top of a cedar close by, doubtless to watch my movements.

“These observations were made under the very adverse circumstance of a cloud of mosquitoes; I was obliged to request a friend with me and my servant to withdraw a little, as I was afraid their defensive movements would keep the birds at any rate in a state of partial alarm. My hands I could shelter, but on the face and ears it was, during the hour I watched them, like suffering an attack of measles; but I never could detect in the birds the slightest recognition of their presence: and, so far as I can gather from the structure of the bird itself, the unusually thick, compact plumage, the horny defences of the legs (plumed) and bill seem to leave not a vulnerable point, except the orbits. However, it seems universally affirmed that they are attracted by smoke, and will perch over a fire, partly spreading their wings, as if intently enjoying it; and such statements should not be lightly set aside, but that the cause of this is [the desire to evade the assaults of] mosquitoes does not appear quite so clear. Accounts, too, seem to agree that when in their autumn quarters, the high mountain woods, they repose in rows on the thicker branches during the heat of the day. Their voracity also is famous, but this, I would suggest, is fully explained by the small portion of the swallowed food which is appropriated to their sustenance. I only saw eight or ten birds altogether, but I was assured that before the tree was in a great measure stripped of its fruit they might be reckoned by dozens in this very pasture, and I can even imagine their numbers amounting to hundreds were their food abundant in one particular spot of a district. But it was a fine sight to see these noble birds feeding; their fearlessness was so unusual. All the colours of their plumage,—the soft lake of the head and neck,—the gay blue of the wings and back,—as well as their actions,—all plainly visible, in beautiful contrast with the dark

green foliage and the splendid racemes of scarlet fruit among which they were moving; and every action seemed to show how completely they were adapted to their appointed mode of existence.

"On examining, a few days afterwards, one of our green parrots I had just shot (*Psittacus agilis*), I was much struck with the similarity the proportions of the tibia and tarsus bear in both birds; and this is the more worthy of remark as in both the habits and mode of taking food may be said to be identical. Both are heavy birds, seeking their food at the ends of small twigs and in positions where great grasp is required, and where constant efforts must be necessary to preserve balance; and both are birds with capacious crops, passing many hours in repose amid the security of the forests. In the above observations I have alluded to what I conclude to be the use, in part at any rate, of the powerful tail with which this pigeon is furnished. With the parrot it is the reverse; the tail is extremely short; but I would suggest that the form of foot in the parrot would lead us to suppose that as a climbing instrument its grip is far greater. The tail therefore may be a necessary compensation to the pigeon for a differing structure.

"I alluded in my last to a beautiful but unknown song now constantly to be heard in the forests here. I devoted a morning of the past week to its investigation, but I found the task so much more difficult than I anticipated that I had to repeat my observations for several successive days before I could satisfy myself as to the songster. I may mention here, as bearing on the subject, that when, during the winter, I used to hear the long-drawn notes of the solitaire from the tall forests between here and Mahogany Hall, the negroes always assured me it was 'Hopping Dick Shiny-eye.' As I had your notes I knew this to be a mistake, and after my arrival here I had soon an opportunity of verifying your statements by procuring specimens of *Ptilogonys armillatus*, and seeing them in the forests, though I never had an opportunity of observing them actually emit the note. In the spring, when I returned, I heard these notes no more, but I still hesitated to conclude they were gone, for, from some far-distant depth of the forest, I used to hear a note that seemed the well-known one of the winter. If I stopped to listen it was audible, as the breeze passed, once or twice more, and then was silent. I soon found that these beautiful notes, like those of the solitaire, in quality of tone, were introduced in a song, and as the spring advanced I became very familiar with them. The song, if I was near enough to hear it commence, always began with a 'Quank, quank, quank, chu' (a very suspicious circumstance), and then



The first bar is rapid, and often repeated, a merle-like stave; the second I intend to represent the flute-like notes which remind me of the solitaire; but flute-like is, I feel, an expression very unsuggestive of the reality. It occurred to me, as I listened to it yesterday, that perhaps the vibrating tones which can be produced on a glass with water in it is something like it, but it is quite indescribable: there is a fulness, a mellowness, a deep tone and feeling,—a consciousness of life, about this voice of the forest,—that no mere instrument can imitate. You will see, by the little score I have given, they are exceedingly fond of the interval a fifth. The accented crotchets in the second bar are followed by still longer notes of the same quality. Sometimes there is a pause before the fifth is taken, with, to me, an extraordinary effect. At others the interval of a fifth or sixth is taken (as well as I can judge), after a run of two or three rapid notes. No sweet sound of the forest I know of is more beautiful than this. The deep gloomy recesses in which it is heard, the influence on sound of the shrouded gorges and rocks, the swell of the breeze which plays far over head, unfelt below, combine to make this ‘sweetness long drawn out’ one of the most deeply impressive of the voices of nature. Often, as I have returned home from following it, the jocund lay of the nightingale [mocking-bird], from a guava close to the house (for, notwithstanding Dr. Robinson’s assertion, this lonely mountain residence has its full complement, three or four pairs at least), with its odd interludes of imitation, has seemed a downright shallow warble compared with its rival of the woods. But perhaps we should not attempt such comparisons; each is perfect in its way. I cannot help suspecting, however, that some of the notes supplied you for the solitaire may apply to this bird; for they once or twice attributed this song to a thrush. I have before remarked that hereabouts at the forest-edge, or deep within, the song is constant; it may be heard on the road which communicates between us and the lowlands, from some dark valley close by, or a towering precipice crowned with wood. The place I chose for my search was a bit of forest where they abound, some way within its boundaries, but where the track crosses the summit of a hill, so as to have the ground as level as possible. I have no negro on whose intelligence I could rely, so was obliged to undertake

it myself. You will appreciate the abundance of these beautiful songsters when I say that within a few hundred yards in all directions from this spot I followed not less than a dozen birds, not necessarily all different individuals, because doubtless they resumed their strains. The forest just here is extremely thick with underwood, composed of small trees about the thickness of walking-sticks, bound strongly together with climbing ferns; *Passifloræ*, &c. The sink-holes, large and small, often shrouded by fallen leaves, make some caution necessary, and besides this the swarms of mosquitoes and perpetual clamour of *Vireosylva olivacea*, which abound here, were very distressing. Generally, when I had cautiously crept up and was trying, without moving, to catch sight of the songster, the song would be suddenly broken off, and followed by a 'quank, quank,' soon repeated more rapidly and becoming more distant. The wary bird had caught sight of me first. At other times I managed to get nearer, and then the song ceased; a bird darted out stealthily and lowly, whose dark back and rufous head could belong to no other than *Merula Jamaicensis*. Several times, however, I was more successful; I got close up without disturbing him, but not without his seeing me. The song would again cease, and I should at last espy him perched generally on the lower limb of a large tree, near the trunk, but sometimes on a low shrub a foot or two from the ground, where his colouring, in the sombre light, made him particularly difficult to see. He would 'Quank, quank,' flirting his wings and tail at each reiteration, then, as I kept quiet, relapse into a puffed musing attitude, and, after keeping me waiting for a quarter of an hour, drop and slide off among the bushes a foot or two above the ground, to begin his song a hundred yards further on. But on a few occasions I have, in birds disturbed by the man with me at some distance, and which have taken refuge close by without seeing me, seen the bird's bill and throat move as it commenced 'Quank, quank,' till it seemed brimful of the lovely notes that were coming, and burst into the first stave of the score given above; but they found me out before the second or flute-like notes were produced, and which do not seem to occur till the bird has sung a stave or two. I have thus given at length the grounds upon which I attribute this beautiful song to this wary thrush, and would place it amongst the most lovely of the warblers of the tropics. I am quite glad to see I am borne out by an assertion of your usually most accurate old Doctor ('Birds of Jamaica,' p. 259).

"The Black Banana Bird is common in the deeper glens of the forest. I shot one, the other day, swinging on a long strip of bark,

where, head downwards, he was probing a small *Tillandsia*. I see I had not, when I last wrote, remarked that the tongue of this species is *pencilled*; it is horny and semitransparent at the tip, where it is hollowed by raised edges, the tip split into two portions, each of which terminates in two or three fimbriæ. The raised edges are jimped (to the lens), so as to leave little barbs pointing forwards; protrudible easily about a quarter of an inch beyond tips of mandibles; hyoid bones are slender, and not much longer than ordinary. You will observe that all these parts are small; indeed they escaped my observation. But it often reminded me of *Certhiola* and *Tanagrella* in its mode of inserting the beak into the sheathing bases of the leaves of the parasites it frequents. I found in the stomach fragments of insects, beetles, Orthoptera and a good many tough, leathery, empty cases, like those of grubs or eggs of insects, but no seeds of any kind. It has a swift dashing flight from tree to tree, the reflections of plumage often deceiving as to its colour. It is frequently difficult to shoot, from the rapidity with which it dodges about these epiphytes. I found a nest the other day, in the densest portion of the forest, attached to a wild pine (*Echmea* ?); when these plants have attained some age the terminal bud gradually leaves a long flattened stem of a foot or two firmly fixed to the tree. The dead leaves of the plant sometimes collect some of their in turn falling successors and leaves from surrounding trees; these gradually form a little bit of black mould, soon appropriated by *Polypodiums* and other pendant ferns. It was on a little but very graceful tuft of these the nest was placed; it was a simple cup, not very deep. It is now in my possession, and I should describe the whole to be composed of a thick interwoven mass of black fibres, which, without having the two at hand for comparison, appear to me precisely the same as those used by *Icterus leucopteryx*, only in this case the mass is much thicker and denser, and the outer threads are carried over so as to include bits of *Lycopodiums*, moss, &c., and the threads within keep down similar materials for a soft bed. But nothing could be more beautiful than the position of this artful structure on a bracket of drooping ferns, the stiff, arching leaves of the wild pine above sheltering it from the weather. The boys brought me young birds of this species, taken with bird-lime and evidently having just left the nest, a month ago. But in the male I shot the other day, the organs were still swollen, so that I conclude the breeding-season is not yet over, and I may light upon further information."

"Freeman's Hall, Jamaica,
August 6, 1859.

"Dear Sir,—In the outset of your preface to 'The Birds of Jamaica,' you allude especially to the very interesting group of the Hirundines, and as no less than three of our ascertained species were among your own discoveries, I conclude you will be glad of any further particulars respecting them which a residence among these mountains, the summer haunts of the major part, may enable me to give.

"In my first letter I alluded to that very remarkable swift, *Acanthylis collaris* (?) and gave such few observations as the previous spring and summer in the lowlands of Westmoreland and the latter months of the year in the mountains of Trelawny enabled me to furnish; but here my experience strictly accords with yours; their appearance is only very occasional, generally after rain or heavy gales of wind. On my arrival in these mountains, in January, I found them much more common, and during April and May, and since, during the summer, they may be said to be constant, scarcely a day passing when they are not to be seen in great numbers, and fully impressing me with the conviction that they inhabit some of the secluded precipices of the neighbourhood, though I have hitherto been quite unsuccessful in hearing of or discovering their hiding places. I have spoken with some hesitation about their *constant* appearance, because it would seem these birds use their extraordinary powers of flight to explore large districts in search of food, and do not, like swallows, regularly beat over a circumscribed hunting-ground; but, in greater or smaller numbers, rarely a day passes when their shrill scream does not here announce their presence. Soon after sunrise they may be seen in small numbers skimming backwards and forwards smoothly over a small space, at no great height, the tips of the long wings depressed much below the plane of the body, evidently busy feeding. As the morning advances a 'wee-wee,' very short, often not more than two syllables, as if interrupted, is heard, when the whole party of six or eight perhaps collect and dash furiously down the valleys, or round prominent objects near. They are gradually joined by more such parties, when the whole, consisting of from fifty to a hundred birds (in heavy weather more) collect and form a gyrating column, produced by the flock revolving at different heights in the same direction and round the same axis. This is not invariably the case; I have often noticed different parties come up and revolve in different directions round different axes; the effect was thus of course merely that of an eddying cloud. The screaming parties are then constant, from three

or four to a dozen birds dash off with amazing velocity, the wings of now one and now another being elevated, motionless, above the body, but the tips kept backwards (a manœuvre, I think, very unusual with *Hirundinidæ*), and in this position shoot along with wonderful impetus, the whole so close together that a lucky shot might bring down half-a-dozen. I take great pleasure in watching them. No bird seems to spend more of its time in amusement, or betrays more exquisite pleasure in the exercise of the wonderful gifts bestowed upon it. Often, when in the forest after other objects, I hear the shrill 'wee-wee' far over the tops of the trees, the birds themselves of course invisible. Towards the middle of the day they generally disappear, and are again to be seen towards afternoon, when they practise the same manœuvres till towards sunset. If there be heavy rain, they come up with it, and, either before or after it, dash about low over the ground in the manner described by your correspondent. Then is the best opportunity the naturalist is likely to get for procuring specimens. To hit them when skimming low would be a difficult feat, and one I do not attempt; but they often rise about thirty feet, and come up slowly against the wind, evidently catching drifting insects. They are then within the capabilities of an ordinary marksman. With regard to the gyrating column, the question has often occurred to me whether this is to be considered as a mode of feeding or not; I think not, from the extreme steadiness of every bird; but that it is a mere concerted movement for collecting before making a change of hunting-ground for the whole flock, or perhaps simply a mode of enjoying their life and powers. I have often been amused by watching a *Cathartes* join them, and steadily keep his place in the crowd till it disperses. This arises, I imagine, not from any predilection of the swifts for such strange company, but from an odd inclination the John Crows have to join any gyrating bird, probably supposing that, as they only gyrate steadily when there is something near in their way of eating, other birds do the same. They often join the chicken hawk in the same way, merely, I think, to see what he has in his eye, for he sweeps along utterly indifferent to his train of black attendants. But in the case of the swifts this curious habit is in one respect fortunate, as, the rate of gyration of these *Vulturidæ* in ordinarily calm weather being well known, it enables me to say that that of *Acanthylis* is little, if anything, faster. If there be much wind the velocity is greatly increased, and they soon break up. Other birds are also deceived in the same way. I once noticed *Hirundo euchrysea* attack one that was gyrating lower than the rest,

doubtless from the resemblance of its action to that of a raptorial bird. Towards the latter end of April, about 8 o'clock one bright morning, I observed an unusually large number of these birds revolving in column over a deep, thickly-wooded valley where our little Quartiers river disappears down a chasm. My position was on the road which winds round the summit of one of its enclosing hills, the valley immediately below. It was with great interest I observed a pair dart out from the summit of the column, and then one just behind or just above the others fall, screaming with peculiar vehemence, together into the valley below, recovering themselves just over the tops of the trees by a curve of astonishing rapidity. Several pairs did this in succession; but though I watched them attentively I always thought I could see a small space of two or three inches between the birds, except in one case, where the juncture seemed to me complete. I should add, that though I found their actions easy to observe when they left the column, as their course became more and more at right angles with the line of sight, and they plunged into the valley and shot over the tree tops, their flight was so rapid that I could not feel certain what they did. Sometimes several others would join; but close proximity always seemed to point out the pair whose nuptials the screams and activity of the pursuing birds were intended to celebrate. They then, at a slower pace, rejoined the column, and were lost amid the revolving crowd. But the contrast between the speed and erratic sweeps of the pairs, and the majestic revolutions of the column, was very striking.

"I shot a specimen the other day; but as you will probably have anticipated any observations on it I have to make (if you have received skins since your work was published), I will not add them, further than to remark that the stomach I found stuffed with the winged females of a small species of ant. There were a few larger insects,—Coleoptera, bees, &c.,—but not many.

"Of *Tachornis phœnicobia* I have nothing to add to the information you collected, except that, so far as my observations go, it is very much rarer on the north than on the south side of the island, where it is one of the commonest birds. Indeed, along the whole of the north coast from here westwards, the only place where I have observed it in any numbers, or constantly, is at a spot near Rose Hall, about mid-way between Falmouth and Montego Bay; and here, curiously enough, is the only clump of fan palms I have met with on this side, for it is certainly here an uncommon tree. In these mountains this little swift is still rarer: I have only observed it once, where

it made the fourth species of Hirundine that were there skimming round this house, and the fifth I had noticed within half-an-hour.

"*Cypselus niger*, from its having escaped your observation, as well as that of your coadjutors, I long considered as probably a rare and very occasional visitor.

"On the 9th of June last we had much rain, heavy clouds which did not disperse, and much thunder; when, hearing the scream of *Acanthylis*, as well as the cry of *Chordeiles*, I went out to watch them, and see whether there was any probability of either giving me a shot. To my surprise *Acanthylis* seemed, as I thought, much smaller than usual, and the curved wings did not form the remarkable arch I was so familiar with. A great number of swifts were dashing about over the meadow, in the violent, impetuous way they do on rainy afternoons, when, one passing between me and a tree, followed by an *Acanthylis*, I saw there were two species. The new one was smaller, quite black, had no white collar, and seemed to me grayish about the head and throat, points which seem to agree with your description of *Cypselus*. I immediately went for my gun, but on returning they had got high, and I fired one or two ineffectual shots. Their flight and habits are, however, very different from those of *Acanthylis*. On the afternoon in question, and since, I have observed when there is little or no wind, they constantly practise a manœuvre I would represent by the accompanying diagram. By the dotted line I mean a beating rise; by the entire, a festooning fall;—a habit very common with the martins, but one I have never observed *Acanthylis* adopt. These latter birds soon collected into column; and then the numbers of the other species, about thirty, became apparent, who had not, evidently, the slightest inclination to practise a similar movement, but continued hawking in an irregular body the rest of the afternoon. I noticed a pair pursue, when the nuptials evidently took place. Their motions were extremely rapid and irregular, not unlike birds fighting; and the scream was not so shrill as that of *Acanthylis*, and broken into separate syllables. I have since, when here, seen them almost every evening, and for the last week have been watching for a shot, but in vain. Except at the above-mentioned time, I have never seen them, except just about an hour before sunset, when they continue hawking till they are joined by numerous high-flying bats, and the light is too uncertain to distinguish them. They generally appear about half-a-dozen together, and glide along slowly, on



motionless wings, for great distances in a straight line; for instance, they will do this for I calculate at least a quarter of a mile up and down the course of our little river. They would present an easy mark if they did not keep so high. If we watch them, while there is still sufficient light, when they pass nearest, a slight jerk of the head from side to side may be detected, but without any apparent motion of the wings: it is thus, I imagine, the prey is taken. They are the slowest in flight, and the most crepuscular of any of our swifts. I would remark that when the tail is expanded for a sudden curve it is exactly even like that of *Acanthylis*, whence I conclude that when closed it is slightly forked as that of the latter bird. I am still in hopes of procuring a specimen.

"On *Hirundo pœciloma* I have little to remark, except that they do not seem so abundant here as in the lowlands; and their appearance, though very general, is not constant. I have not fallen in with a colony hereabouts, which is remarkable, as there are the large, untenanted buildings of the thrown-up sugar estate and several caves close by. However, I often met, during last month (July), with flocks, evidently composed in part of this year's young, perched at a great height on the bare branches of forest trees, and, from the flights the whole would take, they at once remind me of our English species preparing for migration, though I certainly do not think they leave the island.

"I was extremely anxious, during my residence here, to procure further information respecting the lovely little swallow you have named *Hirundo euchrysea*. When I returned, in April, I was afraid, as I rode by their winter haunts, they had gone; but I soon found this was not the case: the flocks had only dispersed into solitary pairs, or at most two or three pairs together. Two pairs, I was much gratified to find, were constantly hawking round this house. They have a singular and very melancholy note, which may be rendered by 'tchee, tchee' constantly repeated, as they wheel round the house, and has become quite a part of my associations with the locality. When toying, it is repeated much quicker, and more impetuously when both birds skim round a tree or other object at a great rate. In the early morning they perch as other swallows, on some bare, exposed twig, and preen their feathers in the sun. I did not shoot more than a single specimen in April, as I was anxious to ascertain where they were nesting. I often saw them catch pieces of silk cotton, but my searches were for some time in vain. At length I saw one enter the old boiling-house. I watched for its return, and soon saw it arrive

with a bit of cotton ; but it refused to enter, wheeling past the aperture in the roof, uttering the plaintive cry with evident alarm. I then found that we had left the opposite door open, and a man and horse standing near it no doubt alarmed the wary little bird. The door was shut, and it entered. I then went in, and for some time could discover nothing of the hiding-place. At length it darted out of a dark corner, where there was a deep recess between the angle of the wall and roof. A negro boy I sent up found only two bits of cotton placed on the top of the wall. On returning, a week after, to my disappointment these had been removed ; and though the birds were about, all my searches after their nest were in vain. I observed another pair constantly at a particular part of the road which passes through the German settlement here ; but the houses were all low, and evidently not inhabited by them. Wishing to shoot one, I stopped to watch them, and then noticed they often disappeared among some bushes on a steep hill-side. I sent to examine the spot, and my expectations were considerably raised on hearing there was a cave. A pair flew round on my approaching the aperture, in evident alarm ; and, concealing myself, after long waiting, I discovered they entered a small crevice in the limestone in the interior of the cave. The aperture was just large enough to admit the hand ; but to my disappointment there were then (19th July) three young. They were naked and blind, the skin of a slate-gray colour. The nest, of which the hollow was not more than three-quarters of an inch deep, was a structure of considerable art. The interior was lined with a bed of the softest silk-cotton, intermingled with feathers, among which those of a green parrot were conspicuous. The foundation and external portions were composed of a flocculent substance ; what it is I am not sure, unless it be silk-cotton picked off the ground, and strengthened by intermingled soil and bits of trash. With this is mixed the pappus of, I suspect, *Compositæ* and *Tillandsiæ*, but the seeds are broken off. The whole mass is intertwined with bits of *Lycopodium*, which, though very ornamental, is extraordinary, as in the narrow, deep hole it could not add to the concealment as in an exterior nest. The diameter was about 5 inches, the outside depth $1\frac{1}{2}$ inch. It was the only nest, apparently, in the cave.

“ Yours faithfully,

“ W. OSBURN.

“ P. H. Gosse, Esq., F.R.S.”

Montagu's Harrier (*Falco cineraceus*).—All the specimens of this harrier which I have examined, from time to time, have exhibited, more or less, a variation in plumage, which the difference of age and sex suggested. A variety came under my notice yesterday which was remarkable. It proved on dissection to be a strongly-developed old male bird in very fine condition, and weighed in the flesh 10½ oz. In the crop were portions of a hare with the fur, &c.,—a fact which rather corroborates than otherwise the adult character of the bird, as the bird of the year would probably hardly attack so strong and large a prey. The whole of the plumage, both above and below, was of an uniform deep chocolate-brown, the only variation being that the basal portion of the tail was paler, the transverse bars just showing themselves, and the under surface of the wings the same, with four or five obscure bars; the occiput had a slight broken patch of rufous; the facial disk was scarcely visible, and the head and face had no paler markings whatever to disturb the uniformity of the umber-brown; nor in fact was there the slightest variation in this tone of colour anywhere except where I have alluded to. Any one might remark at a short distance that it looked like a diminutive young marsh harrier, which we all know is a very brown bird; but the dimensions and inferior size of the bird, with the prominent length of the third quill-feather and the general contour of the bird, leave no doubt as to the species. In the adult male Montagu's harrier, independently of the pale rufous longitudinal streaks on the belly and the under surface of the wings, there is a remarkable black diagonal bar across the upper and under surface of the wing; but all these peculiarities of the species in colour are of course not distinguishable in the present example, from the uniformity of the tone of colouring throughout. I may remark that in the young of this species, both male and female, there is more or less white or pale yellow about the region of the eyes; and although the plumage on the back and belly is brown, yet that on the whole of the under parts is of so light a character as to deserve the appellation of bright bay. In the marsh harrier the wings and tail are also long, but the bird is much larger and more robust, without that *slimness* peculiar to the appearance of Montagu's harrier. The third and fourth quill-feathers, too, of the marsh harrier are of equal length.—*Edward Hearle Rodd; Penzance, September 5, 1859.*

Friendly Alliance between Blackbird and Thrush.—Early in the spring of 1853 a dead thrush was found which appeared to have died from "natural causes;" and the next morning a nest was discovered which had three eggs. This nest was in a laurel, about four feet from the ground (the dead bird was supposed to be a hen). In the afternoon of that day a thrush was seen sitting on the nest. This bird was never seen off the nest for more than a fortnight. There was plenty of proof under the laurel that the nest had been very rarely left, and during the time that this thrush was so closely engaged a cock blackbird fed it very often. The hen blackbird was never seen near the nest. When the young thrushes were about a week old the cock thrush began to sing again, for no note of a thrush had been heard for more than three weeks, and even now he seemed to say, "I am too busy to sing a long song at a time." When the young ones flew the widower found another mate, and reared two more broods in the same garden that spring. After the kind attentions of the blackbird to his bereaved acquaintance were no longer needed, old feelings seemed revived, for whenever the two met on the grass the thrush invariably gave way. The blackbirds had lost so much time by these gentlemanly and Christian-like attentions that they were in a muddle the whole spring. For their first brood they took

up with the thrushes' nest of the year before without "cleansing or patching;" their second was a very slim affair, and for their third anything would do. The lady of the house laid out a heavy Vandyke collar on the grass to bleach, which was taken by these birds, and formed at least one-third of their nest. There were but two eggs in this nest, and only one of them hatched.—*Comm. by E. Newman.*

Description of the small Chinese Lark. By ROBERT SWINHOE, Esq.

"Along the sky the music floats,
And distant hills resound the notes."

