THE

MAGAZINE OF NATURAL HISTORY,

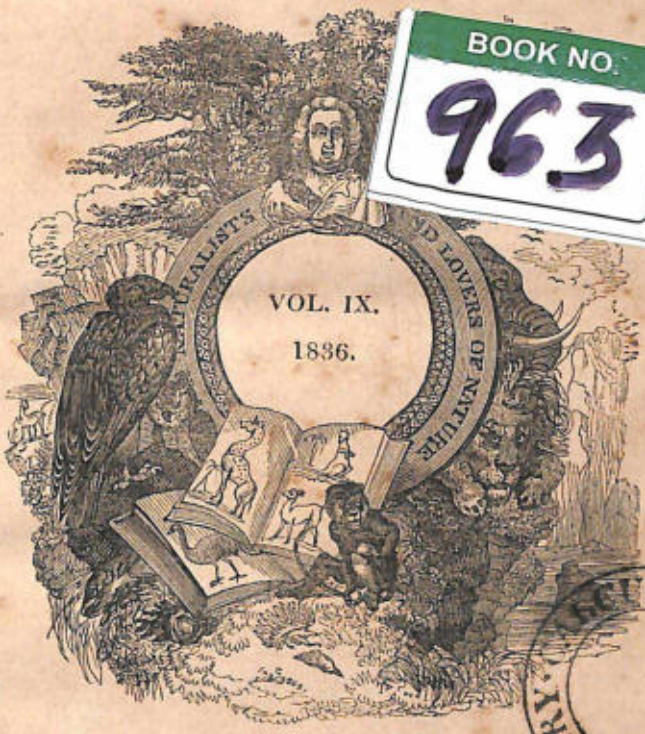
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JOURNAL

OF

ZOOLOGY, BOTANY, MINERALOGY, GEOLOGY, AND METEOROLOGY.

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LONGMAN, REES, ORME, BROWN, GREEN, AND LONGMAN,
PATERNOSTER-ROW.

1836.

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PREFACE.

NINE years have now elapsed since the commencement of the *Magazine of Natural History*; and, during that period, we have endeavoured to conduct it in such a manner, that, while a large proportion of the contributions to its pages have been of a nature directly tending to an extension of our knowledge in the various departments of Natural History, it should, at the same time, not be deficient in subjects of general interest to those who derive gratification from some knowledge and observance of Nature's laws, although they may not enter upon their investigation as a science.

To a considerable extent, we think that this combination has been happily effected; and, in presenting our Readers and Correspondents with the completion of the Ninth Volume, we trust that it is one which will not be found to contain less instructive, or less interesting, matter than those which have preceded it. Among the communications which will be perused with pleasure, are several from our old and valued correspondent, Mr. R. C. Taylor, whose contributions on Fossil Zoology and Botany, published in one of the early Volumes of this Magazine, were publicly alluded to, in terms of the highest commendation, by one of our most distinguished Geological Professors, at the late assembly of the British Association at Bristol.

We have occasionally been told that miscellaneous communications are allowed to appear in our pages, which sometimes do not constitute additions to the vast fund of knowledge which we possess relating to the economy of Nature. We readily admit the fact; but it should be borne in mind, that one principal object with us has been that of exciting and promoting a spirit of enquiry, and a habit of observation, among those who, perhaps, did not previously possess the taste, or the means, for acquiring an insight into those delightful pursuits which are attendant upon the study of Natural History. Had our Journal been appropriated exclusively to subjects of deep research, and only open to the communications of experienced Naturalists, it might have taken a higher stand as a philosophical work, but it would not have been productive of the general good that it was our object to promote, and which has undoubtedly arisen from the course which we have followed.

At the present time, there seems so generally diffused a feeling in favour of those objects for which this Work was originally instituted, that it appears to us a desirable opportunity for the commencement of a new series. This plan will prove a great ad-

vantage to those who subscribe during the course of the following year, and will not be at all injurious to our original supporters.

The *Magazine of Natural History*, for the greater part of the last five years, has been almost entirely edited by Mr. John Denson, A.L.S.; but it will, in future, be conducted by Mr. Edward Charlesworth, F.G.S., who proposes to figure and describe some of the new and choice fossils contained in his extensive collection. With a view of enabling us to give a larger number of engravings than has yet been done, the Magazine will be reduced from three sheets and a half to three sheets.

An improved method has been adopted for referring to the articles contained in the present Volume. Hitherto this has been done by a Table of Contents at the beginning of the Volume, and an Alphabetical Index at the end of it. The Table of Contents was so far deficient, that it did not indicate the subjects included under the general title of Miscellaneous Intelligence, consisting of a great variety of matter; and, in bulk, filling at least one third of the entire Volume. The Index, though it has been made as comprehensive and complete as any index could be in so limited a space, yet, like all alphabetical indexes that are miscellaneous as to their subjects, has been felt to be an indefinite, and often uncertain, mode of acquiring a knowledge of the contents of a book; and more especially to the scientific enquirer. We have been aware of this for some years in the case of the *Gardener's Magazine*; and we have succeeded, we think, in completely remedying the evil, by combining the Table of Contents with certain alphabetical lists, and placing the whole at the beginning of the Volume, as exemplified in the Volume of the *Gardener's Magazine* for 1835.

In enumerating the Contents, we have not only given, as usual, the titles of all the Original Communications; but, under Miscellaneous Intelligence, we have added the sub-titles, or side-headings, as they are technically called, of all the separate articles. This, we conceive, will give as complete an idea of the Contents of the Magazine as can be obtained without perusing it; since the side-heading always states the subject of the paragraph, whether it is a fact to be recorded, a proposition to be proved, a criticism to be made, or a question to be asked.