This little songster, called in Mandarin "Proan Tien-fei," or "flying in mid-heaven," and in the Amoy dialect the "Paw-tewah," is a great favourite among the Chinese, and is generally kept in a high, cylindrically-shaped cage, made of light bamboo wicker-work, with a round, moveable, wooden bottom, fastened to the upper part by pegs; a small stick projects from the centre of the bottom about six inches, and on it is placed a piece of coral, or other rough substance, for the bird to stand on while singing or shaking his wings; and the height of the cage enables the bird to jump without fear of striking its head. Besides the usual pots for water, millet, and dried "Notonectæ," or "boatflies" (collected and dried purposely for the support of insect-eating birds), a wee bit of a cage is generally attached to the wires outside, into which live grasshoppers are from time to time inserted, and torn out as soon as seen by the bird, and devoured with evident relish. How much better the Chinese style of cage is adapted for the lark than the cage used by fanciers at home, I will leave others to judge. One thing is certain,—the captive, as he hangs in his cage suspended over some shop in the busy throng of men, sings away most merrily, regardless of all that passes below.

His congener the northern lark (*Melanocorypha mongolica*, Pall.), called the "Pile-ling," or "hundred spirits," a bird far more highly prized than our little friend, is kept in a very low-roofed wicker cage, not above three-fourths of a foot high, but having also a circular wooden bottom, with a centre projecting piece, shaped like a small round table, for the bird to stand on.

The fact of this bird being such a favourite among the Chinese makes us the more wonder how it has been so long neglected by Europeans as not even to have been described or named. When the great naturalists at home were chalking down everything that came to them

from China as "*sinensis*," though probably brought from some isolated spot in this vast Empire, or from some distant part of Thibet or Mauchuria, it is indeed a wonder that this poor little bird was passed over, and not specified with some similar name. "*Sinensis*" would certainly have been most erroneously applied in this instance, as the bird is not found much above this province; it is certainly not found in Shanghai; but it is abundant in various places in the neighbourhood of Amoy, and particularly so in the plains on the western side of Formosa; and I found it nestling on the high hill of Kooshan, at Foochow. How far South its range extends I cannot say. People may, however, argue that if a bird comes from any part of China it may be entitled to the name "*sinensis*." Such may be essentially the fact; but names are given to distinguish species, and surely most birds have some peculiarity which could afford them a name. This lark, which Mr. Blyth remarks is "probably new, but nearly akin to *Alauda malabarica* and to *A. dulcivox* of Hodgson," I propose naming *Alauda cœlivox*, and here give a short description of its characters.

ALAUDA CÆLIVOX, Swinhoe.

Descr.—The bill is dark grayish brown above, with a pale yellowish edge to the upper mandible; the lower mandible is yellowish tipped with brown. The inside of the mouth is flesh-colour, with pale king's yellow on the rim and commissure. Irides are deep hazel. Feet and claws light ochreous brown, the latter more or less tipped with brown. Upper parts yellowish brown, with a tinge of red; the central streak of many of the feathers, and the greater part of others on the head and back, being blackish brown. The quills are hair-brown, the second feather having the outer web reddish white; the other primaries edged with a redder tinge, and the secondaries more broadly with the same colour, the tips of both being whiter. The winglet is marked in the same way, but the first and second coverts are somewhat whiter. The tail-feathers are also hair-brown, the middle ones being very broadly edged with reddish brown, the others scarcely at all. The outer feathers are white, with the exception of a small basal portion of the inner web, which is brownish; the adjacent feather has also the greater part of its outer web white. There is an ochreous streak over the eye, and another from the bill below round the ear-coverts. The ear-coverts are reddish, but not more so than the top of the head. Throat, belly and vent are ochreous white. The breast and flanks are reddish brown, with a rusty tinge, the former spotted with narrow arrow-head spots of blackish brown, the latter streaked

here and there with a pale shade of the same colour. The under wing-coverts are pale rust-colour. The male is much redder than the female on the under parts, and the female has speckles on the throat and face, which are wanting in the male. She is also larger, as will be seen from the following measurements, though her wings are shorter and rounder. In the breeding-season the feathers get considerably abraded in both sexes, which gives the bird a much browner and dingier appearance; but in the winter, after the autumnal moult, the plumage once more resumes its rich tints. The male, while singing on the ground, generally raises his crest, which gives him a very elegant appearance.

Male.—Bill, $5\frac{1}{2}$ -tenths; to gape, 7-tenths; length to end of tail, 5 inches 1-tenth; wing, 3 inches 1-tenth; tail, 2 inches 4-tenths; tarsus, 9-tenths; mid toe and claw, $7\frac{1}{2}$ -tenths; outer toe, 5-tenths; inner toe, $5\frac{1}{2}$ -tenths; hind toe, $4\frac{1}{2}$ -tenths, its claws over 5-tenths.

Female.—Bill, $4\frac{1}{2}$ tenths; to gape, 6-tenths; length, 6 inches 1-tenth; wing, $3\frac{1}{2}$ inches; tail, 2 inches 4-tenths; tarsus, 1 inch; hind-toe, $4\frac{1}{2}$ -tenths, its claws over 5-tenths.

The members of this genus differ so slightly in colour, that without attention to the proportions and other peculiarities it is almost impossible to distinguish them; for example, the skylark and woodlark are perfectly distinct birds at home, yet I have seen some very good bird-fanciers for a while puzzled to point out which was which. Our bird resembles *A. malabarica* in some degree, yet on comparison I think there are sufficient grounds to separate them.

Having said something about its colours and its affinities, let us now have an insight into its domestic habits. For this purpose we must follow it to its haunts. There is an island in the Amoy Harbour honored by the name of Whale Island, from the similarity of its profile to that cetacean; and when the day is gradually yielding to darkness, and outlines stand out more apparent, the resemblance is very complete when viewed from certain parts of the harbour. The fore part of the island is clayey, covered with loose rocks, and stones which crumble and rattle under foot, and thus make walking on it very unpleasant. Here and there a few patches of coarse grass and a few low plants occur. The middle and "flapper" part abound, on the contrary, in rich grass pasturage; and here the larks love to dwell, and rear their young. Many a by-gone Chinaman who was evidently determined to lay his bones in quiet has been deposited here, and fine large graves overgrown with grass and herbage are

frequent, on the tablet-stones of which the merry lark, regardless of the crumbling remains entombed beneath him, stretches his little throat and quivers his wings as he carols to his mate; then, in the ecstasy of his joy, up he rises, and, gradually soaring higher and higher, soon becomes lost to view, though the cheerful cadence of his notes still strikes the ear of the delighted listener. The notes are rich and full, and sound delightful in the open air, especially when heard in the comparative solitude of this island; but in a house they soon become overwhelming. Leave the bird, however, where Nature intended it to be, and its song will continue to enchant as long as man has soul to enjoy.

I was only able to find one nest, on which the parent sat so close that I nearly trod on her before she bustled out and fluttered down the hill. Ensconced among the grass and almost concealed by it, lay the nest on the ground. It was placed in no hole scraped for the purpose, as the skylark places her nest, but knitted among the roots of the grass. The outside was composed of roots and coarse grasses; the inside was somewhat shallow, and lined with finer stems of grass. In it were deposited three eggs, varying but slightly in size, shape and colour; one that I brought away with me measures in width 7-tenths, and in length $8\frac{1}{2}$ -tenths; it is of a pale brownish hue, with numerous spots and blotches of umber-brown, smaller and scarcer at the lesser end, but disposed in almost a mass at the larger. The young are constantly exhibited for sale in the streets during the breeding season, and are reared by the Chinamen on a creamy substance called bean-cake, until they are able to feed themselves. In their markings they a good deal resemble the young of the skylarks.

The nestling has the inside of the mouth of an orange-chrome, which as the bird grows to full size pales into flesh-colour, with light yellow on the rim of the beak; the irides are umber. The feathers on the upper parts are smaller and rounder than in the adult, fringed with light ochreous yellow. The margins of the wings and tail are not so rich. The under parts yellowish white, and the pectoral band more ochreous yellow, with indistinct spots of blackish brown. Feet pale flesh-colour.

In autumn, when the season of incubation has come to a close, they herd together in flocks, though never in any great numbers, and may be seen all the winter through, in companies of twenty or thirty, in the fresh-ploughed fields or stubble, on which it is very difficult, nay almost impossible, to see them, from their being so much the colour of the ground. I have often walked quietly up to a spot where

I but a moment ago saw a flock alight ; and I have never been able to get a glance at them on the ground. On my approach they would spring up, several at a time, uttering the lark note, and rapidly remove to a further part of the field, or would ascend into the sky, and after fluttering round and round come down with quick descent to some chosen spot. They seldom hovered much, as at the season of courtship they so love to do.

Varieties of this lark occur with patches of white on various parts of the body. I have an individual alive that has a good deal of white on most of the feathers of the wings and tail ; and a bird formerly in the possession of a Chinese bird-fancying merchant here, but which he subsequently presented to me, is entirely white, with reddish eyes, and pallid beak and legs ; in fact, a perfect albino.

The name of the lark is one of the few names used by the people here to distinguish birds ; and when a countryman meets you on the hills, returning home with the produce of your morning's chase, with the prying curiosity so habitual to his race he examines the burden in the hands of your game-carrier, and pronounces all the birds of a brown colour—be they pipit, finch, or any other species—to be larks : to him they are all "Paw-tewahs." His first question then is, for what object the foreigner shoots, for the pot ? When told for amusement, he immediately points to a flock of sparrows or a passing crow, and is extremely disgusted with the foreigner's prowess if he does not devote one or other of these luckless creatures to the amusement of the gaping booby. The majority of these questioners go on their way incredulous, and fully persuaded in their own minds that the specimens are intended to satisfy the voracious appetite of the stranger ; for the Amoy Chinaman, more than the rest of mankind, harps on the gratification of his appetite, as may be gathered from the mutual salutation when friend meets friend. "Have you dined ?" is the greeting question ; and the response is, "I have eaten my fill," or "Not yet," as the case may be. I give this as a closing episode to my notes on the lark merely to show that you may look for help in vain from your Chinese friends in ornithological pursuits. The Chinaman cannot understand your object. He quietly laughs to himself, and thinks the indefatigable naturalist a great fool for his pains.

ROBERT SWINHOE.

British Consulate, Amoy,
July 1, 1859.

Occurrence of the Sand Grouse (Syrrhaptes paradoxus) in Wales.—A fine male of this rare bird was shot in a turnip field at Portreuddyn Farm, near Tremadoc, on the 9th of July last. It was observed, together with two other birds of the same kind, by a farm labourer in the employ of T. Chaffers, Esq., of 14, Great Howard Street, Liverpool, while "scuffling" the turnips. Fortunately he was provided with a gun for shooting rooks; but, it being single-barrelled, he was unable to kill more than one bird. This was kindly forwarded to this Museum, while still in the flesh, as a donation, by Mr. Chaffers; it was shot in the head, and only one or two feathers were displaced from the crown; it has been very successfully stuffed by Mr. Butterworth, of this town, and is now open to the inspection of visitors. The two birds that escaped flew off in an easterly direction towards Merionethshire; and Mr. Chaffers has been unable to obtain any information of their having been observed either before or since. This species, which is rare in Museums, inhabits the plains of Tartary; and its occurrence in Britain is an event the importance of which is greatly enhanced by the fact of its claim to be an European species having previously been doubtful. It is included in the European list by Prince Bonaparte in his 'Geographical and Comparative List of the Birds of Europe and North America,' but is omitted by Gould, Temminck, Schlegel and Degland. I have been informed by Mr. Solater that he has examined a specimen of the above species shot lately in Norfolk, and that he has heard also of another. These and the birds observed in Wales doubtless originally belonged to the same flock. What special influence has this year caused them to wander so far from their native land?—*Thomas John Moore; Free Public and Derby Museum, Liverpool.*

Notes on the Wood Sandpiper and Dunlin.—On the 11th instant my brother and I were on our sands on the look-out for whimbrel, when we noticed among a small flock of the summer snipe (*T. hypoleucos*) what seemed a decided stranger. This bird soon separated himself from his companions, and alighted on the mud close to us, uttering at the time a strange and dissonant cry, which my brother not inaptly compared to the noise made by a person whistling into the tube of a key. This note sealed the bird's death-warrant, as at my request my brother walked forward and shot the bird, which unsuspectingly allowed him to get near to it, jerking its head backwards and forwards all the time in the peculiar manner of the Tringæ,—a motion which suggests to one that the birds have either very creaky necks, or else something wrong with their internal arrangements. When my brother brought me the dead bird, from the very ochreous colour of the legs I at first thought I had become the lucky possessor of a yellowshank; but a closer examination proved the bird to be a wood sandpiper (*Totanus glareola*) in adult plumage. When I skinned the bird (a male) I found it to be in very poor condition; and I fancy its thinness indicates that it had just accomplished a migration. Its stomach was full of a sandy grit, amongst which I found several small white larvæ and fragments of minute Crustacea. I have since heard that another specimen of the wood sandpiper has been obtained in our neighbourhood, very likely the companion of the bird I have. If any naturalist wishes to amuse himself by contemplating the habits of that pretty little Tringa the common dunlin, now is the time for him to visit the sand-flats. The birds are now coming to them in great numbers from their breeding-stations on the moors; and the young birds, for the first month or so, are so very tame and confiding that they may be watched very readily at a close distance. On a hot morning large flocks of these lively birds may be noticed squatting lazily on the sands, and none of them will think

of raising as you walk among them. Take care, or else you will tread on some of them. Perhaps one or two of the little fellows will run on before you; the majority (whose plumage at this time of the year wonderfully matches the colour of the sand) will squat close, a few of them yawning, and stretching their wings every now and then vertically above their backs (another common habit peculiar to the Tringæ). A few of them, not quite so lazy, you may see within a few inches of your feet, prying about for sand-worms and small Crustacea. See! that lucky fellow has just seized a fine worm; but, epicure as he is, he runs down to the retiring waters first of all, and gives the worm a rinse or two before he swallows it. Another fellow wades out boldly into the water, and when out of his depth swims about a little, and when he comes out sits quietly on the sand close to you, and regularly preens his feathers. A gentleman told me that once, as he was watching a flock of these little birds, one of them came up to him, and examined the sand which was clinging to his boots for insects! These little fellows are extremely affectionate, and will squat close to a wounded companion, until you fancy you are going to pick up an uninjured bird, when, just as your hand is on the point of seizing them, up they fly, and dart off with their zic-zac flight, and shrill cry, "Sesteely, sesteely!" While watching these little birds and other of the Tringæ, it has often struck me how unnaturally these birds are generally to be found "mounted" in collections. There you will see them with their legs and necks stretched to the uttermost, and looking either as if they had been racked or drilled by some martinet. On the sand these birds seem to have scarcely any necks at all, and their bodies are low down close to the ground, looking very round and puffed out; the beak generally with its tip almost resting on their porrected breasts. Altogether they look very much like jack snipes appear when they are standing still on the ground and meditating. I am afraid the Editor will think this is a great deal to have to say about such a common, unassuming little bird as *Tringa variabilis*; but I fancied a few remarks from one who is fond of watching these pretty little Tringæ and their habits might be acceptable to those who have not lately visited a sand-flat.—*Murray A. Mathews*; August 14.

[The Editor does not think the observations on the dunlin at all *de trop*, and he fully sympathises with his contributor's observations on bird-stuffing.—*E. Newman*.]

The Hawfinch at Selborne.—On Saturday last, the 27th of August, I picked up on my lawn the wings and a few other feathers of a hawfinch, which had doubtless been killed by a cat. This is the fifth instance I have known of the occurrence of this species in our neighbourhood; and I thought the fact worth recording, particularly with respect to the season of the year.—*Thomas Bell*; September 1, 1859.

A Sea Monster.—Captain John Dunn, of the schooner 'Rover,' on a trip from Quebec to Belle Isle, reports as follows:—"On Saturday, the 20th of August, in lat. 59° 14' N. long., 59° 10' W., at 4 o'clock A.M., weather fine, saw something like a vessel bottom up, S.E., about three miles distant; bore down to ascertain what it was, and on approaching close to it could discern something like the bow of a clinker-built vessel bottom up, showing the rows of planks apparently the same. About what seemed to be the head noticed a great deal of red. Bowsprit apparently under or in a wash with the water. On nearing on the larboard side saw something snow-white on the

centre of the body. Brought the schooner close alongside, and to our great astonishment found it to be a living monster. The large part of the body, or shell, was about fifty feet long and sixteen feet high, conical shape and sharpening to the fore part, with a long neck, and jaws about fourteen feet from the body. At the junction of the neck with the body was a large horn. It had large white fins, something like the wings of a bird, under the middle of the shell. We were scarcely thirty feet distant when we saw the head come above water and turn towards our boat, when we hauled off, tacked, and stood in on the other side for a further survey. The right fin was more under the water than the left, and the horn we could see distinctly. It was very long and blood-red. The neck and head again moved towards the boat, when we got somewhat alarmed, and made all sail from this floating monster. We counted the streaks from the centre of the back to the water fifteen to a side, and the top of the shell was partly covered with birds' dung. The shell was of a dark colour, and came down in wash with the water. Under the shell we could plainly see a curve, and then a second projection. The hind part very much the shape of a turtle, but the fore part was sharper. At 5.30 A.M., soon after we hauled off, saw an American schooner passing very close to it.—*Quebec Chronicle. From the 'Times' of September 22.*—*[Communicated by Mr. Gosse, who adds the following apposite note.]*

What shall we say to *this* new American story? My first idea on reading it was that of a rorqual, dead or nearly dead, floating belly upward. The plicæ of the throat and belly would be the semblance of the planks of a clinker-built craft. The length and height would agree well enough, especially if we suppose the small of the body and the tail to have been under water. This, too, would make the pectoral fins come near the middle of the (visible) body, and their white hue would agree with their reversed position. It might have been mortally wounded in some of those misadventures which whales are liable to, perhaps having run a tilt against some ship, as a cachalot once did to the good ship 'Essex'; and if so, there might well be "a good deal of red about the head." 'Tis true this hypothesis will not account for the neck and jaws, "about fourteen feet from the body," nor for the large horn, "very long and blood-red," at the junction of the neck with the body. May the latter have been the *membrum virile*, a little mis-stated as to position? And may we take the liberty of supposing that possibly the two extremities of the body may have been confounded, and that the flukes of the tail-fin, indistinctly seen in the wash of the sea, were the "jaws," and the small of the body the "neck"? In this case the "red about the head" would require some other explanation. I may add, from my own observation, that rorquals are quite common in that part of the Atlantic alluded to. Of course much allowance must be made for imperfect observation and still more imperfect description, for the influence of surprise and terror, and for a natural love of the marvellous. Whether, with this allowance, my hypothesis is tenable, I leave you and your readers to judge. I am far from thinking that Science has yet chronicled *all* the monsters that "make the deep to be hoary;" but I doubt whether this was one of the "great unknown." Pray keep a sharp look out for the report of the American schooner.—*P. H. Gosse; Torquay, September 23, 1869.*

A new British Snake.—The Hon. Arthur Russell has sent to the British Museum a specimen of the female *Coronella austriaca*, which was taken by a resident near the

flagstaff at Bournemouth, Hampshire,—the habitat of the larger heath lizard (*Lacerta sterpium*). These species are found together not uncommonly, and generally distributed over Europe. The snake is said to live on the lizard. This is one of the most interesting additions to the British Fauna which has been made for many years, as it is not common to find a new vertebrate animal, except occasional visitants. This snake has small scales, is brown, with two lines of darker spots down the sides of the back, a dark blotch on the shoulder and head, and a blackish streak under the eyes. It is like a viper in size and general appearance, but wants the dark lozenge-shaped spots on the back.—*John Edward Gray; British Museum.*

[The following brief description of this interesting addition to our Fauna may possibly be acceptable to my readers: my authority is Lord Clermont's admirable little work intituled 'Quadrupeds and Reptiles of Europe,'—a work that I am very glad to have this opportunity of heartily recommending. "The *Coluber austriacus* is identical with *Coronella austriaca* of Dumeril and Bibron, vol. vii. p. 610, and it is also the *Coluber lævis* of Schinz, vol. ii. p. 46. It never attains a very large size, its entire length being about two feet. The head is but slightly distinct from the body; the tail short, and strong at the base; the eyes small; the rostral plate presses much upon the muzzle, and is of a triangular form, with its top pointed; there are seven labial plates on the upper lip on each side, the third and fourth of which touch upon the eye; scales of the body smooth, rhomboid, in nineteen longitudinal rows; ventral plates 160 to 164; subcaudal 60 to 64 pairs; one anal plate divided; the upper maxillary teeth are on the same line with the others, and longer; the upper parts are greenish brown, with two parallel rows of black markings along the back, more distinct towards the head than in the hinder portion; sometimes the spots on the back are small and few in number; the lower parts have a lighter ground colour, but are often much darkened by black marblings. It inhabits central and southern Europe, is found in various parts of France, but is not very common in the south of that country: it occurs in Sicily, and in the whole of Italy and its islands, but is more frequent in the north than in the south of that peninsula; it is included in the Fauna of Galicia and the Bukovina, Silesia and Carniola: it is common in Switzerland near Zurich; but rare in Belgium, where it has been met with near Louvain, and on the right bank of the Moselle: Schinz states that it has been found in Sweden, but it is everywhere less abundant than our common snake (*Coluber natrix*)."—*E. N.*]

Occurrence of the Plain Bonito (Auxis vulgaris) in the Moray Firth.—A very fine male specimen of the above rare fish was captured off Cullen, Banffshire, on the 7th inst. It was taken in a herring-net. It measured over 20 inches in length and 12 in circumference behind the first dorsal. One very peculiar feature connected with it was that if stroked down when wet it gave the hand all the appearance of having come across a piece of metal newly black-leaded. I am not aware of this peculiarity being mentioned in Yarrell or elsewhere.—*Thomas Edward; Banff, September 17, 1859.*

Spider and Wasp.—In the autumn of 1858, Dr. Howard, of Sandgate, wishing to observe what a large Diadem (or garden spider) would do if a wasp were put into his web, took one by the wings and entangled it by the feet. The spider immediately made a rush at it, when it turned and transfixed the spider in the belly with its sting. On this, the unhappy spider doubling up, fell from his web dead upon the ground, and the wasp, getting up, flew away. Dr. Howard thought that the spider had been merely paralyzed or was shamming dead, so kept him until the next morning, but he never revived, and showed clearly how deadly the venom of the wasp must have been.—*Charles Horne ; Sandgate, September 2, 1859.*

Occurrence at Brighton of Lycana bætica, a Butterfly new to Britain.—I am indebted to Mr. Thomas Thornecroft, of 87, North Lane, Brighton, for the information that a new butterfly was taken near the chalk downs, on the 5th of August last. My son being at Brighton at the time had an opportunity of seeing it, and Mr. Doubleday has since determined the species. The fortunate captor is Mr. McArthur, of Brighton. The species is common on the Continent, and, simultaneously with its appearance at Brighton, was seen in profusion along the northern coast of France and in the Channel Islands, so that its occurrence here does not appear extraordinary; nevertheless, it can only be regarded, like *Pieris Daplidice* and *Chærocampa Nerii*, a purely casual visitor, and, like those, it should be kept perfectly distinct from our truly indigenous insects. It is a dull brownish insect, above and below has waved markings, rather like those of a *Thecla* than the spotted appearance of a *Lycæna*. Each of the hind wings has a short but very distinct tail, and near the hind margin of each hind wing are two small, but very distinct, rounded red spots.—*Edward Newman.*

Captures of Varieties of Colias Edusa at Brighton.—Since the 12th of this month, Mr. George Smith, of No. 33, Marlborough Street, Brighton, and myself, have captured nine very fine specimens of the light variety of *Colias Edusa* and two of the small variety called *Colias Chrysothemene*.—*John Meiklam ; 97, King's Road, Brighton, August 19, 1859.*

Colias Edusa and Sphinx Convolvuli.—The accounts of captures of these insects are too numerous to insert; their appearance has been general.—*E. N.*

Capture of Sesia Chrysidiformis near Folkstone.—I captured in the middle of last July, on the Undercliff between Dover and Folkstone, a beautiful specimen of *Sesia Chrysidiformis*. This was captured near the same place in 1855, according to the 'Entomologist's Annual' for 1856. Mr. Haworth had only seen a single specimen, and this of Mr. Wratislaw's makes the sixth known or asserted to have been captured in Britain.—*A. H. Wratislaw ; School Hall, Bury St. Edmund's, August 8, 1859.*

[This insect was formerly rare, but has lately been proved to be only local: about thirty specimens have been taken this year and as many last, at the spot mentioned by the Rev. Mr. Wratislaw.—*Ed.*]

Description of the Larva of Limacodes Testudo.—Formed like a wood-louse; the upper or exposed portion being an oval-arched carapace resembling that of a tortoise, or perhaps still more closely the segmentally-divided carapace of a *Chiton*; this

carapace has two longitudinal waved raised ridges and a margin which is reflexed in front, and its whole surface is delicately shagreened: the head and anterior segments are retractile beneath the carapace, and these segments as well as all the under surface of the larva seem to possess a mucous or adhesively glutinous covering or skin; there are six articulated but rather short legs, as usual in *Lepidoptera*, but singularly enough they do not appear to be used in locomotion; there are no claspers, the entire under surface of the larva is prehensile, and the larva moves forward by an undulating gliding motion like a slug; this gliding is equally well performed on a rough surface and on the most polished glass, and either in a horizontal, perpendicular or inverted position, indeed on the oak-leaves, its ordinary resort, it is usually found in an inverted position. The colour of the carapace is a light delicate green, the two dorsal ridges and the margin being pale yellow; on the inside of the dorsal ridges are nine oblong crimson spots, and between each pair of crimson spots is a pair of transverse linear yellow spots placed end to end, the two having almost the appearance of a continuous line; intermediate between each transversely-placed pair of spots are a pair of longitudinally-placed smaller spots, exactly of the same colour: on each side of the larva below the dorsal ridge are three longitudinal series of pale yellow dots, the upper series of which have a dark green stigmatiform centre: I do not detect real spiracles in any part of the carapace, and suppose them to be concealed by its projecting margin. This larva feeds on the oak. The family to which this singular larva belongs is of great extent in India and has a few representatives in North America and Australia. In Europe there are but two species, the present insect and a smaller one, *Limacodes Asellus*. This natural order is perhaps the most distinct that has yet been eliminated from the vast and closely interwoven class of insects called *Lepidoptera*: it is to be regretted that no characters have yet been discovered distinctive of the imago.—*Edward Newman*.