J. C. L.

Bayswater, Nov. 16. 1836.

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Accno. 887
dt. 27/12/06

THE MAGAZINE OF NATURAL HISTORY.

ZOOLOGICAL GARDEN
Kolkata
700027
ALIPORE

JANUARY, 1836.

ORIGINAL COMMUNICATIONS.

Art. I. *Notes on the History and Habits of the Brown, or Grey, Rat* (*Mús decumànus*). By Charles Waterton, Esq.

Some few years after the fatal period of 1688, when our aristocracy, in defence of its ill-gotten goods, took upon itself to dispose of hereditary monarchy in a way which, if attempted nowadays, would cause a considerable rise in the price of hemp, there arrived on the coast of England a ship from Germany, freighted with a cargo of no ordinary importance. In it was a sovereign remedy for all manner of national grievances. Royal expenditure was to be mere moonshine, taxation as light as Camilla's footsteps, and the soul of man was to fly up to heaven its own way. But the poet says,

——— "dicique beatus
Ante obitum nemo, supremaque funera debet;"

that is, we must not expect supreme happiness on our side of the grave. As a counterpoise to the promised felicity to be derived from this superexcellent German cargo, there was introduced, either by accident or by design, an article destined at no far distant period to put the sons of Mr. Bull in mind of the verses which I have just quoted.

This was no other than a little grey-coloured short-legged animal, too insignificant, at the time that the cargo was landed, to attract the slightest notice. It is known to naturalists sometimes by the name of the Norwegian, sometimes by that of the Hanoverian, rat. Though I am not aware that there are any minutes, in the zoological archives of this country, which point out to us the precise time at which this insatiate and mischievous little brute first appeared among us; still, there is a tradition current in this part of the country, that it actually came over in the same ship which conveyed the new

dynasty to these shores. My father, who was of the first order of field naturalists, was always positive on this point; and he maintained firmly that it did accompany the House of Hanover in its emigration from Germany to England. Be this as it may, it is certain that the stranger rat has now punished us severely for more than a century and a quarter. Its rapacity knows no bounds, while its increase is prodigious beyond all belief. But the most singular part of its history is, that it has nearly worried every individual of the original rat of Great Britain. So scarce have these last-mentioned animals become, that in all my life I have never seen but one single solitary specimen: it was sent, some few years ago, to Nostell Priory, in a cage, from Bristol; and I received an invitation from Mr. Arthur Strickland, who was on a visit there, to go and see it. Whilst I was looking at the little native prisoner in its cage, I could not help exclaiming, — "Poor injured Briton! hard, indeed, has been the fate of thy family! in another generation, at farthest, it will probably sink down to the dust for ever!"

Vain would be an attempt to trace the progress of the stranger rat through England's wide domain, as the old people now alive can tell nothing of its coming amongst them. No part of the country is free from its baneful presence: the fold and the field, the street and the stable, the ground and the garret, all bear undoubted testimony to its ubiquity and to its forbidding habits. After dining on carrion in the filthiest sink, it will often manage to sup on the choicest dainties of the larder, where, like Celæno of old, "vestigia fœda relinquit." We may now consider it saddled upon us for ever. Hercules himself, could he return to earth, would have his hands full, were he to attempt to drive this harpy back again to Stymphalus. It were loss of time to dwell on its fecundity. Let any body trace its movements in the cellar, the dairy, the outhouse, and the barn, and he will be able to form some notion of the number of hungry mouths which we have to fill. Nine or ten young ones at a time, twice or thrice during the year, are an enormous increase, and must naturally recall to our minds one of the many plagues which formerly desolated the fertile land of Egypt. In the summer months it will take off to the fields, and rear its young amongst the weeds which grow in the hedgerows; plundering, for their support, the birds' nests with a ferocity scarcely conceivable in so small an animal.

Man has invented various instruments for its destruction; and what with these, and with poison, added to the occasional assistance which he receives from his auxiliaries, the cat, the

dog, the owl, the weasel, the ferret, and the foumart, he is enabled, in some degree, to thin its numbers, and to check its depredations.

There are some localities, however, from which it may be effectually ousted, provided you go the right way to work. My own house, than which none in Great Britain can have suffered more from the plundering propensities of the Hanoverian rats, is now completely free from their unwelcome presence. On my return to it in 1813, they absolutely seemed to consider it their own property. They had gnawed through thirty-two doors; and many of the oaken window frames were irreparably injured by them. While I was in Guiana, a Dutch lady named Vandenheuvil had given me a young tiger-cat, which one of her negroes had taken that day in a coffee field. It was the marjay, which, by the by, Buffon considers untamable. I raised it with great care; and it grew so fond of me, that it would follow my steps like a dog. Nothing could surpass the dexterity with which this little feline favourite destroyed the rats on our reaching home. Towards the close of day it would ascend the staircase; and no sooner did a rat make its appearance from the casements, than it would spring at it with the velocity of an arrow, and never fail to seize it. In 1828, having got, by long experience, a tolerably good insight into the habits of this tormenting quadruped, and having found that it spoiled or pilfered every thing within its reach, I finally resolved that it should look out for another place of residence. Wherefore I carefully searched for all its various entrance holes. These I effectually closed with stone and mortar. I then filled up all useless sewers, and paid great attention to the paving and renewing of those which were absolutely required; fixing, at the same time, in either end of them a cast-iron grate movable at pleasure. The bottoms of all the outer doors were done with hoop iron; and the pavement which goes round the house was relaid with particular care. By these precautions I barred all access to these greedy intruders; and, as no rubbish or lumber is now allowed to remain in the different nooks and crannies commonly found near ancient dwellings, there is no place of shelter left to conceal any stray individual whose bowels may chance to yearn for one more repast on cheese or bacon. In the meantime, the cat and the owl meet with no obstructions, while prowling for those which may still linger in the environs. The mice, too, seem to have taken the alarm. In a word, not a single mouse or rat is to be found in any part of the house, from the cellars to the attic stories.

In case it were not convenient or practicable to adopt similar precautions to those already enumerated, I would suggest what follows: — Take a quantity of oatmeal that would fill a common-sized wash-hand basin; add to this two pounds of coarse brown sugar, and one dessert spoonful of arsenic. Mix these ingredients *very well* together, and then put the composition into an earthen jar. From time to time place a table-spoonful of this in the runs which the rats frequent, taking care that it is out of the reach of innocuous animals. They will partake of it freely; and it will soon put an end to all their depredations.

Rats are fond of frequenting places where there are good doings; while their natural sagacity teaches them to retire in time from a falling house. This knack at taking care of self seems common both to man and brute. Hence the poet: —

> " Donec eris felix, multos numerabis amicos;
> Tempora si fuerint nubila, solus eris."
>
> When Fortune smiles, thy friends are many;
> But, if she frowns, thou hast not any.

Whilst the rats had all their own way here, they annoyed me beyond measure; and many a time have I wished the ship at Jericho, which first brought their ancestors to these shores. They had formed a run behind the plinth in my favourite sitting-room, and their clatter was unceasing. Having caught one of them in a box trap, I dipped its hinder parts into warm tar, and then turned it loose behind the hollow plinth. The others, seeing it in this condition, and smelling the tar all along the run through which it had gone, thought it most prudent to take themselves off; and thus, for some months after this experiment, I could sit and read in peace, free from the hated noise of rats. On removing the plinth at a subsequent period, we found that they had actually gnawed away the corner of a peculiarly hard-burnt brick, which had obstructed their thoroughfare.

The grey rats are said to destroy each other, in places where they become too numerous for their food; but, bad as they are, I will not add this to the catalogue of their misdemeanours. They can never be in such want of aliment as to do this; because instinct would teach them that where there is ingress to a place, there is also egress from it; and thus, when they began to be pinched for food, they would take off in a body, or disperse amongst the fields, and live upon the tender bark of trees, and upon birds, beetles, and other things which the adjacent ground would afford.

That they move from place to place, in large bodies, cannot

well be disputed. A respectable farmer, by name John Mathewman, now living in this neighbourhood, has informed me that, as he was returning home one moonlight night, about eleven o'clock, he suddenly came upon a large drove of rats, near Sandal Three-houses. They were coming up a lane which opened upon the high road; and, as soon as they discovered him, they gave mouth in a general squeal. Those nearest to him rose on their hind legs; and then the whole body separated, and scampered off in all directions. Probably these adventurers were on the look out that night for better quarters.

Rats will occasionally attempt to feed on individuals of the human species when they are asleep. In 1824, I went with that excellent American naturalist, Mr. Titian Peale, down the Delaware, to the neighbourhood of Salem, in order to make researches in ornithology; and we procured good lodgings at a farmer's house. During the night I was disturbed by a movement in the straw mattress on which I lay, of a somewhat suspicious nature; but, being exceedingly tired with our day's exertion, I fell asleep again till about half-past four, my usual hour of rising. At breakfast, "Madam," said I to the farmer's wife, "I could almost have fancied that there were rats in my mattress last night." "Very likely, Sir," said she, with the greatest composure; and then she told me that the year before, whilst she was fast asleep in the bed which I had occupied, a rat began to eat into her shoulder. On saying this, she bared the place to let me have a view of it; and I distinctly saw the marks which the hungry rat had left. "Upon my word, Madam," said I, "though I am not prone to make wry faces at a fair allowance of fleas or bugs, still I must own to you that I have not yet quite made up my mind to be devoured alive by rats; wherefore, if you have no objections, when our breakfast is finished, we will go and take a peep into the interior of the mattress." On ripping it up, no rats were found; but out bounced seven or eight full-grown mice. The old lady smiled as they ran across the floor; and I thought I could read in her face that she considered I had raised a false alarm.

When I reflect on the numbers and the appetite of the Hanoverian rat, and put down to its account the many depredations which it is perpetually committing, I cannot bring my mind to show it the same good feeling which is extended in this park to the rest of animated nature. In truth, I consider its arrival in our country an event productive of much annoyance to the community at large; and, had I the power,

I would send its whole stock, root and branch, back again to the country whence it came; seeing that we have gained nothing by letting it exterminate the original English rat.

Walton Hall, Nov. 9. 1835.

ART. II. *On the Habits, Haunts, and Nidification of the Robin Redbreast* (*Rubécula familiàris* Blyth.) By S. D. W.

——— " The redbreast swells,
In the slow fading wood, his little throat
Alone, for other birds have dropp'd their note."