Discovery of Clostera Anachoreta in England. — I am pleased to record my fortunate capture of eleven larvæ, ten of which reached the imago state and proved to be *Clostera Anachoreta*; a pupa found by a friend after I knew what it was, and presented it to me, also came out. I can at present give no locality for it nearer than "the home-counties," for several reasons, not the least of which is the certain inundation of the spot by persons collecting for profit, &c. I attempt a description of the larva, which, being very attractive in appearance, would not be easily overlooked:—Covered slightly with yellowish hair; a pale buff broad dorsal band extends longitudinally; below this on either side is a slaty black band, with some dull orange spots, and beneath this the prevailing colour is orange, the spiracles and spots above being brighter. The head is black, the fold before it being dull orange. On the fourth segment is a dull pinkish red tubercle, surrounded by a black patch, in which on either side of the hump is a very conspicuous pure white spot, the hump or tubercle appearing considerably larger when the larva is in repose or in fear; a second smaller and similar tubercle is placed on the anal segment. The larva appears to be, to a certain extent, gregarious when full-fed; when young it feeds in companies. It spins a brownish cocoon, and when about to turn to the pupa, the anterior part assumes a bright green colour; the pupa is at first green anteriorly and yellowish brown posteriorly, but soon changes to black.—*H. G. Knaggs*; 1, Maldon Place, Camden Town, N. W., September, 1869.

A new British Noctua: Leucania putrescens. — Early in July I took, flying over bramble blossoms, three *Noctua* which nobody here could make out. I sent one of

them to Mr. Henry Doubleday, who writes that "it is certainly new to Britain, and extremely near to *Leucania punctosa* and *L. putrescens*."—*R. M. Stewart*; 3, *Park Place, Torquay*. [A specimen of this insect has been forwarded to me, to be named, by Dr. Battersby, of Torquay; it was taken at dusk, in the middle of July, hovering over the blossom of the blackberry, on the cliffs. I presume this is the insect taken by Mr. Stewart, and this is undoubtedly *L. putrescens*. *L. punctosa* is a redder insect, with a less distinctly marked black streak from the base of the wing. *L. putrescens* is a native of the South and West of France. Herrich-Schäffer and Guenée both place it next to *L. obsoleta*.—*Ed. 'Intelligencer.'*]

Capture of Haden peregrina in the Isle of Wight.—I have much pleasure in recording the capture of a second specimen of the above insect: I took it on the 23rd ult., at sugar, within a few yards of the place where Mr. Bond captured his specimen last year: it is a female and in beautiful condition. I am indebted to the courtesy of Mr. Doubleday in naming the insect.—*R. MacLachlan*; 1, *Park Road Terrace, Forest Hill, September 7, 1859*.

Xanthia gilvago, &c.—I have again bred a few specimens of this insect from the larva. I am unfortunately unable to give a description of it, farther than to say that it so closely resembles that of *X. ferruginea* that I cannot separate it. Both feed on the seeds of the wych elm, and it is impossible to distinguish them at that early stage—at least, I cannot. In the 'Intelligencer' (vol. ii. p. 94) I gave a description of what I then supposed to be the larva of *X. gilvago*: it turned out to be *X. ferruginea*. However, the description there given will answer equally well for *X. gilvago*, so far as I can judge at present. My specimens of the perfect insect, which differ much from others that I have seen, are small, which I account for in the following way. The seeds of the wych elm appeared a fortnight earlier than usual, owing to the uncommon warmth of the season. This warmth was followed by a sudden and protracted frost, and the seed perished by wholesale. It was, therefore, with the utmost difficulty that I could supply them with food, since, as far as my experience goes, they will not eat the leaves. For the same reason, I doubt not, I have been unable to find a single pupa. I have bred a fine series of *X. cerago*, from the catkins of the willow, and shall be happy to supply, as long as they last, any collector with bred specimens of it, or any of the following, viz., *X. silago*, *Trichiura Cratægi*, *Hypogymina dispar* and *Tethea subtusa*.—*J. Greene*; *Cubley Rectory, Dovedge, Derby*.

Description of the Larva of Eupithecia absinthiata.—It would be impossible to give an accurate description of the almost endless varieties of this most variable larva; they run so closely into each other that it would be an almost Herculean task to separate them. The ground-colour is either yellowish green, deep rose-colour or dirty reddish brown, with a series of reddish lozenge-shaped spots down the centre of the back, generally becoming faint or confluent towards the head and tail. In the green variety these spots are often entirely wanting. On each side a number of narrow, slanting, yellow stripes, forming a sort of border to the dorsal spots. Spiracular line waved, yellow. Body wrinkled, thickly studded with minute white tubercles, and somewhat more sparingly with short white hairs. Segmental divisions yellow, thick and stumpy, tapering but little. Feeds from the end of August to the beginning of November, upon the flowers of common yellow and hoary-leaved ragwort (*Senecio Jacobææ* and *S. crucifolium*), the hemp agrimony (*Eupatorium cannabinum*), the mugwort (*Artemesia vulgaris*), yarrow (*Achillæa millefolium*), golden rod (*Solidago virgaurea*), &c. The pupa, which is enclosed in a tightly-spun earthen cocoon, has the

wing-cases bright green, the nervures very prominent; thorax yellowish green; abdomen reddish yellow, with a dark green dorsal line. The perfect insect appears in June and July.—*H. Harpur Crewe; Breadsall Rectory, Derby, September 6, 1859.*

Description of the Larva of Eupithecia denotata.—This larva, in size and general appearance, closely resembles that of *E. innotata*. It is long, rather slender and tapering towards the head. There are two varieties: var. 1 is green, with three purple dorsal lines, the centre one broad and distinct, expanding considerably on the anal segment, the two side ones very indistinct. Head and prolegs purple. Segmental divisions and spiracular line yellowish. Belly green. Back studded with a few minute white tubercles, interspersed here and there with a black one. Var. 2 is of a uniform purple, with two lines of a deeper shade on each side of the back. It feeds, as far as my experience goes, exclusively on the flowers and seeds of the lesser Burnet saxifrage (*Pimpinella saxifraga*), and is full fed throughout the month of September, and occasionally at the beginning of October. It prefers the hedge-sides and banks. It is fearfully infested with ichneumons, not above one in ten escaping. The pupa is enclosed in an earthen cocoon: there are two varieties; the one yellowish green, the other red. The perfect insect appears at the end of June and in July. The larva is by no means rare in the Eastern Counties; I have also taken it in Derbyshire.—*Id.*

Mr. Gregson's Criticism on the Description of the Larva of Eupithecia assimilata.—I have just been reading Mr. Gregson's strictures (*Zool.* 6665) on my description of *E. assimilata*, and I can assure him, with no unfriendly spirit, he must not fear any accusation of presumption from me. I am well aware of the labours he has bestowed upon the genus *Eupithecia*, and I feel that perhaps no one has so much right to criticize as himself: I only wish he and I were located nearer each other, so that we might have much *Eupithecian* talk and many a Pug-hunt together. I must, however, stand up in my own defence, and maintain the accuracy of my statements. First, with regard to size, I know not whether there is anything in the soil in the neighbourhood of Liverpool which causes the larvæ of *E. assimilata* to attain gigantic proportions, but in these parts they certainly do not increase in stature according to Mr. Gregson's ratio. Last autumn I took between forty and fifty larvæ. Some were ichneumonised, it is true, but the rest certainly were not sickly; they fed well, spun well and turned well, and they were all about the size of the one from which I took my description. But then these were taken in the middle of October, and this Mr. G. says is too late to form a correct idea of their size. However, yesterday (September 6th) I took a stick and umbrella into the garden, and thrashed the black-currant bushes; twenty-six larvæ, of all sizes, were the fruits of my labour: those that are full fed are no longer than those I took last October; some have already turned pink, preparatory to spinning up. Secondly, with regard to the dorsal markings: out of those I took last autumn some three or four had a few small black specks along the central dorsal line, and this was the only approach to a dorsal marking or lozenge-shaped spot which any one of them showed: all the rest were a uniform green colour. All the larvæ I took yesterday are green, without a spot or speck. In some localities almost all the larvæ of *Smerinthus Populi* are studded with large rust-coloured spots, whilst in others this variety seldom or ever occurs. May not the same be the case with the larvæ of *E. assimilata*?—*Id.*; September 7, 1859.

Mr. Gregson's Criticism on the Description of the Larva of Eupithecia assimilata.—I read, with very considerable surprise, Mr. Gregson's remarks (*Zool.* 6665) upon Mr. Crewe's description of the larva of this insect. Mr. Crewe is well able to defend himself, and needs no advocate in me; but I wish, on my own behalf, to express my

entire dissent from the statements somewhat dogmatically set forth by Mr. Gregson. He objects, *first*, to the length given by Mr. Crewe (three quarters of an inch), affirming that his specimens are double that size! A Pug larva an inch and a half long I have never seen; possibly that of *E. togata* may be so, but *E. assimilata* is certainly to be ranked among the small species of this genus. *Secondly*, he objects to the time specified by Mr. Crewe: the period for the appearance of larvæ varies, as every one knows, according to localities and the backward or forward state of the season. *Thirdly*, he finds fault with the description of the dorsal markings: "When he speaks of a dorsal line, no one would suspect that he was describing the lozenge or diamond-shaped markings which are so conspicuous an object in one or two groups of this genus, and particularly so in *E. assimilata*." These are the three particulars in Mr. Crewe's description objected to by Mr. Gregson. I am prepared to support Mr. Crewe in every point. I took a considerable number of the larvæ last year, at precisely the same period as that named by Mr. Crewe, from which I bred a fine series this spring: I made a carefully coloured drawing of the best marked specimen at the time, and find it to agree, in the minutest particular, with the description given by Mr. Crewe. "No one would suppose," says Mr. Gregson, "that Mr. Crewe was describing the lozenge or diamond-shaped markings, which are so conspicuous an object in one or two groups of this genus, and particularly so in *E. assimilata*." I will undertake to say that Mr. Crewe would be much surprised if any one *did* suppose it. I have at this moment some half-fed larvæ before me, and I can unhesitatingly affirm that, neither in its youthful or full-grown stage, is there the slightest trace of anything like diamond or lozenge-shaped markings. With regard to the time, as I have already said, that varies according to circumstances: I have some already "gone down," others about half fed, and this morning (September 6th) I have beaten some, evidently only just hatched, so that there is no occasion to suppose that Mr. Crewe was "evidently describing poor, half-grown, sickly larvæ." Lastly, with regard to size, Mr. Crewe is not to be understood as saying that every single specimen is exactly three quarters of an inch, and no more, but that that is the average length, and I quite agree with him, as no specimen that I have seen has exceeded one inch, at the utmost; but perhaps the Lancashire measurements are different from ours. My firm impression is that Mr. Gregson's insect is not *E. assimilata* at all. I may add that the description in the 'Manual' (vol. ii. p. 89) and the 'Intelligencer' (vol. i. p. 203), as far as they go, tally exactly with that given by Mr. Crewe. In the sixth volume of the last-named work (p. 64) is a communication facetiously representing the 'Zoologist' as the "heavy coach" of Entomology, and, from his signature of a "Fast Man," we are led to infer that the writer considers the 'Intelligencer' as the "light" or "fast" coach. There is an old proverb, "Most haste, worst speed,"—a proverb applicable, in my opinion, to many of the communications addressed to the 'Intelligencer,' and to none more so than Mr. Gregson's so-called descriptions of the Eupitheciæ. I should not have made this remark were it not that Mr. Gregson takes such a "patronizing" tone. Compare Mr. Crewe's elaborate and minute descriptions with those of Mr. Gregson. The 'Zoologist' may be a "slow" coach, but it is "steady," and I have no hesitation in expressing my conviction that we have not, in any entomological work whatever, such accurate and careful descriptions of the larvæ of the Eupitheciæ as those recently given by Mr. Crewe. Mr. Gregson seems to think that no one breeds Pugs but himself. If I mistake not, Mr. Crewe has descriptions of twenty-three species, and I myself have bred eighteen, and am making drawings each year of all I meet with.—Joseph Greene; Cubley Rectory, Doveridge, Derby

Capture of Emus hirtus in the Isle of Sheppey.—Accompanied by Mr. Lewis, one well initiated in the mysteries of insect haunts, I started yesterday morning on an excursion through the Isle of Sheppey, designing to hunt up certain interesting species of Coleoptera, which that fertile locality is known to present. After much futile labour for a well-known rarity, the main incentive of our visit, I happened by a fortunate chance to cast my eye on a bank sloping to the sun. There, wriggling in a mass of dried cow-dung, I caught a hasty glance of a creature clothed in long golden hair, and having the appearance of a large *Bombus*. It immediately occurred to me that a bee wallowing in dung was somewhat incongruous, and at the same moment I arrived at the conclusion that it could be no other than *Emus hirtus*. My companion was sceptical, which did not surprise me, and after assisting in the hunt left me. In faith of the correctness of my conviction, I continued digging for about ten minutes, and, at a depth of about 8 inches, succeeded in turning out a beautiful and perfect specimen of this rare and conspicuous insect. Having preserved my specimen alive for observation, I would first remark the rapacious manner in which its powerful mandibles are brought into play to destroy whatever opposes it. The cork of the bottle in which it was stored was so excavated that, if undisturbed, it would doubtless have effected its escape. Being enveloped in the *débris*, I was next interested in observing how effectually every particle was removed, by elevating the hind legs and passing them by a comb-like process over the upper surface of the body. The insect being in the constant habit of unfurling its wings, I observe that they are strongly nerved and so long as completely to cover the abdomen. This seems to indicate that, like certain of its allies in this group, its habit is to fly in the sunshine, from one patch of dung to another, in search of its prey.—*Alfred Haward; Gloucester Road, Croydon, September 23, 1859.*

Larva of a Carab.—Extract from a letter of the late Col. Tylden, R.E., dated "Gaika's Kop, Amatola Range, South Africa, Oct. 9, 1860 :—" "I have observed the ground perforated with small round holes, the entrances to which appeared to be very elaborately and neatly finished with mud, bits of grass, &c. For some time I thought them the habitation of the Tarantula, but as they appeared unusually large for that gentleman's location, I one morning proceeded to a nearer inspection. Having picked out one of the smartest and most compact holes I could find, I lodged a charge of powder therein, in engineer-like style. The mine was completely successful, demolishing the edifice with a suitable 'orater' of about eight inches, and ejecting the occupant, which proved to be an animal closely resembling a large flea in form and colour, about 2½ inches long, with a flat head like a locust, to which were attached two most formidable nippers or jaws. He was rather a vicious-looking fellow altogether. I wished to preserve one, but, as the body is soft like that of the scorpion, it is difficult to do so, and the ants usually get them in the end."—[Probably the larva of one of the large African Anthias.—*Edward Newman*]

Paintings of Animals by the Bushmen.—Extract from a letter of the late Col. Tylden :—"I have been occasionally amused by the remains of rude paintings of animals, &c., which are to be found upon the rocks about the caves formerly frequented by the Bushmen. Some of the animals are really well represented, and nearly all are to be recognised. They are coloured with clays, &c., generally rather

smaller ; but in some cases, especially snakes, the size of life. Considering the extraordinarily degenerate state of a Bushman's cranium, compared with that of an European, these productions are singular, and would be an interesting fact to the phrenologist."

The Zoology of the Andaman Islands. By the Editor of the
' Indian Field.'

WE learn from the 'Moulmein Advertiser' that "Dr. Walker is preparing a very interesting account of the Andaman people, furnished by a Pandy who has been domesticated amongst them for more than a year." Pandy's information will of course have to be well sifted ; but it should not be difficult to eliminate truth from fable and exaggeration, or the flightiness of an Oriental imagination. We have therefore pleasure in anticipating some trustworthy revelations on the habits and mode of life of this remarkable wild tribe, one of the far-scattered remnants, as we hold, of a wide-spread primæval population, of no proved African origin, nor indeed greater probability of African descent than the negroes have of Oriental origin, but which races of higher culture and prowess would appear to have long since compelled to take refuge in mountain fastnesses or remote islands, where not a few of such remnants yet survive, including a population still in great force on the extensive and little-known island of Papua, or New Guinea (whence, of course, so denominated), and its vicinity. On the principal island of the neighbouring group of the Nicobars, such a race still inhabits the mountainous interior, and is stated to be ever at war with the coast population ; which latter is derived obviously from the adjacent territories of Burma and Malasia.

Inclining strongly to these views, we do not venture to indulge the hope or expectation expressed in the recently-published Government Report on the Andaman Islands, with reference to their Negrillo inhabitants, that "to ascertain their manners and customs, and to establish their identity with any existing portion of the negro race, to which they clearly belong, would solve the mystery of ages, and lead to a knowledge of the probable manner in which Asiatic islands came to be occupied by an African people." This, we opine, is rather like "jumping to a conclusion." We are not at all surprised to learn that the individual captured by the expedition did not "comprehend a word of the several African dialects spoken by the Seedees in the service of the Peninsula and Oriental Company, with whom he was confronted." On the contrary, we should have been exceedingly astonished had he done so.

The inhabitants of the Andamans, we are told, "are dwarf Negrillos, strong and robust when their supply of food is abundant, as it was during the time of our visit; intensely black, and possessing most of the physical characters of the true negro, with the exception of the projection of the heel.

"The individual captured at Interview Island was singularly quiet and docile, imitated regularly the actions and gestures of those by whom he was surrounded, and never, from first to last, exhibited the smallest indication of ferocity." Of the vulgarly reputed cannibalism of the Andamanese there does not appear to be the slightest proof; but every indication that, however ancient and prevalent the notion, it is utterly unfounded; nor can we fear that any Negrillo tribe has been elsewhere convicted of the abomination.

Vague as may be the information derived from Ptolemy, from Marco Polo, and from the two Arab travellers of the ninth century of our era, we still gather sufficient, even from these imperfect records, to feel incredulous of the story in the 'Calcutta Monthly Register' for November, 1790, quoted in the Government Report. "We are told that when the Portuguese had a settlement near Pegue, two of their ships, with cargoes of slaves on board, amounting in number of men and women to three hundred, were cast away there; and as the inhabitants are of the Coffree caste [caste!], it must be allowed that probability favours this opinion or conjecture." It did so, perhaps, when so little was known of the Negrillos or Negritos of the Philippines and elsewhere, and when Ethnology was more completely in its infancy than at present. But we happen to have heard how the domestic pig found its way to the islands from a wrecked ship; whereas the fact is that the little wild pig of the Andamans (*Sus andamanensis*) is of a totally different species from the domestic porker, and peculiar (so far as hitherto known) to the Andaman Archipelago, though identical on the islands of Great and Little Andaman, which are separated by some thirty miles of sea. On conversing with a well-known gentleman who has often visited the Nicobar islands, and is familiar with their ordinary productions, we once asked him, by way of jest, how the potato came to grow wild on certain of the Nicobars, and were duly informed of the manner of its introduction. Indeed, it may be remarked that if a few domestic swine were actually to find their way on shore from a wrecked vessel, their tameness would at once betray them to the human inhabitants, and so lead to their immediate destruction. Besides which, the chances would be very great against there being an unmutated boar amongst them, to continue the race if allowed the chance.

With some surprise we remark that not a word is said in the Government Report respecting the curious fact, that, whilst the pig is the only warm-blooded quadruped as yet determined on the islands, it proves to be of a species exceedingly different from any race of domestic swine, whether Indian or Chinese, and equally so from all the numerous wild swine of S.E. Asia and its Archipelago, with the two exceptions of *Sus papuensis* of New Guinea, and the curious pygmy hog of the sub-Himalayan sâl-forest, which is described by Mr. Hodgson by the name *Porcula salvania*. These three species differ from all the rest by their diminutive size, and externally by having a mere tubercle in place of a tail; while in the relative proportion of the molar teeth the difference is so considerable that Mr. Hodgson separated the one known to him as the type of a distinct division, styled by him *Porcula*.

Whether the little wild pig of the Andamans inhabits also the neighbouring group of the Nicobar islands remains to be ascertained; but the modern Nicobarians have domestic swine of a very large size, which they have doubtless obtained from the European shipping. There is a slight notice and very rude figure of the skull of the tiny hog, from the Little Andaman, in Jameson's 'Edinburgh New Philosophical Journal,' vol. xvi. (1826-7); but all that is stated of the animal occurs in the description of an Andamanese hut,—“Ranged in a row round the walls [!] were the smoked skulls of a diminutive hog,”—a statement which, with the figure, serves to prove the existence of the species on that particular island. It is not unlikely, but rather the reverse, that it may yet prove to inhabit the forests of the neighbouring mainland, the zoology of which has not been much investigated; for be it remembered that its congener of the sub-Himalayan sâl-forests was long overlooked.

In the Preface to the Government Report we read that the Andamans “are extremely deficient in animal life, and the birds inhabiting them are comparatively few; but the reefs and bays abound in shell and other fish.” Shell and other fish!—do not these constitute animal life in their way? But it is a vague method of writing, another instance of which we have just chanced to notice in Ogle's book on 'Western Australia,' where the author tells us that “the fish are without number, from the whale to the shrimp.” In a late number of the 'Illustrated London News' we find a seal figured as “the talking and acting fish;” and in like manner the flying fox might as well be termed a *bird*, albeit surely not of the feathered class; and we might adopt the Indian and Chinese fancy of classifying the *Manis*, or Pan-

golin, as a fish ! “Shell-fish” are more than once mentioned in the Report, meaning alike crustaceans and shelled mollusks ; and we read also of the coral “insect.” “The only mammal whose existence we ascertained was the pig, their skulls being found suspended in the huts of the savages.” The pig, as before remarked, naturally elicits the question, What sort of pig ?—it being not even mentioned whether wild or tame ! But, being wild, it surely merited an inquiry regarding its particular species. In like manner we read of “the bamboo, the rattan, and the cane.” The last, we apprehend, must mean some kind of rattan (*Calamus*) ; but, the precise species not being identified (so far as appears), would it not have been better to have employed the expression “a species of,” or “species of bamboo and of rattan” ? A Frenchman or a German would have been far more explicit in his statements ; and the reader, desirous of accurate information, is disappointed at such want of precision.

The only additional mammal as yet determined from the Andamans is the dugong (*Halicore indicus*), a marine creature, one of the Syrenia, or Cetacea herbivora of Cuvier, some bones of which (now in the Asiatic Society’s museum) have been obtained from an Andamanese hut ; and this is the most northern locality in which we as yet know of its occurrence.

Rats, however, there certainly are, and their burrows have been remarked by recent observers ; but rats of some kind are not of recent introduction. The writer in the ‘Calcutta Monthly Register’ (1790) mentions “wild hogs and rats (the only animals that were perceived in that country ;” and Lieutenant Colebrooke notices monkeys in addition, a statement which greatly needs confirmation. We are credibly informed, however, of the loris (or so-called “sloth” of Europeans, “little Bradypus” of Helfer !) having been observed on the island of Preparis, situate to the north of the Andamans in a line with Cape Negrais. Bats may of course be looked for, probably a shrew or two, perhaps a Tupaia, and squirrels and flying squirrels ; but, unless bats, not any of the rest would appear to have been hitherto remarked at Port Blair. Even the alleged rat may not improbably turn out to be a species of *Rhizomys*, or bamboo rat. *

* Since writing the above we have taken a mouse from the stomach of a venomous snake from Port Blair, the *Trigonocephalus Cantori* (heretofore only known from the Nicobars). So far as it can be made out the mouse is the *M. Mani*, which is the common house mouse of India. Another mammal since reported, seemingly a Tupaia. In an extract from a letter from Port Blair, dated June 22, and published in the ‘Delhi Gazette’ for July 15, it is stated that “the settlers had caught another small

According to Colonel Symes, "Birds are not numerous in Great Andaman; doves, parraquets, and the Indian crow are the most common species." Which Indian crow? Not the common Calcutta species, but the Indian black crow (*Corvus culminatus*), which is popularly miscalled the "raven." The doves and parraquets are as yet undetermined, though a large fruit pigeon (*Carpophaga sylvatica*) abounds. We have seen only one decided bird novelty from Port Blair, which is a peculiar shāma (*Kittacincla albiventris*), like our favourite Indian songster, but having a pure white belly, and the middle tail-feathers being much elongated beyond the next pair. We have been assured that it is an equally fine musician.

From the Report we learn that "At old Port Cornwallis, where water abounds, there were numerous birds; but our occupations did not permit of any collection worthy of notice being made." We should have been glad to learn, however, what actually were collected. Novelties among water-fowl and wading-birds are not to be expected, nor among the birds of prey, of which last we have seen two species from Port Blair, both common in the neighbouring countries,—the *Hæmatornis cheela* and the *Blagus leucogaster*; but the parrots, the pigeons, and the small perching birds are tolerably sure to yield some novelties, to judge from analogy with the neighbouring group of the Nicobars; and at Port Blair a pretty species of the starling family (*Temenuchus erythropgia*) abounds, a bird previously observed only in the Nicobars. The Andaman oriole, or "mango bird," appears to be the *Oriolus coronatus* of the great Asiatic Archipelago; and we have never seen this bird from the adjacent countries, the fine oriole of the Nicobars (*O. macrourus*) having hitherto been met with only upon those islands. Another common species at Port Blair, which was originally discovered in the Nicobars, is a fine redbreasted thrush (*Geocichla innotata*), doubtless the "redbreast" of Mr. Quigley; and we have seen other species that occur there as a matter of course; among them the large "hill maina" (*Gracula javanica*), which is also common in the Nicobar islands. The splendid *Irena puella* is an inhabitant of the Andaman forests. There is little use in quoting such vague enumerations as

quadruped on the island, somewhat like a mungoose, but its genus has not been determined,—in all probability a *Tupaia*, a small squirrel-like animal, with peaked snout and insectivorous dentition. In one of the early volumes of the 'Calcutta Journal of Natural History' a *Tupaia* is actually figured for a species of mungoose (*Herpestes*)!

those of Mr. Quigley (*vide* Report, pp. 60, 65); and we have hitherto always supposed that the Trochilidæ, or humming birds, were quite peculiar to America! Even Lieut. Colebrooke, however, tells us that "a species of humming bird, whose notes are not unlike those of the cuckoo, is frequently heard in the night!" But, for that matter, we might cite a quasi-scientific book that treats cursorily of the zoology of the province of Kemáon, wherein we read, amid other utter rubbish, of "Trochilus, or humming bird. In Kemáon this is a very splendid genus, but so numerous that it would be impossible to enter into an enumeration of the species"—two or three species, and scarcely more, of Nectariniidæ being here intended.

If the very remarkable genus *Megapodius* ever existed in the Andamans, as it still does in the Nicobars, it is likely to have been extirpated by the human inhabitants, who would dig the eggs from the mounds, and so eventually exterminate the race; inasmuch as it is not likely to have penetrated far inland, especially in a dense forest. Such a forest may be inhabited by Psittacidæ, Bucerotidæ, Picidæ, Bucconidæ, Cuculidæ, Trogonidæ, Batrachostomi (perhaps), and Columbidae; but the small perching tribes would be little seen until clearance had been effected, and then we doubt if the islands would be remarkable for paucity of species! At present our knowledge of the Ornithology of the Andamans is meagre in the extreme.*

Of reptiles we have seen as yet but four—a lizard, apparently a female of a second species of the remarkable genus *Dilophyrus*; a particularly interesting small gecko (*Phelsuma andamanense*, also new); a venomous snake (*Trionocephalus Cantori*), which previously was known only from the Nicobar islands; and a harmless tree-snake, common in the neighbouring countries, the *Dendrophis picta*. In the inferior classes the reader will probably not be much interested; and we shall therefore merely remark that the most notable discovery is that of a superb large land-crab, which there can be little doubt contributes, and probably to no small extent, to the ordinary food of the Andaman savages.

No fresh-water fishes have been seen as yet; but some little mudskippers (*Periophthalmus*), and a curious new genus of them, which

* The species as yet determined with certainty are *Hæmatornis cheela*, *Blagrus leucogaster*, *Todirhamphus collaris*, *Halcyon coromander*, *H. smyrnensis*, *Corvus culminatus*, *Gracula javanica*, *Temenuchus erythropygia*, *Tephrodornis grisola*, *Geocichla innotata*, *Copsychus saularis*, *Kittacincla albiventris* (new), *Artamus leucorhynchus*, *Edolius retifer*, *Periorocotus peregrinus*, *Pycnonotus jocosus* (Malayan var.), *Irena puella* (Indian var.), *Oriolus coronatus*, *Carpophaga sylvatica*, *Calenas nicobaricus* (from the Cocos), and *Anous stolidus*.

has been styled Andamia ; also a new type of fresh-water crab, and a few insects, with the common large centipede (*Scolopendra morsitans*), which seems to be universally distributed in hot countries. The marine productions are of course those of the Bay generally ; and a better locality for studying and collecting them there cannot be. The products of the sea, moreover, are obtained with comparative facility ; the implacable and ever-vigilant hostility of the islanders proving a serious obstacle to the collection of the animal inhabitants of the land.

Birds of Canada observed near Kingston during the Spring of 1858.

By Captain HENRY HADFIELD.

(Continued from p. 6709).

Canada Nuthatch (Torcheput de la Canada of Buffon). April 16th. Shot what I believe to be a bird of this species, it having a blue head, and differing materially from the common redbellied blackcapped nuthatch, which has the upper part of the head of a pure glossy black, the sides and the whole of the lower parts rusty brown ; whereas the former has the crown bluish gray like the back, with numerous small longitudinal dark brown spots. The white line over the eye passes quite round the forehead without any interruption ; there is also considerably more white about the cheeks and throat, which, meeting at the nape, forms a collar ; the breast, sides and belly are of a grayish white tinged with rufous. The primary quills, as in the other species, are of a glossy hair-brown, but they have considerably less grayish white on the margins ; the first is about a quarter the length of the second ; the third slightly exceeds the fourth, whereas the latter feather is the longest in the redbellied nuthatch. The former has the secondaries broadly tipped with white ; but what forms the chief distinction, and I think proves it to be a different species, is that the wing is rounded ; both primaries and secondaries being greatly *incurved* ; the outer webs, from the second to the fifth quill inclusive, are but slightly indented ; whereas in the other species the whole of the primaries are emarginate and *recurved*. In the present species both primaries and secondaries are broader than in the redbellied nuthatch, and the inner secondaries are more elongated. The tail in both kinds is almost similar, but the white patches on the three exterior feathers are smaller, and do not extend to the outer web on the second quill of the Canada nuthatch, which, though of the same length and extent, is a somewhat slighter bird than the other. The head being blue, and

the wing of a different shape, there can be no doubt of its being a distinct species, though Wilson seems to hesitate in pronouncing it to be so, for he remarks, vol. ii. p. 208, "Buffon's Torchepot de la Canada is either a young bird of the present species (Redbellied blackcapped nuthatch) in its imperfect plumage, or a different sort that rarely visits the United States, probably the latter, as the tail and the head appear of the same bluish gray or lead-colour as the back. The young birds of this species (redbellied), it may be observed, have also the crown of a lead-colour during the first season."

In my note on the habits of the European nuthatch (Zool. 5684) I remarked:—"The bill, although undoubtedly strong, I should not at first sight have considered sufficiently so either to have perforated or cracked a nut, unless it had been so stated on the best authority; besides, if constantly used in drilling holes through nuts, it would necessarily have become, I should have thought, in some degree blunted thereby; whereas the bills of all these birds are very acute, and the upper mandible exceeding the lower in length, which seems unlikely to be the case if constantly brought in contact with so hard and polished a surface as that of the nut." And I am glad to find my opinion corroborated by so great an authority as Wilson, who, in remarking on the habits of the Carolina nuthatch, says, "The name 'nuthatch' has been bestowed on this family of birds from their supposed practice of breaking nuts by repeated hatchings or hammerings with their bills. Soft-shelled nuts, such as chestnuts, chinkopins and hazel-nuts, they may probably be able to demolish, though I have never yet seen them so engaged; but it must be rather in search of maggots that sometimes breed there than for the kernel." "From the great numbers that I have opened at all seasons of the year, I have every reason to believe that ants, bugs, small seeds, insects and their larvæ form their chief subsistence, such matters alone being uniformly found in their stomachs. Neither can I see what necessity they could have to circumambulate the trunks of trees with such indefatigable and restless diligence, while bushels of nuts lay scattered round their roots." Although I have skinned several, I omitted to examine the contents of the stomachs; but there can be no doubt of their being insect-feeders, though they may occasionally amuse themselves with a nut. This bird is a tree-creeper, and closely allied to the woodpecker, but the latter has the bill worn and blunted, though the decayed bark and wood perforated cannot offer the resistance that the hard and polished surface of the nut does.

Blueeyed Yellow Warbler (*Sylvia citrinella*). May 9th. Saw

three of these elegant little birds among the willows in my garden ; had noticed one on the 6th. It is undoubtedly a true willow wren, though differing somewhat from the European in shape and colour.

Blue Yellowback Warbler (*Sylvia pusilla*). May 13th. Shot one of these diminutive birds, a handsome male, measuring $4\frac{1}{2}$ inches in length, and 7 inches in extent of wings.

Blackthroated Blue Warbler (*Sylvia canadensis*). May 13th. Shot one of these rather rare birds (length 5 inches, extent of wings $6\frac{1}{2}$ wing from flexure $2\frac{1}{2}$ inches), of which Wilson says, "It is highly probable that they breed in Canada ; but the summer residents among the feathered race, on that part of the Continent, are little known or attended to ;" "and unless there should arrive an order from England for a cargo of skins of warblers and flycatchers, sufficient to make them an object worth speculation, we are likely to know as little of them hereafter as at present." Later in the month I saw another that had been sent into Kingston to be stuffed ; so I am inclined to think they breed in the country.

Baltimore Oriole (*Icterus baltimore*). May 13th. Procured one of these handsome but common birds.

Whitecrowned Bunting (*Emberiza leucophrys*). May 14th. Saw two of these rare and beautiful birds in a tree in the garden ; succeeded in shooting one, which proved to be the male.

American Woodcock (*Scolopax minor*). May 15th. Found two of these diminutive woodcocks in a swampy bit of ground, so closely covered with alders and brushwood that it was a difficult matter to get a shot at them ; but, both being eventually killed, they proved to be males. They were highly prized, for although a common bird they were the first I had seen. The largest measured 11 inches 4-tenths in length, and 17 inches in extent of wings.

Wood Thrush (*Turdus melodus*). May 15th. Shot one of these fine songsters. I found it at the edge of a wood, where it might have remained concealed and unobserved among the thick foliage, had it not been betrayed by its song. This is one of the few birds of North America whose song is deserving of the name. Although a handsome bird, the plumage is not so rich as that of the ferruginous thrush. It measures $7\frac{1}{2}$ inches in length, and 13 inches in extent of wings.

Ferruginous Thrush (*Turdus rufus*). May 18th. When in quest of birds near an extensive marsh and cedar swamp, I saw and heard, for the first time, this large and elegant thrush, which from the clearness of its notes I at first took for the wood thrush ; but in shape, colour and size it differs widely, having a more elongated tail, richer plumage, and greater weight.

Canada or Whitefronted Swallow (*Hirundo lunifrons*). May 21st. Saw a number of these beautiful little swallows near Toronto, the first I had observed since my arrival in Canada. It was not until after several unsuccessful attempts that I succeeded in shooting one; whether this arose from over-excitement, or was caused by the unsteady flight of the bird, it is difficult to determine, but they appeared to be constantly wheeling in narrow circles, frequently within a few yards of one, and then would suddenly disappear behind the trees. I never knew a bird more difficult to shoot, except perhaps a jack snipe; as to the swift-flying *Hirundo pelagica*, I had found it comparatively easy. I merely secured one specimen, but had a few days before procured another near Kingston, the only one seen during my residence there, possibly the limestone formation being unsuited to its habits, as it is said to breed in the cliffs of barren grounds.

Sand Martin (*Hirundo riparia*). May 21st. Found these birds very numerous in the sand-banks and cliffs near Hamilton; secured some specimens. Although this town, as well as Kingston, is on Lake Ontario, I never observed a sand martin at the latter place, owing no doubt to the different nature of the soil. They vary much in size, the largest being 5 inches 3-tenths in length, and 11 inches 2-tenths in extent of wings; the smallest measuring but 4 inches 9-tenths in length, and 10 inches 2-tenths in extent.

Cat Bird (*Turdus loides*). May 21st. Saw two of these birds, male and female, near Toronto, in some bushes skirting a stream; shot the latter. It is not, I think, a very common species; at least I observed but few the previous autumn, and those were invariably in low, swampy situations.

Tyrant Flycatcher, or King Bird (*Muscicapa tyrannus*). May 22nd. Obtained a specimen; length $8\frac{1}{2}$ inches, extent of wings $12\frac{1}{2}$ inches. This is a common species.

Great Tern (*Sterna Hirundo*). May 22nd. Obtained a specimen; extent of wings $31\frac{1}{2}$ inches.

Redeyed Flycatcher (*Muscicapa olivacea*). May 24th. Shot one of these elegant flycatchers, which are so closely allied to the warblers that had it not been for the slightly decurved upper mandible I should have set them down as such. The tarsus is unusually long, namely, 7-tenths of an inch; the length of the bird is $5\frac{1}{2}$ inches; in colour it somewhat resembles the wood wren.

Chestnutsided Warbler (*Sylvia pennsylvanica*). May 24th. Shot one of these rather rare and beautiful birds; it proved to be a handsome male; length 5 inches, extent of wings $7\frac{1}{2}$ inches, wing from

flexure $2\frac{1}{2}$ inches. I subsequently saw another that had been recently killed. As this bird, according to Wilson, passes through Pennsylvania in April, or early in May, there can be little doubt of its breeding in Canada. The bill is rather stout and slightly decurved, and this bird, both in form and habits, seems allied to the tits.

Blackburnian Warbler (*Sylvia Blackburnia*). May 24th. Shot one of these rare birds, the only one I ever saw; length $4\frac{1}{2}$ inches, extent of wings $7\frac{1}{2}$ inches, wing from flexure 2 inches 4-tenths. This bird also appears to migrate northwards in May, returning in September, consequently must breed in Canada. Wilson remarks, "Of the nest and habits of this bird I can give no account, as there are not more than one or two of these birds to be found here in a season, even with the most diligent search." The bill of this species is slighter and less decurved than that of the preceding, which it seems to resemble in habits, frequenting the upper branches of the fir trees.

Scarlet Tanager (*Tanagra rubra*). May 24th. Shot a handsome adult male (had previously observed one). Although not a very common species, I saw several in a small wood about two miles from the town, on the above day; the splendid red and black plumage of the males making them very conspicuous, and though but 7 inches in length and $11\frac{1}{2}$ in extent of wings they appear much larger (Wilson gives $6\frac{1}{2}$ inches as the length, and $10\frac{1}{2}$ as the extent of wings). The females are of a yellowish olive-green, with dusky quills and tail-feathers, margined with greenish yellow; the under parts yellow tinged with green, except at the vent, where the feathers (including the under tail-coverts) are of a pure bright yellow. Except in size and shape they bear no resemblance to the males, and might be taken for another species until closely examined and compared. I do not think so great a disparity exists between the male and female of any of our European birds.

Great Horned Owl (*Strix virginiana*). May 25th. A fine bird of this species was brought to me for sale; it had been badly wounded, having lost one eye, and appeared in a dying state; and it being imagined that pressure alone would have extinguished life, it was placed on its back, and stood on, but its muscular power was still so great that it succeeded in freeing itself of the load, probably some 130 lbs. It measured 22 inches in length, 49 inches in extent of wings, and $15\frac{1}{2}$ inches from flexure, and weighed 4lbs.; eye dark blue; iris yellow.

Humming Bird (*Trochilus colubris*). May. Towards the end of the month several of these birds were seen by my sons, flitting about in a

hawthorn bush (a common shrub, not unlike our own, but the thorns and berries are larger). It was found impossible to count them, as they were in perpetual motion; but my sons are agreed in thinking that there must have been twenty or more congregated in this single bush, possibly for the purpose of roosting, as it was late in the day when they were discovered. Probably they had recently migrated, as not one had I observed, although out early and late collecting specimens to bring home with me. During their short stay in Canada, where they breed, they frequent the flower gardens in and near the towns and villages; but I never met with one, either in the fields or woods.

Rice Bunting (*Emberiza oryzivora*). May. Procured a specimen, the first I had seen, though a common species.

Winter Wren (*Sylvia troglodytes*). May. Saw one of these common birds. My gun having missed fire more than once, it was allowed to escape; but as it was very tame, creeping among the decaying trunks of the fallen timber, I had a good opportunity of observing it. Although Wilson seems to think it is "the same species as the common domestic wren of Britain," one that I examined in the autumn was decidedly a much darker bird than the common European wren.

Piedbilled Dobchick (*Podiceps carolinensis*). One was shot by my son.

Buffelheaded Duck (*Anas albicollis*). Saw one recently killed. Rather a common species.

Hooded Merganser (*Mergus cucullatus*). Saw several up a creek; endeavoured to approach them in a boat, but did not succeed in getting within shot. When disturbed they made for the lake. Their flight is rapid.

Dusky Duck (*Anas obscura*). There have been great numbers of these ducks on the lake since the breaking up of the ice. It is a very common species. I also observed large flocks late in the autumn. Several other kinds of ducks and teal were occasionally seen, but not identified.

American Bittern (*Ardea minor*). Observed one rise out of a marsh.

Remarks.—Gulls, rails, divers, hawks, and numerous other species were observed, but not identified; so it must not be inferred that the above list includes anything like the whole of the migratory birds that may have arrived up to the 29th of May, the date of my leaving Canada; for not only must many have escaped my notice, but the

immediate neighbourhood of a town is not the most desirable locality for carrying on one's observations on any but the swallow tribe and a few others. Most of the birds seen or collected were found within a very narrow range, and within two miles of the town; and I intend, for the benefit of any ornithologist who may chance to stray to that part of the country, to point out the exact position of the secluded and sheltered glen in which the greater part of my specimens were collected.

Quitting the town of Kingston by the upper Portsmouth road, leaving the Cathedral on the right and the splendid new Court-house on the left, you proceed for nearly a mile on the usual raised boarded foot-way, through level, half-cultivated fields almost without a tree or even a stump; then, leaving the high road, and striking off obliquely to the right for half a mile or more over a barren-looking common, dotted here and there with clumps of the everlasting fir, the first wood or enclosure is reached (where a few birds only are likely to be met with, there being neither underwood nor water), but not quite so smoothly as on paper, there being endless snake-fences to be clambered over, no easy matter when encumbered by shot and gun, to say nothing of heavy boots (rendered imperatively necessary by the swampy and spongy nature of the soil in Canada, which would puzzle the ingenuity of the most skilful agriculturist to drain, the country being generally a dead level); and ornithologists afflicted with obesity, if such excitable beings ever are so, should pause ere they trust themselves astride on the topmost bars of suspicious-looking snake-fences, as they are in these old enclosures very apt to give way, when great is the fall thereof. [I have in my mind's eye a vivid recollection of a scene of the sort, but the sufferer, fortunately, was of the leaner kind, or the fall of some five or six feet, gun in hand, might have knocked out his own brains as well as those of the much-prized specimen he held. But supposing these intolerable zigzag barricades to be surmounted, passing a "clearance" or two, *i. e.*, fields literally covered with charred stumps, the glade is approached, its sloping banks margined with a profusion of scrubby underwood and stunted hawthorn-bushes. In the back-ground trees of various kinds are seen, though, the soil being shallow and rocky, they are somewhat dwarfish in growth; but their spreading branches and thick foliage serve to shelter and protect the various kinds of birds now daily arriving from the South, and which seemingly make this their resting place before dispersing to their breeding stations or spreading themselves over the country. At the head of the vale is a

swamp, swarming with frogs, or marsh nightingales as our neighbours call them, whose notes it would be in vain to attempt to describe, there being something unearthly about them ; suffice it to say that it is overpowering, and unlike that of frogs in any other quarter of the globe. The prostrate trunks of some gigantic trees in different stages of decay lie half-embedded in the marsh, but there are still a few of equal size standing erect, their decaying and perforated trunks the abode of nuthatches and woodpeckers, which may be seen peering out at the intruders, and if unmolested will present themselves on the trunks or on the blasted weather-beaten limbs. Lower down the glen there is the source of a small rivulet, which, winding through the rocky and broken ground, falls into the lake at the pretty and sheltered village of Portsmouth. But returning to the sloping woods that skirt the upper valley, where many an hour was passed in close and diligent search after newly-arrived species : here warmth and shelter are doubtless the chief attractions, but the running stream must be preferred to the stagnant pools or swamps that more usually abound. The "bush" in reality is no bush at all, but forests of lofty trees, with bare and branchless trunk, canopied with dense foliage impervious to the sun ; and on the leaf-covered ground beneath there is neither shrub nor bramble that could afford birds shelter or screen their nests. Though so narrow and confined, there is in this glen a diversity of soil ; in the more elevated portions of it the blue limestone crops out in all directions, and very peculiar-looking it is, having occasionally the appearance of gigantic slabs of blue slate, so even and horizontal that it might be imagined this favoured land had escaped the floods and convulsions that in ages past have torn and rent our globe, leaving it in a state of chaos. But suddenly the scene changes : the dwarfish growth is succeeded by lofty beech, elm, and other forest trees, showing the rich nature of the soil. Here a few pigeons may be found ; some small birds too on the outskirts of the wood, where sun and light have caused the trees to throw out lateral branches, and promoted the growth of underwood and brier. The notes of the thrush may here be heard early and late, but we listen in vain for those of any other songsters. Having heard the ferruginous thrush (French mocking bird) and the wood thrush, I am inclined to think the former the best songster, but neither, in my opinion, equals our own mavis either in power or compass. Chirpings and occasional subdued warblings we may and do hear, but nothing approaching to a song ; so we might be inclined to set down Wilson's description as an overdrawn, if not a figurative one, did we not bear

in mind that the far-famed mocking bird, together with many a songster that charmed the enthusiastic ornithologist of the West (whose early impressions of his native warblers must have been well-nigh obliterated) are never met with north of St. Lawrence.

In returning to the town by the lower road which skirts the lake, blueeyed warblers (like our willow wrens) may be seen sitting among the branches of the lofty poplars (probably planted by the early French settlers, as many of them are now falling into decay), and a few gulls and terns may be observed soaring over the water or reposing on its surface.

H. W. HADFIELD.

Lossiemouth, Elgin, N.B.

Note on the Habits of the Longeared Owl (Strix otus). — Having paid successful attention to this species for the last two years, I am in a position to state several facts which I believe are little known. Large, sombre and retired woods, in which the various species of evergreen fir are freely interspersed, are the favourite haunts of the long-eared owl. When a pair are in possession of such a wood they seldom leave it permanently, unless driven by some very powerful cause. They spend the day in sleep, and come forth at dusk to search for prey. An evergreen fir, where such is available, is the most esteemed roosting place. They perch in an erect position; and when on one of the larger limbs of a tree of this description they sometimes get so close to the bole that an ordinary observer would mistake them for a crooked or enlarged portion, so nearly do they approximate it in colour. Occasionally, also, the thick stem of an old gorse bush will be selected as a roost. The same dormitory is seldom resorted to for more than a few days consecutively. Their hearing is so acute that even a very stealthy approach will awake them. I have endeavoured to form an intimate acquaintance with them, but without success. From whatever point I tried to observe them, the head always turned and the eyes were towards me. Generally they are wary, and will fly as an unwelcome intruder advances. When disturbed, the tufts on the head are raised, and maintained in that position while the cause continues. The food of the long-eared owls consists of mice, with an occasional finch. I have not known anything larger to be taken. With regard to the way in which they capture birds, an observant and trustworthy countryman told me that he had watched them flying about trees and bushes, and following the course of their branches, at dusk; his idea being that they were looking for birds, though he never saw them catch any. I have not seen this movement, but believe the man's statement, and think it original. This owl is seldom its own architect, but generally selects and repairs the old nest of a hawk, magpie or wood pigeon. The only instance within my knowledge in which a pair may have built their own was in last spring. I discovered three or four young ones, still unable to fly, scattered at short distances in a place where no nest large enough to contain them could be found. Dead bracken was in profusion everywhere about, and gorse and small black firs were growing up and down. Now, I think these birds must have been reared on a prepared bed of

decaying vegetable matter, either under a fir or amongst the gorse. When they could fly the parents led them to a neighbouring wood, and continued to feed them for several weeks. I state the facts of the case, and leave others to judge for themselves. When a pair of longeared owls take possession of a nest, usually early in March, they roost by it until the first egg is laid, about the middle of the month, when incubation at once commences. Frequently the full complement of eggs—two, three or four in number—are laid on consecutive days, whilst occasionally a week or so may intervene between; for instance, the second and future ones. As a proof of this, I took a nest last spring which contained four eggs; of these one was fresh, as though laid that morning; a second was slightly sitted, whilst the third and fourth were still more so, each differing a little in degree. The difference between each was as much as a day might make. I have previously seen an old bird sitting on her first egg. A second nest which I took contained three eggs; of these two were deeply sitted, whilst the third was only slightly so. These facts seem conclusive, whilst their beating the trees and bushes, as above related, will tend to show that they take birds off roost. — *J. F. Brockholes; 16, Cleveland Street, Birkenhead, October 3.*

Notes on the Mountain Birds of Jamaica.

By W. OSBURN, Esq.*

“Freeman’s Hall, Trelawny, Jamaica,
“September 6, 1859.

“Dear Sir,—I have in my former letters made frequent allusion to that very remarkable bird *Acanthylis collaris*; and as, during some rainy weather last month, I had unusual opportunities for observing them, I propose to devote this letter to some further remarks. On the 20th of August last they came close to the house, when I procured one. About an hour and a half afterwards my servant again reported them close over, when I got another, this time very fortunately only breaking the wing, so that I was able to observe its actions much more closely. Having washed and restored the broken wing as well as possible, I let it go on the polished floor; but notwithstanding this unfavourable surface it scuffled off, the tip of the wing and tail touching the floor, at a great rate, taking refuge in a dark corner. On being taken up it made a loud and very harsh screeching, quite distinct from the ordinary scream. On putting it in a position where it could see out, it stretched its neck and made several attempts to rise, tumbling over each time; so that without my experience at Grand Vale I should certainly have concluded it could rise from a flat surface. During the whole of this time it made no attempt to stand on the foot, resting always upon the points of the curved claws and the heel-bone.