WHAT lover of nature has not watched, admired, and encouraged that confiding familiar bird, the robin redbreast, singing so cheerily his " home beside? " This sweet little garden minstrel, although petted by every one, has, strange to say, been much maligned: no less a charge than that of ingratitude has been preferred against him. He is represented as visiting the dwellings of man in winter, for the sake of food and warmth; and then, continue the accurate observers, he retires to the inmost recesses of the woodland shade, or else resorts to our gardens to rob us of the scarlet-fruited currant. As far as my experience has gone, this is an erroneous statement; for the bird of " the russet wing and ruddy breast " deserves the epithet familiàris (so aptly applied by Mr. Blyth) all the year round. In the summer time, two or three of these little favourites enter a room about the same time, unaware of each other's presence; the third has scarce passed the window sill, when yon saucy little fellow perched on the bookcase darts down on it, and the intruder is well off if his " scarlet stomacher " sustains no damage: the second, seeing the state of affairs, likewise makes a speedy retreat, and the conqueror remains the sole feathered possessor of the room. He forthwith commences a song of self-gratulation, which might, perhaps, be interpreted,—

" I am monarch of all I survey,
My right there is none to dispute; "

and the little fellow looks happier and perter than ever.

This is a blemish in the character of this *social* bird which must not be concealed; and a very prominent trait it is. I have frequently witnessed desperate battles on frosty days, and their collisions seem to be of more frequent occurrence in winter than at other seasons: rather a rough way of keeping each other warm, it must be confessed. And it is not only with birds of its own species that the redbreast wages war,

but with other birds, who are not unfrequently "boxed on the ear" by our pugnacious little friend, whose organ of combativeness must, we suppose, be pronounced to be "largely developed." The puffy, dumpy, squabbling, house sparrow (*Pásser doméstícus Aldr.*), and even the blithe, inoffensive, sombre hedge dunnoc * (Accéntor modulàris *Cuv.*), come in for a share of the redbreast's ill-humour. I have more than once seen birds of different species, as the garden linnet (*Linària cannábina Lin.*) and the grey wagtail (*Motacílla cinèrea Aldr.*), playfully contending with each other: but the redbreast seems to consider undue familiarity too serious an affair to be trifled with. This disposition continues unabated, according to Dr. Bechstein, in confinement. I will transcribe the worthy doctor's words: — "In confinement, the inhabitants of my neighbourhood like to see the redbreasts hopping about the room; and they make a roost for them of oak or elm branches. They find that this bird destroys flies, and even bugs. Such a situation appears to agree with him very well, as he lives in this way from ten to twelve years. He is so jealous and unsociable, that he must not have a companion; he must be quite alone: a second would cause battles, which would end only with the death of one of the combatants. If, however, they are equal in strength, and in a large room, they will divide it, and, each taking possession of his half, they remain in peace; unless one should pass his limits, in which case war begins, and is maintained to the last extremity." The same author says that hybrids between the redbreast and dunnoc may be procured: — "Dunnocs may be paired with redbreasts, and these unions succeed very well." (*Cage Birds*, art. Dunnoc.)

But, notwithstanding the truth of the proverb, "Unum arbustum non alit duas rubeculas" [Two robins cannot dwell in one bush], this "poet bird" will always be regarded with favourable eye by the true lover of nature, and those who require something more substantial than the endearing associations which have been linked with his very name in the glowing pages of the poets, those, in short, who direct their attention principally to things "of the earth, earthy," will find ample reason for cherishing the bird for its insectivorous services. I have before shown (VIII. 517.) that the redbreast does not altogether reject currants; but, at the same time, I know, from

* Mudie suggests the popular name "dunnoc" to relate to the dun-coloured plumage of the bird; and thus it is a very appropriate appellation. "Sparrow," by which name it is even yet sometimes known, is very inappropriate, as the bird is not in the genus *Pásser*. For an arrangement of the British birds, see the *Analyst*, No. xiii., for October, 1835. (Vol. iii. p. 26—35.)

experience, that this species consumes but a very small portion of that fruit; but, were the quantity ten times what it is, this familiar guest should be welcome to it all; ay, all. The black-capped fauvet (*Ficédula atricapílla Aldr.*) and the garden fauvet (*F. horténsis Blyth*) are great consumers of fruit; as well as the hedge coalhood * (*Pyrrhùla modulàris W.*), the garden tit (*Pàrus màjor Lin.*), &c.; but I never suffer a single individual of these pretty flutterers to be destroyed. They are always welcome guests. The coalhood, it is true, destroys many buds which might, in due season, have yielded fruit; and the garden tit eats many peas: but what then? Is the palate the only sense to be gratified? are we to sacrifice the delightful employment (luxury I may call it) of watching the habits of the feathered race; of investigating their uses and affinities, an exercise no less beneficial to the body than the mind, to say nothing of their charming songs? shall we sacrifice these, merely to obtain additional gratification for the palate? The organ of alimentiveness is, I take it, very well in its way; but, to gratify it at the expense of the intellectual organs, is not acting quite in accordance with what might be expected from a rational being. The inferior animals (as man loves to call them) were given for our use, and to administer to our pleasures; and, when they interfere with any project, or in any way annoy us, we have a right to rid ourselves of them; but to destroy them when they are capable of affording us intense pleasure, in order that we may obtain an inferior pleasure, is not very reasonable.