* Communicated by P. H. Gosse, Esq., F.R.S. Google

In no position I could place the bird did the sole of the foot rest on a flat surface, even conjointly with the heel-bone ; so that it cannot be said to walk, but merely scuffles along with the assistance of the wings, though it can thus make considerable way. I then put it to the wall, but found it had no secure hold on the finished plastering of the room. But on being placed on a roughened wall outside, it immediately ran up with such surprising quickness that I was obliged hastily to secure it. The tail was partially spread, so that the points were even pressed against the wall ; but what chiefly surprised me was that during its progress I could see the feet in action on each side of the neck. On placing it against the wall with an object above it, it remained in an attitude of perfect repose. The points of the tail rested against the wall, as we should suppose ; but the feet were hitched so far upwards as to be only about half an inch below the bird's eyes ; the heel-bone I could see resting on the wall just below the flexure, so that the femur, tibia and tarsus formed a single straight line. It is obvious that from gravitation this straight line from the foot to the head of the femur would always tend to the vertical, and thus the ventral surface of the bird would be inconveniently pressed against the surface clung to. But this is entirely prevented by the salient nodosity at the heel, which intervenes and keeps the leg off, forming also another point of support. The powerful but elastic shafts of the tail lend additional aid. I found a recent bird could, after death, be supported on the tail alone, provided it were prevented from swaying over laterally. I unfortunately omitted to try whether it could perch, but I thought of it immediately after I had killed it, and, placing my finger in the claws, pressed them towards the breast. The toes bent as usual, but the grasp was scarcely perceptible. I am inclined to think they could not perch, at any rate without the voluntary action of the muscles ; they could not sleep on a branch in fact. But if, before the limb become rigid, the leg is straightened and stretched forward in the position when clinging, then the foot remains perfectly pliable ; but a very violent flexure takes place between the ultimate and penultimate phalanges of all four toes, so strong that the points of the claws are doubled upon the sole, and cannot be forced back so long as the leg is kept in this position, without the exertion of far greater force than the bird's weight could bring to bear. The hallux is lateral ; it will form a right angle with the *internal* fore toe with perfect ease, but cannot be brought completely forwards without manifest violence ; its most usual position with the living bird is antagonistic with the external toe, and there seems

some reason for this. As the bird hung, the distance between the feet was greater than the space between the femur joints, as of course it almost necessarily must be. Thus the drag on each leg is slightly oblique in opposite directions, and the hallux therefore is opposed to the direction of pressure, or very nearly so. These birds can therefore cling with perfect security to any vertical surface rough enough to give hold to their powerful claws, and without any continuous effort. You will observe from this that your correspondent was in error when he stated that the tarsus could not be bent beyond 28° with the tibia. It is obvious, if this were the case, that the bird's leg could never be altered from the position of perching, *i. e.*, the femur directed forwards, the tibia backwards, and the tarsus forwards again. This does support the bird when the direction of gravitation is perpendicular to the axis of the body or approaching it, but with a clinging bird this direction of course coincides with it. If the bird attempted to cling with the leg in this position, the claws, which give the point of suspension, would be very little in advance of the posterior margin of the sternum. Thus the head, the greater part of the sternum, the viscera it encloses, and the powerful muscles which cover it, by far the heaviest portion of the bird, would be *above* the point of suspension. Its protuberant breast would prevent its throwing this weight *on* the claws; and we can hardly imagine that, thus circumstanced, even the powerful tail would prevent its fall backwards. But by placing the feet forwards the whole body is *below* the points of suspension; the head only, or a portion of it (for the neck is drawn in when the repose is complete), is above the claws. This inclination to climb, as a means of escape and safety, was so strong that it overcame every other. On replacing the bird on the floor it hurried to me and ran up my clothes, taking refuge in the skirts of my coat. I showed one of my skins to an old hog-hunter, who assured me he had often seen them fly out of caves where, during their long expeditions, these men stop for shelter or rest. I took care he should not confound it with *Hirundo pœciloma*, of which I do not think there was much danger.

"I remarked in my last letter that these birds, from their occasional appearance, and their uncertain stay in any one spot, do not, like our other *Hirundines*, seem to hunt over a circumscribed locality, but explore large districts. The little valley which cleaves through the limestone down to the red conglomerate, in which this house stands, consists of about a hundred acres of pasturage. It possesses some unusual advantages for the observation of *Hirundines*; for

though scattered clearings occur to some distance on each side the road from the lowlands after it leaves the lower range, the forest suddenly approaches on either side at the gates leading to the house, and, with this exception, closely hems in the whole pasturage. So far as my observations go, no Hirundine goes in or over the forest for food; *H. pœciloma* ventures the furthest, but I have never seen it exceed the pathways a few hundred yards from the edge. I would estimate our usual allowance for these isolated pastures at about twenty *H. pœciloma*, the same number of *Progne*, and two or three pairs of *H. euchrysea*, rarely all these together; for many hours in the day not a single bird is visible, but still small numbers look round from time to time. Early in the morning they are almost always busy on the western hill; towards evening the eastern hill and the river beneath it have more attractions. On dissection of the stomachs of any of these three species of birds, we shall arrive at very much the same result: five or six species of insects, small beetles, small Ichneumonidæ, &c., with perhaps one large plant-bug; in another, shot soon after, many insects are the same, but some different, and the plant-bug is replaced by two small bees; in *Progne* the bees will be more numerous, but accompanied by many small insects. So that though an expert entomologist (and I feel every ornithologist who wishes to progress ought to know at any rate something about the kindred science) might be able to say with certainty, this bird has been shooting round the mangos, that has been skimming over the grass,—there would be no marked characteristic deducible, save that these birds evidently hawked over a certain space, and took any suitable insect that happened to come in their way; in fact, that they were local feeders. But in the case of *Acanthylis collaris* the results are very different. I give four cases of birds, for the most part shot at great intervals, both as to time and locality:—

“Stomach examined March 6, 1858. A small species of Coleoptera, with a few of a second species, and one large insect.

“Stomach examined August 1, 1859. The winged females of a very small species of ant, a few other insects, and one or two bees.

“Stomachs examined August 20, 1859. First bird: numerous small green beetles, one or two bees, and six wasps whole and just swallowed, which I could not distinguish from a specimen of *Polistes rubiginosa*? building in the verandah. Second bird, an hour and a half later: traces of the same small beetles but slight, antennæ of a Capricorn beetle, and a mass composed of disjointed segments, empty legs, thoraces of some wasps; little clots were composed entirely of

wings folded longitudinally; there were about thirty heads, which probably helped to digest the rest.

"We have thus, I think, very good evidence that these great swifts do not content themselves with the insects which a single locality may furnish, but search for large congregated swarms,—are swarm-destroyers. And this quite conforms with the irregularity of stay on any particular spot they visit. Some very remarkable points with regard to their mode of finding these swarms have latterly much attracted my attention. Let me give two examples. On the 20th of August, just before I shot the first bird, I had heard the column coming up. A good number of *Progne* were skimming low over a grass-covered mound in the pasture, of about an acre and a half in extent, and two of the swifts with them, for they always join and explore a flock of another species. Soon the number increased, and in a short time the column had disappeared, and a hundred and fifty or two hundred birds were dashing in every direction over the spot. They continued in different parts of the meadow adjoining the hillock, till I shot the next. On the 3rd instant I heard them again coming, but this time from the forest above. Just as I got out, the column, composed of numerous birds, descended and deployed over the meadow, but I presume found nothing, for they speedily formed again, gyrating slowly and moving along the western ridge, thus approaching the house, Though it was still distant three hundred or four hundred yards, several birds were shooting in an impetuous, irregular way over the house round the neighbouring trees, dashing even through the yard, without any apparent object rising to some height, then darting up the river course for a great distance, and back again. As the column progressed along the ridge, which it did very slowly, a man walking along the path would have arrived opposite the house before it. There skimming birds became more numerous; perhaps ten or twelve were over the yard and house at once, and the whole space between the house and the ridge was equally densely occupied by great numbers of birds shooting about low, in the same wild, irregular manner. The column stopped a little, and then moved in the same direction. It now began to leave the house, and the skimming birds became fewer. If one was selected, and its motions watched attentively a little, it would be evident that, notwithstanding its irregularity and amazing rapidity, its deviations did not prevent it from steadily keeping after the column. As this passed out of our little valley, and became scarcely visible over the intervening ridge, now one and then another bird might be seen darting after it in a straight

line, evidently intent only on coming up with it. Now, if it be considered that we have here a swift of very extraordinary size which does not, as might be supposed, secure a sufficient amount of prey by hunting in small parties, but, notwithstanding its size, wonderful activity, and the voracity which these imply, hunts after its prey in very large numbers, it will be understood that the ordinary produce of insects of one locality is not sufficient, especially in an island where I have your authority for saying insects are by no means in extraordinary abundance. It is absolutely indispensable to the flock that they should seek for swarms; but for this, it will be seen, extraordinary obstacles are to be overcome. In a large flock of gregarious birds, which have simply to rise to a certain height, survey the country beneath, and then, selecting some large geographical object, descend and feed, their cries and ordinary powers of vision are quite sufficient to keep the whole flock together; but with a number of birds seeking swarms of insects the case is widely different. No powers of vision we have any cognizance of could possibly enable them to discover swarms half a mile off; indeed, there is abundant evidence they do not see them till close upon them. The birds then would be obliged to beat over immense districts, following a small number of leaders if they are to keep together,—a mode of hunting evidently involving great loss of time and great fatigue. If, on the contrary, they availed themselves of their numbers in the obvious mode of exploring in different directions at once, they would infallibly be separated, and then their numbers would be of no avail, for when a party have found the swarm how are the rest to know it? They would cease to be swarm-destroyers at all. The probability is that this mode of feeding requires the simultaneous action of great numbers to explore large spaces at once. It is far from impossible that without some such power the birds would perish. As you may have gathered from the observations given above, this combination of action is secured by the very remarkable habit of a varying proportion of the flock rising and forming a gyrating column. Whilst thus revolving a bird darts out, followed by others who form a screaming party, and then rejoin the column. I have in other letters mentioned that these screaming parties are so constant that I often, through them, know of the passage of the column over head while in the forest, or it gives notice of their approach when, from their great height and distance, they would otherwise elude my observation. It cannot be doubted that these perpetual screams, and the column itself, so conspicuous as it floats, equally or in a far greater degree,

announce to the host of birds below the direction of its movements, and thus combine the movements of the whole flock. And we may observe that by the introduction here of the ordinary instinct of swifts to scream when they pursue each other, the hunting birds can concentrate their powers of vision on their search, and by ear know the direction those searches must take. If, therefore, every bird in the flock regulates its course by the slow movements of the column, which thus gives them ample time to explore thoroughly, it will be obvious that, whatever the movements of each individual bird, quite unconsciously the column will always tend to be over the centre; and we might expect exactly what I observed on the 3rd of September, that the hunting birds were thickest immediately round it.

“But though now it can be comprehended how these large flocks of birds keep together in their search, another most formidable difficulty presents itself. Supposing a couple of birds (as I observed on the 20th of August), sweeping up to a troop of *Progne*, find they are feeding on wasps—a prey which will suit them: the successful birds do not hesitate a moment; their wild, irregular dashes are suddenly changed to a dart in a straight line, a rapid whirl and a dart back again; in fact, they begin at once to feed. How then is the column to know it, or be prevented from moving off in another direction? This, I believe, is effected by a most remarkable structural change, involving a corresponding habit. To describe this change of structure I use the words of your exact old Doctor, ‘Eyes large, deep sunk in the head, with remarkably large eyebrows,’ only remarking that the surface of the feathers is considered by him as synonymous with ‘head.’ If the skin and feathers are removed the eyes are remarkably prominent. He afterwards adds, ‘the head large, like whip-poor-will.’ I will add to this that the pupil is very large, lustrous and of a very deep blue. So little is, I believe, known as to the effect upon vision which the almost endless changes of form we meet with have in this organ, that we could not say that such and such a form is unnecessary in a particular case; but, reasoning from analogy, we have examples of other birds which pursue insect prey precisely, so far as we can see, in the same manner as these birds: the humming-birds are perhaps even more rapid in their movements, yet none of these are remarkable for large lustrous eyes; quite the contrary, they are rather apt to be smaller than larger than those common to the greatest number of birds. But if we learned that a particular species had such wants that it was necessary it should be able to take a careful survey of objects below it whilst it floated above, we should be able to say, with perfect cer-

tainty, it must have a prominent, lustrous eye with a large pupil (deep blue often), carefully screened from the light above by a prominent eyebrow, that it may be wholly unembarrassed in its watch over objects below. Now let us consider the effect of the central position of the column, its commanding height, if suddenly, in any one or two birds at any part of the vast circle it is over, the motions change, like the two birds who had reached the little flock of *Progne*, detailed above. Can we suppose that an alteration of action, observable to us at a considerable distance, for a moment escapes the keen scrutiny of a hundred telescopic eyes watchfully gyrating above? We may be quite sure it does not, for the sudden descent of the column may often be witnessed. Now it will be understood what will be the effect of this on the scattered birds who are less successful: the column, which has been the centre of their movements, is gone; the birds then rush up in the direction it has disappeared, or, rising above intervening objects, catch sight of it busy feeding. And thus we have the extraordinary spectacle of dozens of birds dashing to the very spot where the prey has been found, as if each had received accurate and separate intelligence. Then a boundary is traced out by a flickering succession of rapid wheels—all within is a storm of dashing courses in every direction at once. The moment the disturbed or angry insects rise from the plants or grass their fate is certain. Others dart out and probably take the wasps as they return to the spot. If we multiply 200 birds by 30 wasps' heads I found to be the allowance of one in an hour and a half, we have 6000 of these formidable insects destroyed in that short time, but I think the number was probably far more. And then, the work accomplished, this wonderful army resumes its aerial march, the magnificent living standard re-erects itself, and its screams growing faint and still fainter, recall the scattered rear.

“I would guard against an impression which may possibly arise from the foregoing details; namely, that in their curious habits there is anything like the rigid instincts observable in other classes of animals. I believe the whole to be carried on by the very simplest instincts, more or less observable in most *Hirundinidæ*. The same instinct which makes the searching birds join *Progne*, and often *Progne* join them, induces them to keep near the column, the column to descend when it sees the prey is found, and the rest to rush after the missing column. It is but a very extraordinary modification of a well-known habit: it results in giving the column a central position, precisely the one where it can best overlook the whole; its motion is probably directed by the direction it observes in the search of a

number of birds markedly pushing in one direction, and we can understand why it tends to move slowly in one direction, unless something occur to stop it, because the whole flock has got that direction also. Slow gyration is precisely the movement with which the watching birds can progress slowest with least fatigue to themselves, and thus give time to the searching host below; it is also precisely the movement best calculated for the exercise of their telescopic vision and ensure their immediate detection of the discovery of prey, important to the whole flock. And thus we have an instance of a great swift approaching raptorial birds in habit and structure the moment its wants are similar. The mistakes of *Cathartes* I have before alluded to are accounted for—than whom no bird is less given to frolic—in oddly joining strangers so far removed from him in wants and habits, but whose manners in this one particular so strangely agree with his own. I would add there is no certain proportion between the column and hunting birds. Individual birds are continually passing from one to the other; they resort to the column possibly for rest. A bird in the column sees a locality or object that it thinks betokens prey; it darts out, is followed by a screaming party, only one or two of which return; the rest deploy and become hunting birds.

“I trust I have thus made clear the mode in which I believe these curious birds are enabled to take a survey of an immense district, and wherever they detect insects in such numbers that the little colony of *Hirundines* stationed on the spot would be unable to cope with them, suddenly throw into the scale their numbers, great size, activity and unusual voracity.

“You will, I fear, be alarmed at letters of such length as this, and all about a single species, but I found the subject so interesting I knew not where to break off. I trust it will prove interesting enough to you to repay the perusal.

“Yours very faithfully,

“W. OSBURN.

“To P. H. Gosse, Esq., F.R.S.”

Autumn Notes on Birds.—A small flock of the tufted duck appeared in our river as early as the 27th of July, and towards the middle of August I obtained a specimen of a young mallard. A far greater number of terns have haunted our sand-flats this autumn than for several recent seasons. The arctic, common and black terns have been plentiful; of the latter beautiful little species I have on several occasions seen large flocks fishing assiduously at low water. While the terns were about the river one of my brothers one day shot and brought home to me a specimen of the gullbilled tern

(*Sterna anglica*) in immature plumage. This specimen had the beak two-thirds of the length of the head, and of a greenish black, short and rather conical in form; the legs were greenish black. The bird was the same size as a young bird of the common tern, and its markings were not dissimilar to those of that species. A short time afterwards I saw another specimen of this tern which had been killed on our sands. This specimen was an older bird, and had the beak longer than that of the first specimen, and the angle on the lower mandible very prominent. Its back was a uniform French blue, the nape of the neck black, crown of the head black, streaked thickly with white. Beak and legs greenish black. A specimen of the little auk was picked up in the middle of August on the sands. This was a young bird of the year, with the slate-coloured cheeks characteristic of the immature state. Amongst large flocks of dunlin and ringed plovers I have noticed the curlew sandpiper and sanderling, and of the former one afternoon I noticed a very considerable number. On one or two occasions I noticed the sanderling very numerous. This pretty little *Tringa* is by no means a regular autumn visitant with us; one September afternoon I had the rare fortune to see a flock of the little ringed plover (*Charadrius minor*), and have since mounted a beautiful specimen, which was killed out of the flock. I was pleased to find this rare and peaceful little plover so distinct from the larger and common *C. hiaticula*. Yarrell is, as usual most happy in giving an accurate account of the distinctive peculiarities of each species. There have been one or two flocks of the little stint with us this autumn, and I have had some pretty specimens brought to me. When a single bird of this species is seen on the sands he appears a ridiculous little pigmy, but his proportions become grander when he rises on the wing, and the long tertiary feathers of the *Tringæ* become noticeable. The flight of these little fellows is very rapid, and in a zigzag, not unlike that of a dunlin or jack snipe. They have a shrill cry, quite distinct from that of the other *Tringæ* which haunt the flats. Godwits and knots have been scarce this autumn; of the former we have not had so many as haunted our sands in May on their way north, and in all the glories of their nuptial plumage. I was on the Braunton sands the morning after a heavy gale towards the end of September, and found them strewn with dead and dying razorbills and guillemots. For more than five miles the sands were dotted in all directions with the white bodies of these birds, and the tide, which was then running in, washed up the bodies of fresh victims each instant; and not only on the sands, but far out in mid channel lay the bodies of these birds, innumerable, floating backwards and forwards on the waves, and puzzling the sailors of the passing ships to account for their destruction. The destruction of life must have been immense. If all the victims to sportsmen, and all those which have been devoured by the "cliff hawks" (*Falco peregrinus*), who have their eyries in one or two places among the breeding stations of the guillemots; if all these which have thus perished during the last century were added together they would not represent one tithe of the birds which perished in that fatal gale: and all these birds were drowned. It seems strange that birds whose very home is on the bosom of the ocean should die thus, but nevertheless it is the fact. As soon as ever the birds are drawn within the influence of the heavy surf they are rolled over and over, and are at length tossed up dead or dying on the beach. The storm falling on them while they are sickly from being in the midst of the great yearly moult is the more fatal. But stranger than this is the number of dead kittiwakes one sees on the sands after a heavy gale of wind at midsummer. These birds are entirely surface feeders, and it seems a fair conjecture that after the waters had been violently disturbed by a gale there would be more food for them on the surface than in calm

weather, but yet all the dead birds you examine have unmistakeable marks about them of having died from starvation.—*Murray A. Mathews; Raleigh, near Barnstaple, October 5, 1859,*

Showers of Feathers.—It is with great reluctance that I venture to reproduce this subject in the pages of the 'Zoologist,' but Capt. Blakiston's hasty and somewhat disdainful reply to my inquiry is not quite satisfactory. That gentleman has entirely mistaken my meaning. I did not for a moment deny the possibility of "feathers scudding in a breeze;" and I agree with him in believing that it is generally known that feathers are capable of being wafted by the wind. Nor did I propose that goose down should be sent to England for the purpose of making "experiments," but merely to afford an interesting and tangible proof to an inquisitive and incredulous mind. If we "let loose at a window" all the "chaff" in Capt. Blakiston's letter instead of "extracting a handful from our bed," nothing but the following sentence remains:—"And as to mistaking feathers for snow, I answer by asking was the latter ever seen floating on water?" but nothing of this sort seems to be mentioned in the first notice of the subject (Zool. 6324). I there find that the writer "witnessed a shower of feathers," and that "it appeared to be snowing." This statement immediately brought to my mind some passages of Herodotus (Zool. 6442), in which he says that showers of feathers were always mistaken by the northern Scythians for falls of snow. Having compared these observations of the ancient traveller and the modern, and found them exactly contrary, surely I am justified in expecting a fuller explanation than that I have received, and I shall be greatly indebted to Capt. Blakiston if he will comply with my request at the earliest convenient opportunity. Was he in the midst of the shower, or at a distance? Did the flying goose-down extend over a large region of air? Are the Indians in the habit of carrying on the "operation of goose plucking" to such an enormous degree as to cause it to rain feathers? Perhaps they observe a sort of Michaelmas day, in which whole tribes, individually and collectively, indulge in goose-flesh; or, perhaps, they were merely "extracting handfulls from their beds" to make "experiments," and astonish the natives of the neighbourhood. With every apology to Capt. Blakiston for having aroused his indignation by presuming to imagine that he could possibly have mistaken feathers for snow flakes, I sincerely hope he will prove that his account of "showers of feathers" possesses more authenticity than the old story of "showers of frogs."—*T. W. Greene; September 26, 1859.*

[I hope the subject may not be allowed to drop, merely adding that I believe it quite impossible for an observer of Capt. Blakiston's experience to have mistaken snow for feathers: I was surprised that such a suggestion should be made. Such showers of feathers are not so rare as either of my correspondents seem to suppose.—*Edward Newman*].

Hawfinch breeding at Muswell Hill.—Having noticed in this month's number of the 'Zoologist' an account of the appearance of the hawfinch at Selborne, it occurred to me to mention that a pair of these birds built in the spring of this year, as far as I can recollect, in the end of May or beginning of June, in an apple tree in a garden, at Muswell Hill, near London. The gardener there informed me one afternoon that he had just destroyed a nest, which he believed to be that of a butcher bird, and killed the five young ones which it contained, and that the old birds were still perched on an adjacent elm tree, uttering a harsh note. On repairing to the spot I found one of them had disappeared; but with some difficulty, for it was very wary, I succeeded in shooting the other, which, upon examination, proved to be a female hawfinch. I also

subsequently discovered, on the ground, one of the young birds still living, which I took into the house, and endeavoured to rear, but it died before morning. The foliage of the apple tree was very thick, and the nest—which was, as I understood, very coarsely constructed—about six feet from the ground. This is the only recent instance of the occurrence of this bird in the neighbourhood, as far as I can ascertain.—*John Henry Gray* ; 7, *New Inn, Strand*, October 14, 1859.

Occurrence of the Sand Grouse in Norfolk.—Early in the month of July last a very beautiful specimen of Pallas's sand grouse (*Syrhaptes paradoxus*) was shot in the parish of Walpole St. Peter's, in this county, about two miles from the Wash. The bird was alone when shot, but at least one other, apparently of the same species, was observed about the same time in the neighbourhood. There is reason to believe the present specimen to be an adult male, in perfect plumage, the beautifully elongated feathers of the tail and wings happily uninjured. It has been beautifully mounted by Mr. Leadbeater, of Brewer Street, and is now in the Lynn Museum. This is, I believe, the first occurrence of this bird in England, if not in Europe.—*Frederick Currie* ; *Clenchwater, Lynn, Norfolk*, September 29, 1859.

[See the account of another specimen Zool. 6728.—*Edward Newman*].

Familiarity of Shennies (Blennias pholis).—I think the familiarity of some shannies I took a few days ago is worth noticing. Two of them were placed in a pan along with a pair that had been captured more than a fortnight, and were consequently tame. The very next day, on feeding these latter, I was surprised to see the new-comers approach for their share of the food, and found that they would follow the finger, and bite at it after the manner of the domesticated specimens. Could it be that they were influenced by the example of the others?—*G. Guyon* ; *Ventrnor, Isle of Wight*, August 10, 1859.

Quivering Movement of the first Dorsal Fin in the Five-bearded Rockling.—Last week I took a specimen of the five-bearded rockling, and while viewing it in the aquarium was struck by the peculiar quivering movement of the delicate appendage termed the first dorsal fin. This mane-like organ was alternately agitated and quiescent, reminding one of the action of the breathing-apparatus along the sides of the larva of Ephemera. Yarrell notices this movement in the three-bearded rockling, and no doubt it is common to both species. The death of the specimen the same evening prevented any further observations. Is any cause known for this peculiar action?—*Id.*

The Moulting of Crustacea.—The moulting of Crustacea is usually described as a painful and tedious process, only accomplished after many struggles. Perhaps different species vary in this respect ; at least I saw nothing of the kind in the case of a *Carcinus Mænas* in my possession last spring. The first part of the process I did not witness, as when I looked into the pan the crab had about a fourth of its body protruding from the hinder portion of the shell. Though I watched it closely, no effort appeared to be made, but the shell seemed to slide off gradually, as if the body was expanding, and the shell was compelled to slip off by its natural spring. No difficulty seemed to occur about the claws, but when nearly free the crab withdrew itself

at one step from its old covering, and the operation was completed. Whether any exertions were required to make the first opening in the shell I had no opportunity of observing. It is remarkable how seldom the act of exuviation is witnessed; while the cast shells in the aquarium prove its frequent occurrence: probably it takes place in the night or early morning; and no doubt the creature avails itself of concealment where it is procurable, or its comrades might act on the principle that when a man has his coat half off to fight is the time to pitch into him.—*George Guyon; Ventnor, Isle of Wight, August 10, 1859.*

A Week at Killarney. By EDWIN BIRCHALL, Esq.

June 18. Reached the Muckross Hotel, at 5 P. M., accompanied by my friends A. A. Dunlop and N. Cooke: walked to Torc Waterfall, about a mile from the inn, capturing *Hepialus velleda*, *H. hectus*, *Hypena crassalis* and *Ennychia octomaculalis*. Subsequently sugared in the wood at the foot of Torc Mountain, but with small success, *Thyatira Batis*, *T. derasa* and *Geometra Papilionaria* being the only captures worth naming.

June 19. Walked to the head of the upper lake; it was a glorious summer day,—

“One of those heavenly days that cannot die,”—

whatever the moths might do, and die they did, some hundreds of them. Rogers sarcastically said, “Englishmen are all alike in this matter; they come down to breakfast, look out of the window, and say, What a lovely morning! what a heavenly day! Come, let us kill something.” The wooded slope from Derrycunilly Waterfall to the boat-house is first-rate collecting-ground, and commands a magnificent prospect: at our feet the lake studded with wooded islands; on the opposite shore rises the Purple Mountain, barren, but singularly brilliant in colouring; further to the left the huge mass of the Reeks, the mightiest mountain in Ireland, shoots its jagged crest into the air, and closes up the valley; here the fleecy masses of vapour pour out of the Gap of Dunlo, and across its dark and rugged breast, seeming to cling to it and circle the giant around with a belt of light: as the lakes are not many feet above the sea-level, nearly the whole height of the mountain (3,400 feet) is here seen at a glance in one vast sweep. It is not often given to entomologists to collect in fairy-land, nor very easy, when it does so happen, to avoid envying the people who dwell in such a paradise all the year round; however, let

us hope they are sufficiently grateful to Providence for their good fortune, and proceed to business. Our captures included—

Hydrelia Bankiana. In abundance. It is out a full week earlier than last year; the caterpillar is said by Stainton to feed on grasses, but the moth seems attached to the *Myrica Gale*; it flies about sunset, but is easily disturbed at any time, settling again within a few yards.

Erastria fuscula.

„ *uncana*.

Cabera strigillaria. Quite a different looking insect to the English *C. strigillaria*.

Macaria notataria.

Melanippe hastaria.

Phytometra snea.

Corycia temerata.

„ *taininata*.

Euthemonia russula.

Lasiocampa Quercus.

Thecla Rubi.

Ctenonympha Davus.

Saturnia Carpini. Larvæ abundant.

Hypena crassalis. Flitting about the gloomiest parts of woods in plenty.

Eupithecia debiliaria. On the stems of the old holly trees, from which a smart blow is required to dislodge it: the labour of taking it in this way is, however, very great; perhaps we got one specimen for every hundred trees examined.

On our way back called at the Tower, to see P. Bouchard: he showed us a splendid male specimen of *Notodonta bicolora*, captured the previous week. Sugared in the evening, but with no result. Noctuæ seem very scarce.

June 20. Over the same ground, and captured most of the species taken yesterday, also *Melitæa Artemis*, *Hyria auroraria* and *Ligdia adustata*. On swampy ground near the lake took a pair of *Dolomedes fimbriatus*, a monstrous and horrid-looking spider. Mr. Meade, of Bradford, to whom I am indebted for the name, informs me that it is not a common species; fortunately so, I think, for it has a very tropical and truculent aspect.

June 21. To the Gap of Dunlo, and thence round the lakes to Killarney; heavy rain most of the day. Our only captures were *Melanippe hastaria*, *Macaria notataria* and *Melanthia albicillata*. The brilliant flowers of *Pinguicula grandiflora* studded the sides of this rugged mountain pass, which, although shorter than Llanberis, I think far exceeds it in grandeur.

June 22. My companions ascended Cromaghlán Mountain. On the summit is a small tarn, which appears to have no connexion with the lakes below; from it were obtained many specimens of the *Limneus involutus* of Harvey; I believe no other locality is known for this curious and fragile shell. *Donacia nigra* (taken on the bank of the tarn), *Olinda Ulmana* and *Emmelesia tæniaria* (beaten from hedge-rows), and a pair of *Microdon apiformis* (Diptera) were our only entomological doings worth recording.

June 23. Spent on the lakes. *Cossonus Tardii* in immense profusion on Innisfallen Island, under bark of decayed ash and holly, occasionally clustered in such masses that we held our hats under and scraped them down by handfulls. The guardian of the island, who, on our arrival, very politely pointed out the decayed trees, was soon horrified at our proceedings, seeming to think that three maniacs, bent on destroying the timber under his care, had landed on his lonely isle; he was stupidly impervious to our explanation that *Cossonus* was the real culprit, and we were compelled to separate and attack three trees at once, so that two of us at least might fill our bottles in peace. Future visitors are advised not to ask to see the vegetable ruins of the island, but to confine their inquiries to the stone antiquities, unless they wish to encounter a frantic Kerry man. A large proportion of the timber on the island is suffering from the attacks of *Cossonus*; the specimens vary greatly in size, some specimens being eight or ten times the bulk of others. We obtained *Gyrinus bicolor*, from the lake near Dina's Island, and *Trechus* ———? under stones at Old Weirbridge. A brilliant sunset, leaving Torc mountain a mass of intense indigo blue. Remained in the birch-woods till day-break, in the hope of making out the habits or hour of flight of *Notodonta bicolora*. About midnight *Arctia Men-thrasti* flew past, and its white wings for a moment cheated us into the belief that we had secured the prize; possibly we were too late for *N. bicolora*, which is said to appear on the Continent in May.

June 24. Muckross domain and peninsula (which, by the liberality of Colonel Herbert, are thrown open to visitors) occupied us to-day. Among the *Lepidoptera* captured were—

<i>Nola strigula</i>	<i>Eupithecia castigata</i>
<i>Venusia Cambricaria</i>	„ <i>irriguata</i>
<i>Emmelesia tæniata</i>	„ <i>coronata</i>
<i>Eupithecia Satyrata</i>	„ <i>debiliata</i>
„ <i>plumbeolata</i>	

Among Coleoptera—

<i>Phyllopertha suturalis</i>	<i>Leptura sexguttata</i>
<i>Melolontha hippocastani</i>	<i>Œdemera lurida</i>
<i>Auchenia 4-maculata</i>	<i>Silpha subrotundata</i>
<i>Galeruca calvariensis</i>	

Libellula cærulescens was very common near the lake: saw one pursue and capture a specimen of *Hydrelia Bankiana*. In the evening divided our week's captures, and went to bed by daylight.

The following insects were also taken during our visit:—

<i>Hadena rectilinea</i>	<i>Lampronia rubiella</i>
„ <i>contigua</i>	<i>Psychoides Verhuellella</i>
<i>Agrotis saucia</i>	<i>Adela Degeerella</i>
<i>Triphæna fimbria</i>	<i>Prays Curtisellus</i>
<i>Cymatophora fluctuosa</i>	<i>Plutella annulatella</i>
<i>Phoxopteryx biarcuana</i>	<i>Gelechia tripariella</i>
„ <i>Myrtillana</i>	„ <i>Mouffetella</i>
<i>Grapholita geminana</i>	<i>Cecophora lambdella</i>
<i>Stigmonota perlepidana</i>	„ <i>pseudo-spretella</i>
<i>Lobesia reliquana</i>	<i>Butalis grandipennella</i>
<i>Eupœcilia nana</i>	„ <i>fusco-mœcella</i>
<i>Clepsia rusticana</i>	<i>Argyresthia retinella</i>
<i>Capua ochraceana</i>	<i>Gracilaria hemidactylolla</i>
<i>Penthina sauciana</i>	<i>Pterophorus bipunctidactylus</i>
„ <i>ochromelana</i>	<i>Chilo forficellus</i>
<i>Lampronia prælatella</i>	

Including eighteen species not previously recorded as occurring in Ireland. Although this looks a pretty fair result for one week's work, still there was not that abundance of life that might have been looked for in a district apparently so well suited to the requirements of living creatures; in the vast woods the silence of death seemed to reign: with the exception of a few species insects were not numerous, and the most promising-looking spot often proved a total blank. Of many of the species above recorded only single specimens were observed. Of birds we saw very few; the wren only was abundant. We saw one bullfinch, also the place where the eagles are not,—it is to be feared this noble bird now only exists, with O'Donoghue and his fairies, among the traditions of Killarney.

The district is characterized botanically by the occurrence of various plants, of which the following may be named:—

<i>Saxifraga umbrosa</i> ,	<i>Erica Mackaiana</i> ,
„ <i>elegans</i> ,	„ <i>mediterranea</i> ,
„ <i>hirsuta</i> ,	<i>Daboëcia polifolia</i> ,
„ <i>Geum</i> ,	<i>Arbutus unedo</i> ,
„ <i>affinis</i> ,	<i>Pinguicula grandiflora</i> ,
„ <i>hirta</i> ,	<i>Arabis ciliata</i> ,

which are not found in any other part of the British islands, or any nearer point of Europe than the coast of Spain, with which country the late Professor Edward Forbes suggested a connexion subsisted in some past geologic age, by means of land over which the Atlantic now

rolls: at that time (1846) Professor Forbes stated, "There was no evidence of any local assemblage of animals corresponding to this Flora." The missing link is now, in part at least, supplied, a number of peculiar shells having been found attached to the district and neighbouring shores; and although with regard to the insect tribes we are still imperfectly informed, evidence is not wanting that a local assemblage of insects also exists. *Anthrocera Minos*, *Notodonta bicolora* and *Hydrelia Bankiana* will fairly represent three of the great divisions of the Lepidoptera, and if the first-named be also a native of Scotland, the west of Ireland is certainly its head-quarters. How strange that these fragile creatures should be preserved through such vast changes to be evidence of the destruction which has overwhelmed the mightier works of God—that they should endure while great continents have sunk beneath the waves.

In the 'Entomologist's Annual' for 1859 it was intimated that a splendid butterfly, *Charaxes Jasius*, might not improbably occur at Killarney, being attached to the *Arbutus*, one of the peculiar plants of the kingdom of Kerry; we were not fortunate enough to meet with it, although there was a nymphalidous chrysalis found suspended to a rock below an overhanging *Arbutus*, of which great hopes were entertained. Respect for the feelings of my companions induces me to draw a veil over the rest of the story, suffice it to say it did not produce what was expected of it.

June 25. Out at 5 A. M. and dug up a hamperful of *Osmunda regalis* as a peace-offering to the ladies at home: a wet morning, heavy thunder-clouds shrouded the mountain and the lake looked dark and stormy. As we drove to the station a brilliant rainbow spanned the valley between Torc and Mangerton, and the whole scene was one of lurid grandeur.

EDWIN BIRCHALL.

Description of the Larva of Eupithecia subnotata. — Ground-colour dull yellowish green, pale green or reddish gray, with a chain of dull olive lozenge-shaped dorsal spots, becoming confluent towards the head and tail, and often bordered by an indistinct olive line. The spots and lines sometimes very faint. Segmental divisions yellowish or reddish. Spiracular line yellowish. The whole body very rough, thickly studded with minute white tubercles and black spots, and sprinkled here and there with short stumpy hairs. Belly pale green, with an interrupted line running the whole length. Feeds on the seeds and flowers of various species of *Atriplex* and *Chenopodium*, in August and September. It seems to prefer the banks of tidal rivers. I have taken it in profusion on the banks of the Orwell and the Stour near, Ipswich, but

have also met with it in some plenty in waste ground near Bexley. It is not so easy to rear as others of the family, and often pines in confinement. The pupa, which is enclosed in an earthen cocoon, has the wing-cases dark green. Thorax and abdomen yellowish, the latter not so tapering as many of the other *Eupithecia*. The perfect insect appears in June and July.—*H. Harpur Crewe* ; *Breadsall Rectory, near Derby, September 28, 1859.*

Additional Remarks on the Larva of Eupithecia innotata.—During the last fortnight I have taken a few larvæ of *E. innotata* off ash in this neighbourhood. I find that a variety occurs here which I have not previously noticed. Its characteristics are as follows:—Central dorsal line wanting. Supplied by a series of dusky triangular markings, becoming very faint or altogether evanescent on the anterior and posterior segments. On each side a row of slanting yellowish stripes tinged with pink.—*Id.*

Description of the Larva of Eupithecia centaureata.—Long, rather slender, and tapering towards the head. Has a slightly wrinkled appearance. This larva is almost as variable as that of *E. absinthiata*; and so dissimilar are some of the varieties that I am not surprised at many a tyro being "awfully puzzled." The following are those most commonly met with:—Var. 1. Bright yellowish or bluish green, with a number of dorsal and subdorsal spots and lines of a darker shade; the dorsal markings very often forming a series of disjointed lozenge-shaped spots. Var. 2. Uniform yellow, yellowish or bluish green, without any spots or markings whatever. Var. 3. Greenish or pinkish white, with a chain of deep red, trident-shaped dorsal spots, connected together by the central prong, and becoming confluent towards the head. Belly whitish, with a short red line or spot in the centre of several of the segments. The larva feeds in August and September, upon the flowers of *Senecio Jacobæa* and *S. crucifolius*, *Solidago Virgaurea*, *Achillea Millefolium*, *Eupatorium cannabinum*, *Pimpinella magna* and *P. Saxifraga*, *Silene pratensis*, *Campanula glomerata* and *Scabiosa columbaria*. Vars. 1 and 2 I have almost invariably found upon the three first-named plants, whilst those on the other flowers were var. 3. This latter variety strongly resembles the pink form of *E. nanata*. The pupa is enclosed in an earthen cocoon. There are two varieties, the commoner one scarcely, if at all, distinguishable from that of *E. absinthiata*; the other a uniform pale red. The perfect insect appears more or less from May to August.—*Id.*

PS.—In my description of the larva of *E. absinthiata* (Zool. 6734), at line 10 there should be a full stop at the word "yellow;" and at line 13 "*S. crucifolium*" should be "*S. crucifolius*."—*Id.*

Larva of Notodonta dictæoides.—Mr. Smithson, Mr. Button, and some others of our hard-working entomologists have beaten the larvæ of *Notodonta dictæoides* off birch trees at Wickham. They feed on the elegant pendant branches of trees that have been allowed to grow up, and are never found on those which have been cut down and have thrown up suckers.—*Edward Newman.*

Capture of Catocala Frazini at Scarborough.—On the 17th of this month (September) I had the good fortune to take a very fine specimen of *Catocala Frazini* at rest on a wall in this town.—*Thos. Wilkinson* ; 6, *Cliff Bridge Terrace, Scarborough, September 29, 1859.*

Proceedings of Societies.

ENTOMOLOGICAL SOCIETY.

September 5, 1859.—Dr. GRAY, President, in the chair.

Donations.

The following donations were announced, and thanks ordered to be presented to the donors:—‘*Proceedings of the Royal Society*,’ Vol. x. No. 36; presented by the Society. ‘*Farm Insects*,’ Parts 3 and 4; by the Author, John Curtis, Esq., F.L.S. ‘*The Zoologist*’ for September; by the Editor. ‘*Smithsonian Contributions to Knowledge*,’ Vol. x. ‘*Annual Report of the Board of Regents of the Smithsonian Institution for the year 1857*; ‘*Reply to the Statement of the Trustees of the Dudley Observatory*,’ by Benj. Apthorp Gould, jun.; ‘*Defence of Dr. Gould, by the Scientific Council of the Dudley Observatory*,’ by the Smithsonian Institution. ‘*The Athenæum*’ for July; by the Editor. ‘*The Journal of the Society of Arts*’ for August; by the Society. ‘*The Literary Gazette*’ for August; by the Editor.

Election of a Subscriber.

R. W. Fereday, Esq., of 2, Leighton Villas, Talbot Road, Kentish Town, was balloted for and elected a Subscriber to the Society.

Exhibitions.

The President exhibited, on behalf of their captor, Dr. Power, the following British Coleoptera, with localities and dates of capture:—

Anchomenus versutus, Gyll. Wimbledon, July 30, 1858.

Polystichus fasciolatus. Sheerness, June and August, 1859.

Trechus longicornis. Banks of Ribble, July, 1859.

Acrognathus mandibularis, Gyll. Darenth, June 19, 1859.

Odocantha melanura. Merton, August, 1859.

Deleaster dichrous. Colney Hatch. June 25, 1859.

Anchomenus pelidnus (var. *Thoreyi* ?). Merton, July, 1859.

Ancylophorus glabricollis, Eric. Merton, July 26, 1859.

Helophorus intermedius. Merton, July, 1859.

The two last-mentioned species had not previously been recorded as natives of Britain.

Mr. Smith remarked, with reference to *Polystichus fasciolatus*, that Mr. Hewitson took this species in some plenty, on the shore to the west of Southwold, near Lowestoft; they were found under stones above the shingle on the sloping shore, in front of the salt marsh beyond which is the mud wall leading to the ferry over to Walbenwick. The salt marsh abounds in species of Coleoptera. The date of capture was the month of April.

Mr. Stevens exhibited a portion of a collection of Coleoptera and Lepidoptera made by Mr. Trimen in South Africa, about 300 miles east of the Cape of Good Hope; and a fine series sent from Sierra Leone by Mr. Foxcroft.

Mr. Stevens also exhibited a living specimen of *Locusta migratoria*, which he had captured near Brighton, in which neighbourhood, he stated, the species was unusually common this autumn.

Dr. Knaggs observed that he had seen a specimen lately taken at Camden Town.

Mr. M'Lachlan exhibited a specimen of *Hadena peregrina*, which he had lately captured at Freshwater, Isle of Wight, being the second recorded British example; also *Phibalapteryx gemmaria* and *Eupœcilia flaviciliata*, from the same locality.

Dr. Allchin exhibited a specimen of *Synia muscuelosa*, taken at Brighton, and two fine examples of *Nola centonialis*, taken in Kent.

Mr. Janson exhibited a fine new species of *Adelops*, found by M. Jacquelin Duval in the Pyrenees, and for which he proposed the specific name of *Bonvouloirii*.

Dr. Knaggs exhibited the following *Lepidoptera*, with notes of capture:—

Clostera Anachoreta. He had lately been fortunate enough to capture eleven larvæ of this insect in one of the home counties, and succeeded in rearing ten moths; a friend who subsequently took a pupa presented it to him, and this also reached the imago state. The only reputed British examples of this species hitherto known are contained in the British Museum Collection, and were obtained by the late Dr. Leach from the collection of Mr. Spratt: so many years having elapsed without the occurrence of other specimens, its claim to rank as a British insect has been almost universally disputed, and the present capture may therefore be looked upon as a re-discovery.

Aplecta Occulta. A specimen taken in his own field at Camden Town in August last. Few examples of this fine insect have occurred in the southern districts of Britain. He had captured, during the past three years, upwards of ninety species of *Noctuæ* in this piece of ground.

Emmelesia Taniata. Taken by B. Piffard, Esq., at Tintern, at the end of June; the locality is interesting, the insect having previously only occurred in Ireland and in the Lake District.

Eupithecia tenuiata. Also taken by B. Piffard, Esq., at the same time and place.

Nonagra concolor. Taken at Folkestone, end of June. Some of the Members present were of opinion that it was not that species, the examples being paler and apparently a more slender insect than those found in the fen district.

Simaethis vibrana. Taken at Folkestone, end of June. Previous captures of this insect certainly do not exceed six examples.

Diplodoma marginipunctella. Bred by Dr. Knaggs from larvæ, taken chiefly near Epping, at the beginning of June. Dr. Knaggs observed that the case-bearing larvæ of this species were by some entomologists considered to be entirely carnivorous; he had, however, found them to feed freely on bramble and hazel.

Melanippe fluctuata. A singular variety, destitute of the larger costal blotch, the central spot being thereby brought out conspicuously.

Dr. Knaggs also exhibited the living larvæ of *Acidalia strigillata*, he believed never before seen in this country; they were reared by him from the egg, and were a few weeks old: he observed that he had supplied them with various plants as food, but all were rejected by them till (by the advice of Mr. Henry Doubleday) he had given them the common knot-grass (*Polygonum aviculare*), on which they fed freely.

And lastly, Dr. Knaggs exhibited a male of *Pamphila Linea* and a female of *Anthrocera filipendulæ*, which he had taken *in copula*, and which was confirmed by Mr. J. B. Lynch, who also saw them in that state; he kept the *Anthrocera* alive for some time, in the hopes of getting ova, but was doomed to disappointment.

Strophosomus limbatus feeding on *Rhododendrons*.

The Secretary read the following letter, addressed to him by Mr. Charles Noble, of Bagshot Nursery, dated August 19th, 1859:—

"Sir,—I trust you will pardon the liberty I take in sending the enclosed insects to you; they are doing me an immense amount of injury by eating the leaves of young *Rhododendrons*, and it appears to me they will destroy some thousands if a remedy cannot be found to destroy them. Could you favour me with its name, its mode of life, how and where its eggs were laid, and if any known remedy can be adopted to destroy it?"

Mr. Janson observed that the insects sent were *Strophosomus limbatus*, a *Curculio* common on heath, and therefore doubtless abundant in the immediate neighbourhood of Mr. Noble's grounds; and the President remarked that it was scarcely to be wondered at that the insect should attack *Rhododendrons*, which belong to the same natural order of plants as heaths.

Bees drinking from a Chalybeate Spring.

Mr. Tegetmeier stated that when recently at Blechynden, near Southampton, he was informed that the bees in the neighbourhood resorted almost exclusively to one particular spring, or deep open cutting dug for draining: on examination, he found that the water was strongly impregnated with iron, evidently derived from the decomposition of iron pyrites. He noticed that the bees congregated in the greatest numbers at the head of the cutting, drinking the water as it issued from the ground, before it had deposited any of the iron as peroxide. There were numerous other open cuttings in the field, the water in which was not impregnated with iron, and they were not frequented by the bees. The fact of bees preferring a chalybeate spring had not, he believed, been previously noticed.

Mr. Pascoe stated that the collection of insects of all orders belonging to the United Service Museum was to be disposed of by private contract.

October 3, 1859.—Dr. GRAY, President, in the chair.

Donations.

The following donations were announced, and thanks ordered to be presented to the donors:—‘The Journal of the Royal Agricultural Society of England,’ Vol. xx. Part 1; presented by the Society. ‘Tijdschrift voor Entomologie uitgegeven door de Nederlandsche Entomologische Vereeniging,’ Vol. iii. Parts 3, 4 and 5; by the Entomological Society of the Netherlands. ‘Journal of the Proceedings of the Linnean Society,’ Vol. iv. No. 14; by the Society. ‘Farm Insects,’ Part 5; by the author, John Curtis, Esq., F.L.S. ‘Exotic Butterflies,’ Part 32; by W. W. Saunders, Esq., F.R.S. ‘The Zoologist’ for October; by the Editor. ‘The Journal of the Society of Arts’ for September; by the Editor. ‘The Literary Gazette’ for September; by the Editor. ‘The Athenæum’ for August; by the Editor. ‘A Manual of British Butterflies and Moths,’ Vol. ii.; ‘The Entomologist’s Weekly Intelligencer,’ No. 157; ‘The Natural History of the Tineina,’ Vol. iv.; by H. T. Stainton, Esq. ‘Bijdragen tot de Dierkunde uitgegeven door het Koninklijk Genootschap Natura Artis Magistra te Amsterdam.’ Part 7; by La Commission du Jardin Zoologique d’Amsterdam. Four specimens of *Pterophorus Loewii*; by the Rev. O. P. Cambridge.

Election of a Member.

The Baron Maximilian de Chaudoir was balloted for, and elected a Member of the Society.

Exhibitions.

Mr. Stevens exhibited a specimen of *Pieris Daplidice*, taken by Mr. Shickle on the Kentish coast.

Mr. Bond exhibited specimens of *Laphygma exigua* and *Heliothis armigera*, taken at Freshwater; also single examples of *Noctua flammatra* and *Leucania extranea*, from the same locality; these two last-mentioned species being additions to the list of British *Noctum*, and the latter especially remarkable as not being hitherto recorded as an European insect, although found in various parts of America, Asia and Australia.

Mr. Bond also exhibited, on behalf of Mr. Mathews, a specimen of *Aspilates sacraria*, taken by him in Devonshire; and on the part of Mr. Lynch, a fine specimen of *Acidalia rubricaria*, taken in Kent.

Mr. Smith exhibited a specimen of *Aspilates sacraria*, taken on Banstead Downs, on the 22nd of August last; and a number of the original drawings of the illustrations of Roessel's '*Insecten Belustigung*,' lent to him by Dr. Gunther.

Dr. Allechin exhibited a specimen of *Lycæna Bœtica*, taken near Brighton on the 7th of August last, and the first known instance of the occurrence of the species in Britain; and an example of *Leucania extranea* taken near Lewes on the 9th of September. He also exhibited specimens of *Coremia ferrugata* and the variety called *unidentata* by Haworth, taken in *copulâ*.

Dr. Allechin also exhibited beautiful drawings of *Lycæna bœtica* and *Leucania extranea*, made by Mr. W. S. Coleman.

Mr. Stainton observed with reference to the occurrence of *L. bœtica* in England, that the species is usually rare in the north of Paris, but this season it had been very abundant in the north of France, and also in the Channel Islands; it was not, therefore, to be wondered at that it should have reached our southern coast.

Mr. Stainton exhibited a specimen of *Pterophorus brachydactylus*, taken in Cumberland by Mr. Hodgkinson; this being the second British specimen of the insect, of which a single specimen had occurred in Norfolk more than twelve years ago.

Mr. Stainton exhibited a drawing of a new species of *Lithocolletis* (*L. Helianthemii*) with a cocoon of the insect; the habit of this species was altogether abnormal, as the larva, which mines the under side of the leaves of the *Helianthemum vulgare*, quits the mine to undergo the change to the pupa state, and forms a flattish, white cocoon, very similar to those formed by some larvæ of the genus *Gracilaria*. The perfect insect has considerable resemblance to *L. sylvella*, and, despite the habit of the larva, appears to be a veritable *Lithocolletis*. Mr. S. has received the drawing and cocoons from Herr Hofmann, of Ratisbon.

Mr. F. Moore exhibited the larvæ of the Eria moth, of Bengal (*S. Ricini*, Boisd.), and of the hybrid between it and the Eria of China (*S. Cynthia*, Drury), reared from eggs received from M. Guérin-Ménéville. The larvæ have been fed on the castor-oil plant (*Ricinus Palma-Christi*).

Mr. Gorham exhibited some Coleoptera taken near Westerham, including *Amara ruficincta*, *Tetratoma Desmarestii* and *Philonthus thermarum*; also *Stenolophus Skrimshiranus*, from Hammersmith.

Mr. Trimen exhibited a further portion of the entomological collection made by him in South Africa, and part of which had been exhibited at the September meeting of the Society; amongst the Lepidoptera were some splendid *Hepialidæ* and *Zygænidæ*.