But we have almost lost sight of our spruce little friend. With regard to its nidification many mistakes have been made. Turner, an old ornithologist, says it builds with leaves; and Willughby copies this assertion. The nest is composed chiefly of moss, with a lining of horse-hair. It generally builds at the roots of an old tree, in a low bush, and very frequently in the holes of walls. Rennie, in his *Architecture of Birds*, doubts this; but I am certain of the fact. In the thirteenth number of the *Analyst* is a very spirited and well-written article, "A Retrospect of the Literature of British

* It has been suggested that *coalhood* is not very appropriate as a generic name, as it is probable that other species may be discovered which may have no black on the head. But does not the same objection apply with equal force to *redbreast*, *waxwing*, *warbler*, &c. Another objection has been raised, namely, that the name *coalhood* will apply equally well to other genera: but does not this apply equally to wagtail (*Motacilla*), longspur (*Plectrophanes*), reedling (*Salicaria*), flycatcher (*Muscicapa*), diver (*Colymbus*), &c. In short, I do not know a single meaning name in ornithology, with the exception of crossbill (*Crucirostra*), which will not designate other genera equally well with that to which it is appropriated.

Ornithology; from the Close of the 17th Century to the present Time." I mention this, because most of the works which have appeared on ornithology are therein noticed; and many unaccountable errors, similar to that I have just mentioned, are pointed out. To this article, therefore, I refer Mr. Rennie; and return we once more to the redbreast, which, we begin to fear, will get rather ruffled at the repeated breaks in his history. Another very favourite place of nidification with the redbreast is the thatch of old sheds. The industrious little bird is not satisfied with the natural nest, as it were, thus afforded, but builds one within this, in the same way that the common redstart (Ruticilla *Luscinia*) does; and neither of these birds easily forsake their eggs. [IV. 465.] I have known redbreasts caught many times a day on their eggs, yet continuing to sit on them: —

> " Sit on; away we would not bear
> Those freckled eggs, thy anxious care;
> Nor of thy plumes a feather mar,
> Thou social bird!
>
> " Sit on, and keep thy leafy bed,
> Secure in thy secluded shed,
> Till forth thy spotted brood be led
> Yon shrubs among."

It only remains to give the description and colours; which is, as Wilson remarks, necessary even in the commonest birds. *Male.* Head, back, wings, and tail, olive brown tinged with green; forehead, cheeks, and breast, reddish orange, somewhat inclining to brick-red; the red on the breast surrounded with light grey; belly white; thighs brownish green; flanks the same; quill-feathers brown, edged with olive; bill and shanks dark brown; length $5\frac{3}{4}$ in. — *Female.* Rather smaller; colours not so bright, nor so distinct; in other particulars similar. — *Young.* Oil-green tinged with brown, and spotted with lighter brown. In this state they are sometimes, by the inexperienced, mistaken for the hedge dunnoc. [IV. 412.] The common blueback (Siàlia familiàris) claims a near relationship to the robin redbreast; and was, by some of the American ornithologists, called *Rubécula* siàlis, the blue-backed redbreast.

Near Derby, October 5. 1835.

ART. III. *Catalogue of Irish Crustàcea, Myriápoda, and Arachnöïda, selected from the Papers of the late John Templeton, Esq.* By ROBERT TEMPLETON, Esq.

CONSIDERABLE additions have been made since the date of this catalogue (1826), due principally to the exertions. in the

cause of science of two of the most distinguished members of the Belfast Natural History Society, George C. Hyndman and R. Patterson, Esqrs.

CRUSTA'CEA.

ENTOMO'STRACA.

I.

*A*pus *Cuv.* Scop. *cancrifórmis Lam.*? In stagnant waters. —Calìgus *Müll.* Múller*i*, Samouelle Ent. Comp. p. 79. On the codfish. — C. prodúctus *Müll.* On the salmon.

II.

Dáphnia *Müll. P*ùlex *Lin.*, Samouelle Ent. Comp. p. 80. In the pond at Cranmore. — D. longispìna *Müll.* In the pond at Cranmore. — Cỳpri*s* Müll. conchàcea *Lin.* Inhabiting ditches and stagnant waters, where I have seen it on the dissolving of the ice after a severe frost. — Cytherèa Müll. víridis *Müll.* Among *F*ùci at Bangor and Macedon point. — C. lùtea *Müll.* Among *F*ùci at Bangor.

III.

Cỳclop*s* Müll. quadricórnis *Lin.* In the drains at the moss, Cranmore. — C. minùtus *Müller.* Early in spring, in the drains of Cranmore. — C. longicórnis *Müll.* In the drains at the point fields, Belfast.—Polyphèmus Müll. óculus *Müll.*, Cephalóculus stagnòrum. In marshes and drains, very rare.

IV.

Branchiópoda *Lam.* stagnàlis *Linn.* In the pond along with Dáphnia *P*ùlex.

MALACO'STRACA.

PODOPHTHA'LMA.

1. BRACHYU`RA.

Corỳstidæ.

Corỳstes *Lat.* Cassivelaúnus Penn. Found on the shore at Cushendall Bay.—Atelécyclus *Leach* 7-dentàtus. Found in the stomach of a codfish, January 17. 1817.

Portùnidæ.

Cárcinus *Leach* Mæ`nas *Auct.* Common about all our shores. — Pórtunus *Fab.* pùber *Linn.* Found in Belfast Lough. — P. depuràtor *Linn.* Found on the sands at Dunfanaghy, county Donegal, July 13. 1815. — P. lívidus *Leach.* With last, on the shore at Dunfanaghy.

Cancéridæ.

*C*áncer *Linn. P*agùrus *Linn.* Common.

Oxypodàidæ.

*P*innotères *Latr.* minùtus *Linn.* Penn. Dredged up in Belfast Lough, August 18. 1811.

Maíadæ.