Dr. Knaggs exhibited some specimens of a species of *Ino*, which he considered might be distinct from the known British species, *Ino Staticos* and *I. Globularis*: he also exhibited a singular mass of cocoons found on a twig of the Virginian creeper, at Kentish Town, which Mr. Westwood pronounced to be the cocoons of *Microgaster alvearius*.

Mr. Janson exhibited a specimen of *Emus hirtus*, taken at Southend by Mr. Haward; and an example of the true *Anohomenus elongatus*, *Dejean*, taken by Mr. Brewer at Southwold, Suffolk,—the specimen, which is unique as British, now belongs to the collection of Mr. Jeakes.

Mr. Janson read some extracts from Henry Mann, Esq., of Mercarra in Coorg, Madras Presidency, respecting a species of *Coccus*, which has done much injury to the coffee plantations in that part of India.

Mr. Mitford stated that he had recently captured a single larva of *Deilephila Euphorbiæ* in the Isle of Wight.

The Larvæ of the Gnat.

Mr. Westwood read a letter from Mr. Swan, which stated that whilst trying some experiments in bleaching materials for paper, he had occasion to use some rain-water swarming with the larvæ of the gnat. Wanting to make some strong alkaline ley, he put 2 oz. of soda (used for washing) with 2 oz. of quick-lime into a pint of the water, whereupon the larvæ darted about as usual, and did not appear in the least inconvenienced after the soda was dissolved and the lime slacked, nor did they succumb till the water was placed over a fire to be boiled. Knowing that chloride of lime was very destructive in killing fish (from seeing the effects of the spent liquor thrown by the paper-makers into the river, after having used it for bleaching their pulp), he tried the effect of it upon these larvæ in two quarts of water, in which over 1 lb. of bleaching salts (or chloride of lime) was thoroughly dissolved, and which was so strong that after stirring it up with the hand he was obliged to anoint it with some oil to take off the injurious effect produced upon the skin; these larvæ, however, seemed quite at home and comfortable, if anything a little more lively, even after having been in the liquor an hour and a half.

Observations on Sitaris humeralis.

Mr. Smith read some remarks on *Sitaris humeralis* by Mr. Stone, in which the writer, after stating that his attention had been directed to these insects on some old walls in the neighbourhood of Brighthampton, by a paper by Mr. J. W. Douglas, published in No. 149 of the 'Entomologist's Weekly Intelligencer,' observes:—

"On the 17th of August the insect made its first appearance this season, and in the course of that day I secured seven specimens. On the following day I obtained four more, and on the third and fourth days a couple of dead ones. Not a single specimen was to be met with from this period till the 3rd of September, when the insect again appeared, and this time in great profusion. I procured that day upwards of thirty specimens, and they have been coming out daily, in numbers apparently varying somewhat, according to the temperature, from that time to the present (September 27th).

"When the insect first began to appear in the winged state I set about exploring the cells of the bee upon which it was said to be parasitic. In doing this I obtained three or four larvæ just about to become pupæ. The change from one state to the

other reminded me more than anything else of a 'dissolving view.' First, there was a distinct picture in the shape of a white, fat larva; presently an obscurity began to extend itself over the picture, gradually becoming more and more dense, and after a while as gradually clearing away, when an entire change was found to have taken place; and instead of a white, fat larva, there was to be seen an amber-coloured object, in shape much like a coffee-berry, loosely enveloped in a semi-transparent covering. Having removed several of these coverings, and examined them with the aid of a powerful lens, they appear to me to be the skins of bee larvæ, and if so, it is clear the *Sitaris* larva must feed upon the body of the bee larva, living and undergoing its changes inside the latter.

"I obtained a considerable number of pupæ, which were found in groups, each group consisting of from three or four to ten or twelve, and each pupa occupying a cell of the bee upon which the insect is parasitic.

"The perfect insects make their way out of the cells in which they have been bred by gnawing away the mortar or dirt of which they are composed. The females, on emerging, station themselves just outside the cells they have quitted, and there await the coming of the males. They are not in general long without a partner, for by some curious arrangement they mostly contrive to emerge in pairs. Copulation takes place without loss of time, and in a brief space (generally not longer than three or four minutes) impregnation is effected, and the female, without removing from the situation she has been occupying, proceeds to deposit her eggs. They are deposited in immense masses, sometimes in the roof of the cell she has just vacated, or if not there, then in some convenient cranny or crevice immediately adjoining.

"I have observed many instances of females dying, apparently of exhaustion, before they had completed the task of depositing their eggs; and in any case they appear to survive its accomplishment but a very brief period. The males also appear to be almost as short-lived as the females.

"Nature would seem to have given these creatures wings merely by way of ornament, for I have never seen either sex make the least attempt to use them, aerial exercise being a thing they seem never to dream of taking; indeed, they appear to be of the most sluggish habits, rarely, if ever, quitting the wall in which their whole life has been passed, but to it they cling with amazing tenacity, and it requires some degree of force to compel them to loose their hold."

Mr. Smith observed that having examined the "semi-transparent coverings" alluded to by Mr. Stone, which that gentleman had forwarded to him, he was of opinion that they were not the skins of bee larvæ, as supposed by Mr. Stone, but the cast skins of the larvæ of *Sitaris*.

Mr. Lubbock said that M. Fabre had recently published, in the '*Annales des Sciences Naturelles*,' an interesting account of the habits and metamorphoses of *Sitaris*. After much trouble he convinced himself that the active little hexapod larva, after fixing itself to the body of the bee, patiently awaits the deposition of an egg, at which moment it quits the bee and attaches itself to the fresh-laid egg. After devouring the yolk it swims about for awhile in the empty egg-shell, and then, after undergoing the first metamorphosis, commences to eat up the honey. M. Fabre is so excellent an observer, and his paper is evidently written with so much care, that this statement is probably correct, in which case Mr. Stone must be wrong in supposing that the *Sitaris* larva feeds on the body of the bee larva. Mr. Stone will be doing good service to Entomology if he is able, in a future season, to confirm the interesting observations made by M. Fabre.

Mr. Westwood stated that he had himself made nearly the same observations as Mr. Stone, on the habits of the perfect Sitaris, many years ago, in a village, in Oxfordshire, when he had found it usually abundant, and had succeeded in rearing the larvæ from the eggs laid by the females. He had since been favoured, by Madame Audouin, with permission to make copies of the extensive series of observations made on the habits and transformations of the same species, by the late lamented Prof. Audouin, which he promised to lay before the Society at a future opportunity.

Part 3 of the current volume of the Society's 'Transactions' was on the table.—
E. S.

Note on the Paper on Bovine Animals.—In reading a very interesting paper on the "Species of Bovine Animals" in the 'Zoologist,' I found a statement (Zool. 6553) to the effect that buffaloes are the only domestic cattle over extensive regions of the South of China, and are used for the purpose of tilling the ground. I have no doubt it would afford some information to your readers to state that in Amoy and its neighbourhood the small yellow cow is chiefly used for ploughing the wet paddy fields. The buffalo is mostly kept for its milk, which article the natives in the neighbouring country of Chang-chow consume largely, though the Amoyites will not touch it. It is the only milk the Europeans drink here, and is much richer and more unwholesome than cow's milk. Buffaloes are slaughtered as well as cows for the market, but the flesh of the former somewhat resembles horse-flesh, and is far inferior to that of the latter, which in winter often puts us in mind of good old English roast beef. The Chinese here seem to have little partiality for beef, and it is therefore the cheapest meat procurable. The yellow cow is rather a timid animal, and always turns tail when a stranger approaches. Not so the buffalo: this brute faces you and snuffs at you, and has often been known to chase a European for a considerable distance. The only two-legged animals it seems to humour are the black magnalis (*Acridotheres cristatellus*, Linn.) and the russet egrets (*Bupluris russator*, Temm.) I have often seen several of these perched on the backs of buffaloes who were wallowing in the water or quietly grazing. Sometimes, in catching a fly off the sides of the buffalo, the egret would give the brute a sharp "dig," but the buffalo would merely turn his head round, and then continue grazing as before.—Robert Swinhoe; British Consulate, Amoy, August 1, 1859.

Whales in the Indian Seas.—At the meeting of the Asiatic Society, held on the 7th of September, the curator read the introductory portion of a paper "On the Great Rorqual of the Indian Ocean, with Notices of other Species of Cetacea." He remarked that the gigantic whales (*Balaenidae*) of the inter-tropical regions of the ocean had been little studied; that the existence of them was even ignored by Dr. J. E. Gray, of the British Museum, in his elaborate Synopsis of the known species of Cetacea, published in the Zoology of the celebrated antarctic voyage of H.M.S. Erebus and Terror (1846); but that not only were such whales, attaining enormous dimensions, familiarly known to navigators, but there happened to be a satisfactory notice of them at the northern extremity of the Arabian Sea more than two thousand years ago, in the narrative of the famous voyage of Nearchus, who commanded Alexander's fleet that sailed from

the Indus to the Persian Gulf, B.C. 327. Not only did the ancient navigator encounter a troop of these huge animals, but it would appear that they were at that time not unfrequently stranded on the coast of Mekran, where the Ichthyophagi of that treeless country used their bones for building purposes. From that distant period until quite recently Mr. Blyth had been unable to discover a single record of the occurrence of great whales in the Indian Seas north of the equator; but they were, nevertheless, so far from being rare, indeed the sight of a shoal of these huge animals was so familiar a spectacle to mariners, that to this very circumstance—combined with the fact of their being of no commercial value—might be attributed the extraordinary absence of such memorial. Had the appearance of a shoal (or “school,” in nautical language) of enormous whales in the Arabian Sea or Bay of Bengal been a phenomenon of unusual occurrence, it would unquestionably have been recorded from time to time. From reliable information obtained, Mr. Blyth was enabled to state, with confidence, that these huge animals are still occasionally observed within the Persian Gulf,—rarely, however, in shoals, but generally one or two stragglers at a time; that just now a particular individual “cruising” about the neighbourhood of Muskat, has been familiarly known to persons visiting that port for some years past. It might therefore be concluded that to this time a shoal of them may now and then be seen off the coast of Mekran, at the head of the Arabian Sea a little further to the east, where Nearchus and his fleet encountered them; and that a carcass may still occasionally be stranded on the same rarely-visited coast, and the bones even yet be applied to like purposes by the scanty fish-eating population of that inhospitable region. An interesting account was cited, from the ‘Friend of India’ of the time, of a whale (described to have been ninety feet in length and forty-two feet in diameter) which was stranded alive on the west side of Maskal Island, on the Chittagong coast (in about lat. 21° north), on the 15th of August, 1842. Another, stated to have been eighty-four feet long, was thrown up dead upon Juggoo or Amherst Islet, south of Ramri and east of Cheduba, on the Arakan coast (about 2° further south), during the rainy season of 1851. A few of the bones of this individual were collected in the following year by the present Major T. P. Sparkes, then Assistant-Commissioner of Ramri, and were presented by him for the Asiatic Society’s Museum, where they are now exhibited: they consist of the two rami of the lower jaw, which are within less than two inches of twenty-one feet in length, a rib, the left radius, and five vertebræ. The proportional length of the radius bone sufficed to show that the animal was a rorqual, “Finner” or “Finback” of seamen (*Balænoptera* of zoologists), as distinguished from a “Hunchback” (*Megaptera*), and still more from a flueless or “right whale” (*Balæna*); but in the remarkable slenderness of the lower jaw it differed much from all previously known rorquals, for which reason the name *Balænoptera indiea* was proposed to distinguish the particular species. Further reasons and arguments were adduced to prove that the great whale of the Indian Seas was a true rorqual, as distinguished from other generic forms of *Balænidæ*; and Mr. Blyth was of opinion that no other species of large whale existed in the Indian Ocean north of the equator. From the concurrent testimony of many trustworthy observers, he remarked that it possessed a high and conspicuous dorsal fin, which again is a marked characteristic from which the name “*Balænoptera*” is derived. He stated that it was not unfrequently observed in and about the Bay of Bengal, often in numerous herds; yet the only additional notice he had met with of these huge creatures consists of a statement in the Rev. J. Mason’s work on the ‘Natural History of the Tenasserim Provinces,’ that, “The whale is found south of Mergui, and Capt. Lloyd named a bay a few miles south of the parallel of 12° north,

'Whale Bay,' from the circumstance, he says of its being resorted to by numerous whales, and its being the only part of the coast where I have seen them." A proper description of the fresh animal is a *desideratum*.—*Communicated by the Editor of the 'Indian Field.'*

Occurrence of the Peregrine Falcon (Falco peregrinus) in Derbyshire.—On Saturday last, as one of my sons was shooting rabbits on a moor, about a mile from hence, he saw a large hawk chasing some wood pigeons; after flying off some distance it returned and hovered over a spaniel he had with him, as if inclined to attack it; being within distance he fired, and brought it screaming to the ground, but, not being dead, it fought both him and the dog most furiously. It proved to be a most rare bird in these parts, a female *Falco peregrinus*, a fine specimen and in excellent preservation. I am not aware that it has been ever before shot in this county.—*Henry R. Crewe; Breadsall Rectory, near Derby; October 25, 1859.*

A Peregrine Falcon (Falco peregrinus) killed by the Telegraph-wires.—A fine young female peregrine, a bird of the year, was picked up one day last week on the Yarmouth line, near Needham, having one wing broken at the shoulder-joint, and a deep cut at the base of the upper mandible, from coming in contact with the wires of the telegraph. The poor bird, when found, was still alive, but did not long survive its injuries; whether these were received from coming in contact with the wires in the dark, on its nocturnal migration, as occurs frequently with the snipe, plover and woodcock at this season of the year, or from its too impetuous chase of some intended victim during the day, must remain a matter of speculation for naturalists.—*H. Stevenson; Norwich, October 22, 1859.*

Disappearance of Swallows and Martins.—These birds were late in leaving this season: about the 16th of October nearly a hundred martins were round the house I live in, and on the 17th none were to be seen. On Monday, October 24th, at 7 A. M., about fifty martins returned and surrounded the house, and kept flying at a nest in the corner of one of the windows; they all disappeared in about four hours: the morning of their return was very frosty, with the thermometer at 23°. Is it usual for them to stay so late? Mr. Whittlecraft, in his 'Weather Almanac' for 1860, repeats his observation of the late departure of these birds as the sign of mild weather during winter, and also observes that the house swallows during the last three hot summers have forsaken the close chimneys and built more in open places.—*H. W. Newman; Hill Side, Cheltenham, November 9, 1859.*

Variety of the Common Nightjar (Caprimulgus europæus).—On the 29th of September another beautifully pied variety of the nightjar was killed near Holt, the same locality in which the specimens which I recorded in the 'Zoologist' for 1856 and 1858 (Zool. 5278, 6242) were also obtained. In its singular variation of plumage this bird, a female, strongly resembled the previous examples, having the wings, throat and upper part of the breast, with the vent and under tail-coverts, pure white. This singular freak of nature in a species rarely subject to any deviation from its normal colouring is the more remarkable from the birds having been met with in three successive seasons in the same neighbourhood, and, although strictly migratory in their habits, being undoubtedly the offspring of the pair obtained in 1856, thus assuming the nature of a permanent variety.—*H. Stevenson; Norwich, October 22, 1859.*

Occurrence of the Rednecked Phalarope (Phalaropus hyperboreus), Redthroated Diver (Colymbus septentrionalis) and Merlin (Falco esoloni) in Norfolk and Suffolk.—A specimen of the rednecked phalarope, in winter plumage, was shot at Hickling on the 22nd of September, and on the 10th of October a very perfect adult male merlin was killed at Malton, in this county: these birds, in their adult stage, have become, of late years, very scarce. A male redthroated diver, assuming the winter plumage, but still retaining a broad patch of red on the throat, was killed off Lowestoft, about the 14th of this month.—*Id.*

Occurrence of the Snow Bunting (Emberiza nivalis) in the Isle of Wight.—On the 28th of October I saw several snow buntings on our downs: they were very active, running on the ground much like the meadow pipit; they were exceedingly tame, and I approached within twenty yards of them: when disturbed they flew but a very short distance, always pitching on the ground again, and though there were several low bushes and fences close by they did not attempt to alight upon them. I returned home for my gun, but only got one specimen. Another was shot by a visitor staying here, which I preserved. I have searched several times since for them, but they have quite disappeared.—*H. Rogers; Freshwater, Isle of Wight.*

Occurrence of Pallas's Sand Grouse (Syrrhaptes paradoxus) in Jutland.—It will, I am sure, interest the readers of the 'Zoologist' to learn that a third specimen of that rare and curious bird, Pallas's sand grouse (*Syrrhaptes paradoxus*), was obtained during the past summer in Western Europe. By the kind permission of Professor Reinhardt I am enabled to inform British ornithologists that an adult male of this species was shot, on the 23rd of July last, near Hobro, in Jutland (Jylland), and it is stated that another example was observed, but not killed, about the same time, some few miles from the same locality. I had the opportunity, through the Professor's favour, of examining the specimen obtained, which is now in the Museum of the University of Copenhagen, and is a remarkably fine one. I am glad to say that the sternum of this example was carefully preserved by the bird-stuffer, as was done in the case of a specimen killed in Wales (Zool. 6728), though, unfortunately, not in that of the Norfolk bird (Zool. 6764).—*Alfred Newton; November 10, 1859.*

Occurrence of the Little Bustard (Otis tetrax) near Oxford.—I half expected that some one would have recorded in the 'Zoologist' the interesting occurrence of the little bustard in the neighbourhood of Oxford, at the beginning of this last October; but, as I have seen no notice of the fact in the last number of this periodical, I venture to give information respecting this by no means common visitant. The bird in question was shot (by a gentleman of St. John's College) not far from Oxford, and is a very fine specimen of a young male, which has very nearly completed its autumn moult. I saw it at the bird-stuffer's just after it had been mounted.—*Murray A. Mathews; Merton College, Oxford, November 11, 1859.*

Rare Birds driven Inland by the recent Great Storms.—After the great storms which have recently been prevalent all over the country, one expected to hear of some rare birds having been driven inland by stress of weather. I was therefore not surprised to see a specimen of Leach's petrel, which had been killed in Blenheim Park. I have also heard from home that many petrels, both Leach's species and the common stormy petrel, have been picked up exhausted in the neighbourhood of Barnstaple; and also that a very fine adult specimen of the great northern diver (still in summer plumage) had been brought to the bird-stuffer by a man who found it dead by the river-side.—*Id.*

Birds of Canada observed near Kingston during the latter part of the Summer and in the Autumn of 1857. By Captain HENRY HADFIELD.

BEFORE proceeding to enumerate the different species, I would remark that the latter part of the summer, for there is neither autumn nor spring in Canada, is a bad time for carrying on observations on birds, or for procuring specimens; for, the trees being then clothed in a dense and all but impenetrable foliage, it is difficult to descry them or watch their movements; moreover, many of the specimens, when procured, are of little value, the plumage being almost invariably imperfect, and not unfrequently in a very ragged state; for instance, the meadow lark (*Alauda magna*), found in the long grass, were scarcely able to rise above it, and then their flight was not sustained. On inspection many of the quills were wanting, and the rest of various lengths, all imperfect. The tail-feathers were in the same plight. The ornithologist of America has in one respect a great advantage, for the birds of that Continent are, I think, much easier of approach than are those of Europe, apparently still unconscious of the destructive powers and propensities of mankind.

Robin (*Turdus migratorius*). August. This most common but beautiful bird, in size intermediate between the blackbird and mavis, is so widely spread over the face of the country that in whatever direction a person goes he is sure of falling in with it; and so tame and fearless are they that even when disturbed they do not conceal themselves among the foliage, but with a low, direct flight often alight within gun-shot. As far as I have been able to observe, this bird in its habits and manners bears a stronger resemblance to the fieldfare and redwing than to either the blackbird or the thrush, being commonly found on the ground. In plumage it also somewhat resembles the former. Though it has a red breast, the familiar name of robin was doubtless bestowed on it on account of its great tameness and sociability. They are not at present in song, but the notes of a caged robin I thought somewhat like that of the blackbird, but far less powerful. As an article of food they are apparently prized by the Indians, for a sick squaw who I found camped in the woods was very grateful for a robin or two that I gave her. The northern migration of this species must be very extensive. I found great numbers towards the end of July, near St. John's, Newfoundland.

Redheaded Woodpecker (*Picus erythrocephalus*). August. Shot

a young male and female of this common species (the first birds I have procured, with the exception of the robin). The male is $9\frac{1}{4}$ inches in length, and 17 inches in extent of wings. Bill along the ridge, 1 inch. Tarsus, 1 inch; thigh, $1\frac{1}{2}$. Inner hind-toe, 4-tenths of an inch; claw, $3\frac{1}{2}$ -tenths: outer toe, 3-fourths of an inch; claw, 4-tenths. Inner fore-toe, 6-tenths; claw, 3-tenths: outer toe, 8-tenths; claw, 4-tenths. Bill bluish black, but of a horn-colour at the base and on the lower mandible. Head black, spotted with red and gray; throat gray, spotted with black; there are two red patches on the sides of the head, a streak of the same colour beneath the eyes, and a small spot over them and at the nape. Back black; feathers tipped with gray; there is also a line of the same both over and under the eye, extending towards the nape. Nostrils oval, partly concealed by black bristles. Upper tail-coverts white and rather elongated. The tail is $3\frac{1}{4}$ inches long, rounded; it has twelve feathers; the lateral ones are only an inch in length, weak and incurved, white on the outer webs, black on the inner, except at the extremities, which are white. Four centre feathers black and doubly pointed; the second external feather white on the inner web for one-third its length, and on the outer margin throughout, point yellowish white; the third is white on the inner web at the base, yellowish brown at the tip; the fourth has a small white spot on the inner web at the base, and is light brown at the extremity, which is forked: the whole of the feathers are arched, and the centre ones very stiff. Wing has nineteen quills: first, black; from second to seventh inclusive, tipped with gray, and partially margined with the same on the outer webs; eighth, slightly tipped with white, and there is a small spot of the same on the margin of the inner web, about half-way up; ninth, white at the point, broadly margined with the same on the inner web; tenth, black at the base and on the outer web, barred with black on the inner towards the extremity; eleventh, black at the base, with patches of the same on the outer web and at the extremity, and there is a narrow bar of black on the inner; from twelfth to seventeenth inclusive, the quills are black at the base, and there are spots of the black on the outer webs, with a bar of black across both webs; eighteenth, black on the outer web at the base, with three spots of the same higher up the web, two on the margin and one near the shaft, besides being barred with black on the inner; nineteenth, almost similar: the third quill is longest, second nearly equal, fourth little shorter, first 6-tenths of an inch shorter than the second. Primary coverts black, tipped and margined with gray. Secondary coverts black,

edged with gray. Legs and toes of a dull lead-colour, claws black. *Female* equals the male in size, but the colours are less bright, and there is no appearance of red about the head, and but one bar of black on the wing; and the black spots towards the base of the quills are small and irregular, and on some of the feathers there are none whatever. There is also more gray about the back, and on the margins of the primaries and lateral tail-feathers. The old birds took shelter in the hollow trunk of a tree. The nest was in a decayed branch, at no great height, the hole comparatively small and perfectly circular.

Song Sparrow (*Fringilla melodia*). August 16th. Was shown the nest of a little bird, which proved to be that of this species; it was placed in the forked branch of a willow, at three feet from the ground; it contained three spotted eggs, greatly resembling those of the house sparrow, but not so elongated; the nest (subsequently examined) is roughly and loosely put together; externally it is of coarse grass, with a considerable admixture of shavings arranged in alternate layers; internally it is composed of finer grasses, with a thin and partial lining of horse-hair at the bottom. Though the concavity is perfectly even and circular, externally the nest is somewhat elongated or pear-shaped, in consequence of the straws being for the most part so arranged that, after passing round the nest, all the ends are brought together both from the sides and bottom, forming an acute angle, the whole having the appearance of a racket. Internal diameter $2\frac{1}{2}$ inches, and it measures about $4\frac{1}{2}$ inches externally not including the projecting angle; it is $1\frac{1}{2}$ inch in depth internally, and about $3\frac{1}{2}$ inches externally. On the 31st examined one of the young ones, which I found had recently left the nest, though barely twelve days hatched; it was running swiftly about, but could not fly. Probably in consequence of being disturbed, this bird may, with the rest, have left the nest prematurely; it was, however, strong and active, so that I had some difficulty in capturing, and still more in retaining it in my hand, for unless tightly pressed it was sure to escape, and run mouse-like through the long grass, and its screeching soon brought both parents to the rescue. The male approached within a few yards of me, running and fluttering about with expanded wings and tail, emitting the while a sharp and angry note. The mouth of the nestling was of a purplish hue, as if stained by berries. This is a most common species.

American Night Hawk (*Caprimulgus americanus*). August 26th. Procured a handsome male of this common species. (For description see Zool. 5798).

Humming or Bird (*Trochilus colubris*). August 28th. Observed one hovering over the flower of a scarlet-runner. They are said to be common wherever flower-gardens abound, but I have seen but two or three of these solitary wanderers.

Goldfinch Yellow Bird (*Fringilla tristis*). August. This goldfinch in miniature is an elegant little bird, and, like its European relative, might be named the thistle finch, as the seeds of that plant form its chief food. It is seen flitting from thistle to thistle, and clinging to the capsules. The summer plumage of the male—black and yellow—is very brilliant; but after the autumnal moult it assumes its dusky green and olive hues; it is then not unlike the siskin, except in length of bill. It is a very common, tame and familiar species, and has a pleasing twittering song emitted on the wing, reminding one of our native songster. Length 5 inches. Extent of wings 9 inches. Forehead black. Nape and back greenish yellow. Neck, breast and belly bright yellow. Under tail-coverts white. Under wing-coverts gray, tinged with yellow.