Pisa *Leach* tetràodon *Penn.* — Hỳas Leach *A*ràneus *Linn.* Carrickfergus, on the shore; in the belly of a codfish, January 1798.

Lithodìadæ.

Lithòdes *Latr. M*àja *Linn.* Found on the coast of the county Wexford, a specimen thence is in Trinity College Museum. It is called by the people Craban.

Macropodìadæ.

Macropòdia *Leach P*halángium *Penn.* Not uncommon on the Irish coast.

2. MACROU`RA.

Pagùridæ.

*P*agùrus *Fab.* Bernhárd*us* Auct. Very common on the coast, in the deserted shells of *M*ùrex antìquus and *B*úccinum undàtum.

Galatèadæ.

Porcellàna *Lam.* platychèles *Penn.* Whitehouse shore, Mr. James Grimshaw, jun. — Galatè*a* Fab. spinígera *Leach*, *A*stacus strigòsus *Penn.*, Herbst, not of Linnæus. Found on a rock near Bangor, November, 1819. Another specimen in the stomach of a codfish.

Astácidæ.

A'stacus *Fab.* Gámmarus *Linn.* Along all our rocky coast. —*A.* fluviátilis *Fab.*, Cáncer *A*'stacus *Linn.* Inhabits several of our lakes and rivers. In great abundance in a lake near Tullahan, county Monaghan; near Antrim, in the 6-mile water. — Nèphrops *Leach* norwégicus *Linn.* A rare species, but sometimes found in Belfast Lough.

Palæmónidæ.

*C*rángon *Fab.* Latr. vulgàris *Fab.* Common. — Palæ`mon Fab. serràtus *Penn.* Inhabits sandy bays; was once common in Belfast Lough, now rare. — P. *S*quílla *Linn.* Common on the shore of Belfast Lough.

EDRIOPTHA'LMA.

Gammáridæ.

Tálitrus *Latr.* Locústa *Latr.* Inhabits all our sandy shores. — Orchéstia *Leach* littòrea *Mont.* Inhabits all our sandy shores, living under stones and *F*ùci, and, when disturbed, leaping to a considerable distance. — Gámmarus *Latr.* *P*ùlex *Linn.* aquáticus *Leach.* Inhabiting our rivers and springs. — *G.* Locústa *Mont.* Inhabits the sea along our coasts, never voluntarily leaving the water. — Coròphium *Latr.* gróssipes *Linn.*, longicórne *Latr.* Leach. Inhabits Belfast Lough. In the little pools of salt water at the point fields, Belfast.

Idotèadæ.

Idotèa *Fab.* éntomon *Linn.* Common on rocks. — I. œ'strum *Penn.* On rocks.

Næ'sa Leach bidentàtus *Adams*, Linn. Trans., vol. viii. tab. 2. fig. 3. Found on some limestone lifted out of the sea at Whitehouse. — Sphæròma *Lat.* serràta *Fab.* Found at Whitehouse shore among sea weeds, Sept., 1807. — Limnòria *Leach* térebrans *Leach.* Occurs on several parts of the coast, along with the *T*erèdo, on piles and timber.

Aséllidæ.

*A*séllus *Geoff.* aquáticus *Linn.* Common in rivulets and ditches.

*Ligìa*dæ.

Ligìa Fab. oceánica *Fab.* Common on our shores on rocks.

Oníscidæ.

*O*niscus *Auct.* *A*séllus *Linn.* Common among rotting timber, &c. — Porcéllio *Latr.* *A*séllus *Fab.*, scàber *Latr.* Common under stones, wood, and in old walls. — P. læ`vis *Leach.* Rare: I have only seen one specimen. — P. convéxus I have not met with.

Armadíllo Lat. vulgàris *Lat.* Inhabits among stones and moss.

MYRIA'PODA.

CHILO'GNATHA.

Glomèridæ.

Glómeris *Lat.* marginàta *Vill.* Leach. Very common under stones, and in moss. — G. testàcea. Similar to the last, but of a brick red; the segmental margins a little paler. I have seen a few specimens of this Glómeris: one is at pre-

sent in the collection of the Museum of Natural History, Belfast; the rest in Mr. G. C. Hyndman's cabinet. It is, perhaps, merely a variety of the last.

Iùlidæ.

*I*ùlus *Linn.* terréstris *Linn.* Inhabiting moss under stones and rotting bark of trees. — *I.* dùbius. Pale brown, with a tinge of purplish red: segments striated, a brown dorsal line: the stigmata dark brown; the 4 anterior and 4 posterior rings without stigmata; the extreme segment pointed. Among rotting wood, not uncommon at Cranmore. — *I.* punctàtus *Leach.* Not very rare among rotting wood. — *I.* pulchéllus *Leach.* Very common in gardens, &c.: it destroys bulbous and tuberous roots. It is the dreaded wire-worm of gardeners and farmers. — *I.* pusíllus *Leach.* I met with one specimen under a slate, among the blanched roots of grass.

Polydésmidæ.

Polydésmus *Latr.* complanàtus. Common.

Scolopéndridæ.

Lithòbius *Leach* forficàtus *Linn.* Very common. — L. variegàtus *Leach.* Not uncommon. — L. lævilàbrum *Leach.* Occasionally seen. — Crýptops *Leach* horténsis *Leach.* Not uncommon among moss and rotting plants in fields.

Geophílidæ.

Geóphilus *Leach* subterràneus *Shaw*, Leach. Very common in the garden at Cranmore. — G. marítimus *Leach.* I found some specimens under stones at Bangor. — G. longicórnis *Leach.* Under stones, &c. — G. eléctricus *Linn.* Found in crevices of decaying trees in damp situations.

*A*RACHNOI'DA.

PODOSO'MATA.

Nymphónidæ.

Nýmphum grósipes *Linn.*? Found among *Confervæ* collected about the Whitehead, Belfast Lough. The specimen is at present in the Belfast Museum. Dr. Drummond found another species, April 1820; but, as I have not seen it, I cannot refer it to its proper species.

POLYMEROSO'MATA.

Sirónides.

Sìro *Lat.* rùbens *Lat.* Among moss, rare.

Scorpiónides.

Chélifer *Geoff.* musæòrum *Leach.* Broad, sub-pentagonal, pale brown, imbricated, depressed, legs pale reddish brown, 5-jointed. Cheliferous legs, with the first joint minute cylindric; second, large triangular; third, elongate cylindric, truncated obliquely at the extremities; fourth, clavate; fifth, pyriform; all more or less covered with minute hairs: the hinder legs with 2 claws. Beneath, the abdomen has, near its centre, an infundibuliform rhomboid depression. R. T. In Mr. Hyndman's cabinet. — C. parasítica *Herm.* The hairs on the abdomen of this species are all spatulate with the apex generally trifid; those on other parts, lobated or toothed laterally. Caught in Island Magee, county Antrim, and at present in Mr. Patterson's cabinet, Belfast. Herman's figure is far from correct, especially in the form of the points of the cheliferous legs. R. T.

DIMEROSO'MATA.

Phalángidæ.

*P*halángium *Linn.* bimaculàtum *Fab.* Common. — *P.* cornùtum *Linn.*, *P.* cornùtum *Linn.* male, *P. Opílio Linn.* fem. Common. — *P.* annùlipes. Two female specimens. —*P.* pusíllum. Not uncommon.—*P.* armàtum. Common. — *P.* nigripálpe. Rather rare.—*P.* trispiníferum. *P.* híspidum ? *Herm.*, *P.* spinulòsum ? *Herm.*, *P.* tricúspidum ? *Dufour.* Very common.—*P.* lóngipes. *P.* lóngipes ? *Herm.* Common. — *P.* rotúndum *Latreille.* Very common.

Woolwich, Sept. 30. 1835.

ART. IV. *Illustrations in British Zoology.* By GEORGE JOHNSTON, M.D., Fellow of the Royal College of Surgeons of Edinburgh.

Cl. Annélides, Ord. Errántes, Fam. Nerèides.

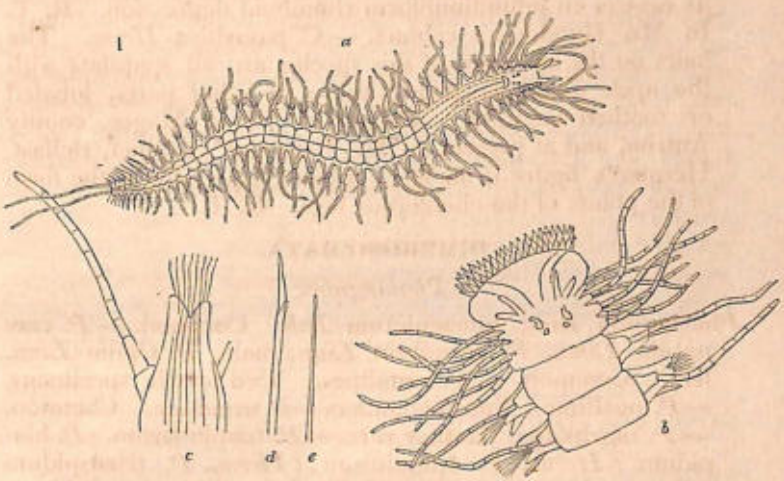
Genus PSA'MATHE.

Character.—Body scolopendriform: head small: eyes 4, in pairs: tentacula 4, short, frontal: mouth edentulous, the proboscis very short, its aperture encircled with papillæ: tentacular cirri 4 pairs, unequal; feet uniramous, bifid at the apex; the dorsal cirri elongate, jointed, the ventral short: tail with two filaments.

This genus, which I have named Psámathe, in honour of the daughter of Nereus and Doris, will take rank, as it appears

to me, between Scýllis and Hesìone. It differs from the first in the number and structure of the tentacula, in the form of the head, and in the arrangement of the eyes; and from the latter in the form of the body, which, I think, is a very important character, and in the structure of the proboscis, which, in Hesìone, is very long and destitute of oral papillæ. I have seen but one species which may be named.

51. PSA'MATHE FU'SCA. (*fig.* 1.)



a, Psámathe fúsca, considerably magnified; *b*, the head, with the proboscis protruded, more highly magnified; *c*, a foot, very much enlarged; *d*, a bristle; *e*, a spine.