Cat Bird (*Turdus lividus*). August. Saw two or three of these birds, which, though smaller, are very like the common blackbird (of Europe) when seen at a distance, and, like that bird, it is shy and wary, concealing itself among low trees and bushes, but generally in wet or swampy ground. Its cat-like note I never heard. A female that I shot measures $9\frac{1}{2}$ inches in length; tail, 4 inches. Extent of wings, 12 inches. Upper mandible, $\frac{3}{4}$ of an inch from gape. Bill and head black; back dark ash-gray; throat, sides and whole of the under parts light ash-gray. The tail has twelve black feathers, margined with gray on the outer webs for two-thirds of their length, the centre ones longest, the rest regularly graduating, giving the tail a rounded form. The wing has nineteen quills, of a dark brown on the outer webs and light on the inner: fourth longest, fifth and sixth nearly of equal length; the first is but $1\frac{1}{2}$ inch in length, and two of the quills, about the centre of the wing, are short, new feathers. Upper wing-coverts dark brown in the centre, margined with gray. Under wing-coverts light gray. Under tail-coverts bright chestnut, the centre ones extending to half the length of the tail. Thigh, 1 inch $\frac{6}{10}$ in length. Tarsus, 1 inch $\frac{2}{10}$ in length. Middle toe, $\frac{3}{4}$ of an inch. Inner toe, $\frac{1}{2}$ an inch; outer toe, $\frac{1}{2}$ an inch; back toe, $\frac{4}{10}$ of an inch. The legs, toes and claws are black.

Blueeyed Yellow Warbler (*Sylvia citrinella*). August. This beautiful but common little bird bears so striking a resemblance to the yellow wood wren (of Europe), that it was not until I had shot one and

examined it that I perceived the difference, which is but slight, the American willow wren being somewhat shorter and stouter, with more and brighter yellow on the plumage, besides having on the breast, sides and belly numerous longitudinal reddish brown streaks and spots. Having occasionally had several at a time in my garden I have had opportunities of observing their habits, which are similar to those of the wood wren. They frequent low and swampy grounds where the willow and other aquatic trees abound, among the higher branches of which they may be seen in perpetual motion, flitting among the foliage in quest of flies and other insects, and, like our own species, rarely pitching on the ground, and but for a few seconds at a time.

Wood Pewee Flycatcher (*Muscicapa rapax*). August. A common species. One shot by me measured 6 inches in length and 10 inches in extent of wings; mandible, $\frac{1}{2}$ an inch; tail, $2\frac{1}{2}$ inches, nearly even, and has twelve light hair-brown feathers; the wings are of the same colour, but the first primaries are slightly, the rest broadly, margined with white on the inner webs; under wing-coverts gray; under tail-coverts light brown, margined with white; upper wing-coverts brown, tipped with gray; throat and breast gray; belly white. There is a spot of gray beneath the eye. Mouth very large; the mandible 3-tenths of an inch wide at base. Thigh, $\frac{3}{4}$ ths of an inch in length; tarsus, 6-tenths of an inch; middle toe, $3\frac{1}{2}$ -tenths; claw, $1\frac{1}{2}$ -tenths. Inner toe, 2-tenths; claw, $1\frac{1}{4}$ -tenths. Outer toe, $2\frac{1}{2}$ -tenths; claw, $1\frac{1}{4}$ -tenths. Hind toe, 2-tenths; claw, $1\frac{1}{4}$ -tenths.

Green or Whitebellied Swallow (*Hirundo viridis*). August. This appears to be the most common species, but Wilson states that the brown swallow is more so, frequenting the houses, where they build under the eaves. One that I measured was $5\frac{1}{2}$ inches in length and $12\frac{1}{2}$ inches in extent of wings. Tail somewhat forked, $2\frac{1}{4}$ inches in length, and has twelve feathers. Bill black; head and back glossy green and blue; wings and tail brownish black. Throat white; breast tinged with gray; the rest of the lower parts pure white. Tarsus, $\frac{1}{2}$ an inch in length, bare of feathers.

Barn Swallow (*Hirundo americana*). August. Only less common than the preceding. It greatly resembles the European redfronted swallow. I observed them late in the season. The head and the whole of the back is of a glossy purplish blue. The chin, throat and forehead dark reddish brown. The belly, vent and under wing and tail-coverts light rufous. There is a narrow collar of blue encircling the lower part of the throat. The tail has twelve feathers, and is greatly forked, the exterior feather being 1 inch and 1-tenth longer

than the second. Tarsus, $4\frac{1}{2}$ -tenths of an inch. Wing from flexure $4\frac{1}{2}$ inches.

Spotted Sandpiper (*Tringa macularia*). August. Found a small flock of these birds on the sandy shores of Lake Ontario; secured two. Wilson remarks, "Mr. Pennant is of opinion that this same species is found in Britain; but neither his description nor that of Mr. Bewick will apply correctly to this." As my specimens differ somewhat, both in size and colour, from Wilson's, I shall endeavour to describe them rather more fully than I should otherwise have done. The latter author quotes an amusing anecdote with regard to this species:—"My venerable friend Mr. W. Bartram informs me that he saw one of these birds defend her young for a considerable time from the repeated attacks of a ground squirrel." Though I do not wish to call in question Mr. Bartram's statement, I am inclined to believe that the squirrel was endeavouring to drive away the sandpiper, for it seems very improbable that such a playful, nut-loving creature should so suddenly and unaccountably be transformed into a savage carnivorous animal. My two birds are so unlike, that I was inclined to believe they were distinct species, but possibly the white-bellied one—though the larger of the two—may be a young bird; it measures 8 inches in length. Extent of wings, $18\frac{1}{2}$ inches; from flexure, $4\frac{1}{2}$ inches. Thigh, $1\frac{1}{2}$ inch, bare for half its length. Tarsus, 1 inch. Middle toe, 9-tenths of an inch; claw, $1\frac{1}{2}$ -tenth; hind toe, 2-tenths; claw, $\frac{2}{4}$ -tenth; inner toe, 6-tenths; claw, $1\frac{1}{4}$ -tenth. Foot, webbed between middle and outer toe to first joint. Bill, 1 inch along the ridge. Upper mandible, dark horn-colour, except towards the point, which is black; lower mandible flesh-colour, all but the tip, which is dark brown. Head, and the whole of the upper parts hair-brown, with a reddish tinge; feathers dark on the shafts, tipped with rufous. Upper tail-coverts considerably darker than the back, very elongated, reaching to within half an inch of the extremity of the tail, which is considerably rounded, and has twelve feathers; centre ones longest; first lateral feather white, barred and spotted with black; second, dark brown, spotted with yellow, barred with black, and tipped with white; third, marked the same; fourth, white at the tip, with some black and reddish brown spots; fifth is also dark brown, but the point is rufous, and there are spots of the same, intermixed with black on the margins; sixth, similarly marked. Scapulars reach to within one inch of the extremity of the tail, and are of a glossy hair-brown, spotted and barred on the outer webs with black and pale yellow. Chin, throat and the whole of the under parts, except the breast, which is tinged with brown, pure white; the

under tail-coverts the same. Thigh white. First wing-primary black ; second, slightly marked with white on the inner web ; from third to ninth, inclusive, there is a large spot of white on the inner webs, extending from near the base to within an inch of the points, which are tipped with gray ; the rest of the quills, excepting the four inner ones, which are black, tipped with white, are about half white from the base. Primary coverts black, with white points. Secondary coverts glossy reddish brown, barred with black. There is a white patch over the eye, extending to the nape, and a narrow dark brown line, commencing at the gape, passes through the eye and on to the nape, where it becomes gradually blended with the general plumage. There are on the head numerous minute longitudinal dark spots. The second, or spotted bird, is $7\frac{3}{4}$ inches in length and 13 inches in extent. Bill barely 1 inch. Upper mandible dark ; lower reddish brown. Thigh, $1\frac{1}{2}$ inch. Tarsus, 1 inch. Inner toe, 6-tenths of an inch ; claw, $1\frac{1}{4}$ -tenth of an inch ; outer toe, 7-tenths ; claw, $1\frac{1}{4}$ -tenth ; middle toe, 8-tenths ; claw, $1\frac{1}{2}$ -tenth ; back toe very short. Head small ; from forehead to nape, 3-fourths of an inch. Eye small and black. Throat and breast white, but speckled all over, the feathers being slightly tipped with black ; the spots are very minute on the throat, but increase in size towards the chest. The sides are also spotted with black. Vent and under tail-coverts white ; the two centre ones as long as the tail. Head, neck and back are of a glossy purplish brown. Tail has twelve feathers, lateral ones brown and white, spotted and barred with black ; second dark brown, barred with black, and tipped with white ; third and fourth similarly marked ; fifth and sixth are darker. The first quill is the longest. This is a much darker bird than the former.

H. HADFIELD.

Capture of the new Snake, Coronella austriaca, at Ringwood.—I captured a specimen of the new British snake, *Coronella austriaca*, five or six years ago, in June, near Ringwood, Hants, when I was after *Eulepia cribrum* : I thought at the time I had something new, but, not taking much interest in the reptiles, it was put into spirits and forgotten till I saw Dr. Gray's notice in the 'Zoologist' (Zool. 6730). I have sent the specimen to the British Museum, so that any one may see it. If this species always accompanies the sand lizard (*Lacerta stirpium*), it may possibly be found nearer London, as I have found the sand lizard at Weybridge, Surrey.—*Frederick Bond*.

Larvæ of Acherontia Atropos.—I had brought to me, on the 22nd of October, a very fine larva of *Acherontia Atropos* : it is about six inches in length and as thick as my fore-finger, but it is a most extraordinary variety, being of an olive or brown

colour, with beautiful dark markings down the back, the two anterior segments white (inclining to pink), with a black stripe from the head to the third segment; then begins a series of lozenge-shaped markings, gray and black all the way down, spiracles black. It was found feeding on the common tea-tree (*Lycium barbarum*).—*J. M'Laren; Worley Barracks, Brentwood, October 25, 1859.*

Larva of Sphinx Convolvuli.—I found a larva, which I suppose to be that of *Sphinx Convolvuli*, on the 5th of October, in a stubble-field near this place. It was not feeding at the time, but I gave it *Convolvulus arvensis*; it did not seem to eat much, but went underground and died. The colour was dark chocolate-brown; the horn of exactly the same colour, smooth and slightly curved; the head was striped with yellowish white, and a waved band of the same colour extended the whole length of the body along the side just below the spiracles, which were black, enclosed in a light-coloured ring: on each side were seven oblique lateral stripes, nearly of the ground-colour, but no dorsal stripe.—*Henry Rogers; Freshwater, Isle of Wight, October 21, 1859.*

Larva of Sphinx Convolvuli.—"A larva, which I suppose to be that of *Sphinx Convolvuli*, was lately found near this place: it was about the same size as that of *S. Ligustri*; the colour dark olive-green, with an interrupted lateral white streak; there were also two or more dots on each segment; the horn smooth and curved. It fed sparingly on *Convolvulus arvensis*, but I did not observe that it ate *Calistegia Sepium*, with which I supplied it."—*Mr. W. H. Hayward, of Penzance, in a letter to E. Newman.*

Larva of Sphinx Convolvuli.—I am indebted to Mr. Doubleday for the loan of a specimen of this rare larva: it was found in a potato-field in Hampshire. The colour is almost black, and the caudal horn entirely so: below the spiracles on each side is a distinct, rather broad and somewhat interrupted white stripe; there is no indication of the oblique lateral stripes so common in the true *Sphinges*; the horn is shorter than in *S. Ligustri*, but bent in a similar manner: each segment is distinctly divided into eight rings by the same number of longitudinal furrows: there is no evidence as to its food.—*Edward Newman.*

Larva of Sphinx Convolvuli.—Last autumn, when at Deal, I had three larvae of *Sphinx Convolvuli* brought to me, on the 7th of September, by a boy working in a potato-field, who told me they fed on privet. I of course tried this, but they refused it; I then gave them *Convolvulus arvensis* and *Sepium*, both of which they devoured greedily, and in a few days went down in the sand, with which the box was filled. I was obliged to dig them up when I left Deal, and found two had changed to pupæ; the third had died. The larva considerably resembles that of *S. Ligustri*, but is of course larger and the colour is much duller, not the semi-transparent look which the privet caterpillar has; the side stripes are black, and two of them somewhat broken up into lines of spots; below the black stripes one had pale yellow, about the same breadth as the black; head with a black stripe on each side; the thoracic segments entirely green; legs black; horn orange tipped with black; spiracles black, edged with orange and again surrounded with black. They are not night-feeders, but very lazy, and I never saw them assume the *Sphinx* posture. I went to the place where the boy found them, but the field was all ploughed up and nothing green left: his first statement that they fed on privet turned out to be the result of confounding them with the privet larvæ, which he had previously found.—*J. T. Syme; 12, Gordon Street, W.C., November 7, 1859.*

Description of the Larva of Ecnomus illustraria.—Larva mulberry-brown, head paler; bifid humps on the fifth, sixth, eighth and ninth segments; there are, properly speaking, but two humps, as they are on the segmental divisions; thus the hump on the fifth and sixth segment stands just on the ring between the two segments, one part in the fifth and the other in the sixth; so likewise in the eighth and ninth segments. The pupa is not truly subterranean, but generally found spun up between two leaves.—*G. F. Mathews; Raleigh House, near Barnstaple.*

Sterrhia sacraria at Croydon.—A splendid specimen of *Sterrhia sacraria*, taken at Croydon on the 5th of October, was obligingly brought to me on Thursday evening for exhibition. It was attracted by a gas-lamp, and on the following evening a fine specimen of *Heliothis armigera* came to the same lamp. Several other specimens of *S. sacraria* have occurred in different parts of the South of England during the past month.—*Edward Newman.*

Description of the Larva of Fidonia pinitaria.—Larva whitish green; dorsal line rather broad, white; subdorsal line pale bluish white; spiracular line yellow, spiracles orange; belly streaked alternately with light and dark green; head rather large in proportion to the body. The segmental divisions of the body are conspicuously marked with pale whitish green.—*G. F. Mathews; Raleigh House, near Barnstaple.*

Description of the Larva of Timandra imitaria.—Larva very long and slender, brownish ochreous, anal segment dark umber-brown. Feeds freely on *Senecio vulgaris* or any species of *Galium*.—*Id.*

Second brood of Zygaena Lonicera.—I took a specimen of *Zygaena Lonicera* flying in the sunshine on the 12th of October; it was evidently, from its perfect condition, just fresh from the pupa. Is not this a rather extraordinary capture for the time of the year? This specimen must have been produced from eggs laid last May or June.—*Id.*

Description of the Larva of Eupithecia sobrinata.—This larva is rather variable in appearance. The ground-colour is either dark green or yellowish red, with a series of rust-coloured dorsal blotches, intersected by a central dorsal dark green horizontal line, and bordered on either side by a yellowish one. These blotches generally disappear on the posterior segments, and are sometimes wanting altogether. Spiracular line waved, pale yellow or whitish. Belly with a whitish central horizontal line. Feeds on juniper. I have found it tolerably common on old trees in gardens and shrubberies in Derbyshire. It is full fed at the end of May and beginning of June, and the perfect insect appears in July. Pupa enclosed in an earthen cocoon or a slight web among the stalks. Head, thorax and wing-cases dark green; abdomen yellowish.—*H. Harpur Crewe; Shooter's Hill, Kent, November 1, 1859.*

Description of the Larva of Eupithecia exiguata.—This larva somewhat resembles that of the little blue Emerald (*Iodis lactaria*), and appears at the same time. It is long, slender and tapering. Ground-colour dark green, with a central row of small dull red lozenge-shaped dorsal spots, connected by a central dorsal line of the same colour. Spiracular line red, bordered with yellow. Segmental divisions yellowish. The dorsal blotches are often wanting on the anterior segments, and their place supplied by a greenish line. In the centre of each dorsal blotch a small yellow spot. Feeds, in September and October, on barberry, whitethorn, black currant, ash, alder and willow. Pupa enclosed in an earthen cocoon; long, slender and tapering. Wing-cases dark olive-green. Thorax and abdomen dusky olive. Abdominal divisions very conspicuous yellow.—*Id.*

Additional Remarks on the Larva of Eupithecia assimilata.—I feel that, in justice to Mr. Gregson, I ought to make a few additional remarks on the larva of *Eupithecia assimilata*. A few days after writing my reply (Zool. 6735) to Mr. Gregson's critique (Zool. 6695) on my description of this larva (Zool. 6679), I found, upon examining the larva which I had lately taken, that a few of the smaller ones had moulted and assumed some dorsal dusky lozenge-shaped spots, and I subsequently met with others upon the black-currant trees in the garden. About the same time I happened to pay Mr. Greene a visit, and found that he had also met with this variety; and a few days afterwards Mr. Gregson was kind enough to send me four or five of his dorsally-blotched larvæ, which precisely corresponded with those I had taken. It is quite clear, therefore, that a dorsally-marked larva does occur, but my observations lead me to feel sure that this is rather the exception to the rule than otherwise. Last autumn I took nearly fifty larvæ. Not a single one had any dorsal lozenge-shaped spots at all, and only about half a dozen had a few small black dorsal specks, about the size of a pin's point. This autumn one of my brothers and myself, by diligent searching, took about two hundred larvæ off black currant and wild hops (upon which they feed equally freely), and out of this number about thirty were dorsally blotched. Neither Mr. Doubleday nor Mr. Bond had ever seen this variety till I showed and gave them specimens. I leave the readers of the 'Zoologist' to draw what inference they please from these facts. The conclusion at which I have arrived is this: that, though a dorsally-blotched variety most undoubtedly occurs, yet that this is rather an exception to the rule than otherwise, and that the plain green larva is the typical form.—*Id.*; November 8, 1859.

Description of the Dorsally blotched Larva of Eupithecia assimilata.—Till the last moult uniform pale green; afterwards with a chain of rusty brown dorsal spots running from tip to tail, and intersected and united by a central dorsal line: ground-colour dirty yellowish green. The dorsal spots confluent on the anterior and posterior segments; bordered on either side by a dusky line. Sides suffused with dusky reddish brown, and streaked with wavy lines of the same colour. Belly greenish. Body covered with small white tubercles and studded with a few short white hairs. Segmental divisions orange. Head greenish, marked with black. Feet on black currant and wild hops in September and October.—*Id.*

Reply to Mr. Crewe's Note on the Larva of Eupithecia assimilata.—Mr. Crewe writes (Zool. 6736) to prove that I am in error in saying there are dorsally lozenge-marked larvæ of *Eupithecia assimilata*, and, it would seem, proves to his own satisfaction there are no such things, at least in his own neighbourhood. I have had the pleasure of sending him specimens of such dorsally-marked larvæ, and of course expected he would set me right with the readers of the 'Zoologist,' but in his reply to my letter and box containing the said dorsally-marked larvæ, he says, "Your dorsal-marked larvæ were not a surprise, for a few days after Mr. Greene and myself had written to the 'Zoologist' I found a few of the dorsally-blotched larvæ, and upon going over to spend a day with him at Cubley I found he had done the same. We both agreed to keep them separate until the perfect insect appeared, and then, in justice to you, to publish our experience in the 'Zoologist.'" Thus, it would seem, though he has both seen such lozenge dorsal-marked larvæ from me and absolutely found such in his own neighbourhood,—where I knew them to occur, having taken them at Ashburn, at Mayfield (in the late Tom Moore's garden), and at Burton-on-Trent, on the Ashby-de-la-Zouch side of the river, all of which places, I take it, are in his

neighbourhood,—he agrees with Mr. Greene to put off the evil day until next year, when the question might have been so easily settled now without this note from me. As to Mr. Greene's bilious letter (Zool. 6735), I who have spent many years of my life in successfully separating the larvæ of the Tineina can well afford to live down the "clap-trap" of any writer who confessedly cannot separate the larvæ of two of our finest Orthosidæ (see Zool. 6734), and only notice his communication to say that I never asserted that the larva of *E. assimilata* was one inch and a half long (see Zool. 6696), and regret he should have led the readers of the 'Zoologist' to think I did say so.—C. S. Gregson; *Spring Hill, Fletcher Grove, Stanley, October 17, 1859.*

The Larva of Eupithecia assimilata.—In justice to Mr. Gregson, I think it right to state that larvæ have been sent to me (of the above insect) possessing dorsal markings such as he describes, and that I have also taken a few in this neighbourhood. In justice to myself I must add that, up to the time at which I sent my remarks to the 'Zoologist,' I had neither seen nor heard of such a variety.—J. Greene; *Cubley Rectory, Doveridge, Derby, November 10, 1859.*

Occurrence of Heliothis armigera at Sugar, Ivy, &c.—My entomological friends have been unusually successful in taking this rarity during the past autumn. Mr. Bond took three one evening; Dr. Allchin two; and Mr. Wright one,—this last in the old locality for *Phlogophora empyrea*. In the 'Intelligencer,' Mr. W. D. Crotch records the capture of two specimens at Weston-super-Mare; Mr. Tompkins one near Worthing; Mr. Therncroft five near Brighton; and Mr. Stewart two near Torquay: the dates are from the 1st to the 25th of October.—Edward Newman.

Occurrence of Phycis contubernella in Dorsetshire.—On examining lately some Micro-Lepidoptera, taken during the past summer by the Rev. G. C. Green, of Hamworthy, one among them, a "knot-horn," struck me as a novelty; I accordingly submitted it to Mr. Bond's inspection, and he and I have come to the conclusion that it is identical with *Phycis contubernella* of Hübner, and not hitherto recorded as British. It is as large as *Phycis Roborella*, handsomer and more distinctly marked, but bears no resemblance to it or any other British species of the genus. Its natural position in the British list would appear to be next after *P. ornatella*.—O. Pickard-Cambridge; *Southport, Lancashire, October 24, 1859.*

Occurrence of Diachromus germanus at Hastings.—Mr. Wilson Saunders has obtained a specimen of this somewhat doubtful native at Hastings: the locality does not seem quite satisfactory, but it is sufficiently so to induce our ardent collectors to search thoroughly: may their efforts be successful. Dr. Power has opened up to us a mine of *Drypta emarginata*, *Polystichus fasciolatus* and *Lebia crux-minor*, and by his unexampled liberality has made these insects comparatively common in our collections.—Edward Newman.

Capture of Polystichus fasciolatus in Sussex.—About a fortnight since Mr. Wilson Saunders was kind enough to describe to me the locality in which he had met with *Polystichus fasciolatus*, an insect which many years ago was once taken in considerable quantity by Mr. Hewitson, at Southwold, but of which, since that time, only isolated specimens have occurred, and that very rarely. I accordingly took a trip by an excursion train to the neighbourhood he mentioned, and was fortunate enough to secure twenty-three specimens. The locality is apparently a very circumscribed one. It was lurking under stones and bricks, and seems to me to be fond of insinuating itself between the stones and earth in dryish places. I have kept some of them alive, and they are still flourishing in a tumbler with a piece of turf, &c., in it: its habits

appear to me to be nocturnal: if the insect is upon the surface, the moment it is exposed to the light it rushes down and takes refuge in a crack in the turf or at the bottom, between the turf and the glass, and never seems to run about in the light if it can help it. I suspect that it would be found roving about at night, if searched for by the aid of a lantern. It nibbles at pieces of meat which I put into the glass, and when the turf becomes dry sucks apparently with avidity any moist substance introduced. Its habits are very like those of *Lebia crux-minor* and *Drypta*, which I formerly kept for some two or three months in the same manner, but they do not show the tendency to congregate and creep into the same hole which I observed in *Drypta*.—*J. A. Pezzer*; 52, *Burton Crescent*, October 26, 1859.

Occurrence of Quedius auricomus at Paisley.—Mr. Morris Young, of Paisley, has discovered a habitat near his home for this beautiful *Brachelytron*: it is adorned with two patches of golden pile on the exposed part of each abdominal segment, and by this very conspicuous character may be distinguished at a glance from every species of *Quedius* with which we are acquainted. It was first recorded as British in the first volume of the 'Entomologist's Annual'.—*Edward Newman*.

Occurrence of Latridius nodifer and Corticaria borealis in the North of England.—I captured, about the middle of October last, a single specimen of *Latridius nodifer*, *Westwood*, and a long series of *Corticaria borealis*, *Wollaston*, by tearing up the patches of *Convolvulus arvensis* growing on the sea-banks, and shaking them over a sheet of paper.—*Thomas John Bold*; *Angas' Court, Bigg Market, Newcastle-on-Tyne*, November 10, 1859.

Capture of Vespa arborea in Cumberland.—In working up my wasps I find several females of *Vespa arborea*, *Smith*, all captured in Cumberland, during the month of July. When there in April, May and June, I invariably took all female wasps, in hopes of finding *V. arborea*, but, after the most careful examination, I cannot find that I have taken it at any other time than in July, when the females were certainly by no means rare. Can it differ so much from its fellows as not to appear till mid-summer?—*Id.*; November 18, 1859.

The Hatching of the Larva of a Chrysopa.—"Twenty eggs of a species of *Chrysopa*, which hatched on the 20th of June, have afforded to me a different result than that which *Schneider* and others have mentioned. Thus instead of, as with them, a smaller, rounder top of the egg being loosened, there was seen in each egg a straight slit, extending nearly half its length, not however quite reaching to the micropyle, and at the upper end of this slit was a shorter transverse, sidelong fissure, through which the exit of the larva was made. The larva cast its skin in the act of exclusion, and left behind it in the cast skin the saw with which (as in *Osmylus*) the slit was made. The saw is nearly in the form of a carpenter's axe, but having a more curved edge, which, beneath, is drawn out at one end to a point, and is rather irregularly furnished with sharp teeth. The upper end of the edge forms a peculiar round, projecting, sharper toothed flap. The young larvæ did not burst direct from the eggs, but crawled down along the thread. It appears to be a general law that the larvæ cast their skins in the exclusion from the egg, and leave the skin in the slit in the egg, as I have before attentively observed in *Osmylus*." The above very interesting note by Dr. Hagen appears in the last part of the *Stettin 'Entomologische Zeitung'*, and may not, except in the English dress, meet the eyes of many readers of the '*Zoologist*'.—*J. W. Douglas*; *Lee*, November 14, 1859.



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