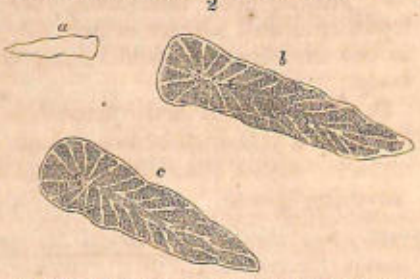
Description.—Animal scolopendriform, 1 inch long, slightly narrowed at the head, tapered towards the tail, constricted between the segments, of a yellowish-brown or fuscous colour: head small, square, entire in front; eyes 4, very distinct, occipital, placed in pairs; tentacula 4, very short, unjointed, frontal, the superior pair thicker than the inferior; mouth terminal, edentulous, furnished with a very short thick proboscis, whose aperture is encircled with a double series of papillæ; tentacular cirri 4 pairs on each side, the inferior about half the length of the superior, jointed, and issuing from a bulged base; segments numerous, nearly of the same breadth and length; feet much developed and very prominent, all alike, conic, the apex divided into two obtuse lobes between which the bristles are protruded: on the upper side of the foot there is a long cirrus, jointed like a *Conferva*, scarcely moniliform, and arising from a swollen basilar sheath; on the ventral aspect the cirrus is short, not extend-

ing beyond the foot, neither is it jointed: bristles retractile, strong, jointed near the top, the point fixed on in a bayonet fashion; they are collected into two small unequal fascicles having a rather small spine in the middle of each: anal segment truncate and terminated with two long tentacular cirri.

This little worm is occasionally met with in Berwick Bay, lurking at the roots of *Confervæ*, corallines, and sponges, between tide marks. It advances through the water with considerable velocity, and in a wriggling manner, pushing out and alternately withdrawing the bristles of its feet, and moving its long cirri in every direction. When the creature is active and first taken, the cirri have a somewhat moniliform appearance under the microscope, but as its activity declines this appearance becomes fainter: they then appear only jointed like a common *Conférva*, and after death even these joints disappear, and the whole organ assumes a homogeneous structure.

52. Plana'ria subauricula'ta. (*fig.* 2.)

The animal, when fully extended, is about six lines long, and two broad, obtuse in front and tapered behind; thus assuming a lanceolate, or tongue-shaped, figure, very thin, flat, smooth, and of a pale or wood-brown colour, with some milkwhite spots scattered over the back. Towards the anterior end we perceive numerous small black eyes, or specks, collected into two irregular parcels with a transparent space between them; the eyes themselves are placed about and within a small circular transparent spot on each side, which is changeable in appearance, and has sometimes the look of a small fold, or auricle, as is represented in figure *b*. The body is transparent enough to allow us to perceive that there are no defined organs, or vessels, beyond the proboscis, which is situated about the middle, and opens on the ventral surface: the interior appears to be entirely composed of gelatinous globules, separated into compartments by clear lines, which run from the centre to the pellucid margin in an imperfectly radiating manner.



a, Planària subauriculàta of the natural size; *b*, the same magnified, the dorsal aspect; *c*, the ventral aspect.

Planària subauriculàta is a marine species, and was found on a leaf of a young specimen of Laminària sacchárina growing near the lowest tide-mark. Kept in sea water, it seemed to sicken sooner than most of its tribe, living with me little better than two days; and although the water had not been changed, yet the coolness of the weather had preserved it from putridity. Its motion was, in general, very rapid; and so smooth, continuous, and even, and made without the slightest apparent effort, that it reminded one of the noiseless lapse of time: but occasionally the worm would behave itself very unseemly, rolling itself up until head and tail met; then unbending, and tossing up and down the tail, as if annoyed by some pest of which it wished thus to rid itself.

It is a genuine species of Planària; but I have not been able to identify it with any hitherto described. It certainly approaches very nearly to the Planària fléxilis of Mr. Dalyell (*Obs. on Planària*, p. 5. fig. 1, 2.); yet there are differences, which persuade me they are distinct, especially the transparent circular spots in the neighbourhood of the eyes, of which there is no trace in P. fléxilis. I propose to distinguish them by the following characters:—

1. *P. fléxilis*, body lanceolate, very thin, semicircular in front, of a dull whitish or pale ash colour; eyes numerous, in two clusters; the intervening space like the rest of the body.
2. *P. subauriculàta*, body lanceolate, very thin, obtuse in front, of a yellowish-brown colour; eyes numerous, in two clusters, with a clear circular spot to each, and a clear intervening space.

ART. V. *Observations on the Construction of Maps for illustrating the Distribution of Plants, with Reference to the Communication of Mr. Hinds on the same Subject.* (Vol. VIII. p. 498.) By HEWETT C. WATSON, Esq., F.L.S.

AFTER waiting a couple of months to ascertain whether any other person would pursue the subject started by Mr. Hinds, I take the liberty of offering some comments in reference to the remarks of that gentleman and, on the subject generally. Mr. Hinds writes, "As the subject of geographical botany has as yet met with but little attention, it is not to be expected that any maps with which we may be furnished would convey much information. The few that exist are, therefore, very bare of facts, containing merely the names of some plants, ac-

cording to their common denominations; without any detail of physical agents, limits of the extension of genera and species, or any circumstances desired by the naturalist. They seem framed more to meet and please the general reader, than for any benefit for the advancement of science." That the maps hitherto published (at least, such as I have seen) bear the impress of that imperfection, which marks a newly created department of science, is too true; and it is impossible that they can yet exhibit the "limits of the extension of genera and species." But from the sweeping assertion, that they contain *merely* the names of some plants, without any detail of physical agents, and are calculated chiefly for the general reader, I must dissent, and most decidedly dissent: for the best maps which I have seen appear to be constructed altogether on the opposite plan; containing *no* names of plants; being almost utterly unserviceable to the *general* reader; and referring chiefly to the *physical peculiarities* of the countries represented and the climatic distribution of plants within them. In saying that no plants are named in De Candolle's map of French botany, I speak from the memory of some years, and not with any confidence; but Wahlenberg's map of Lapland (*Mappa Botanico-geographica*), and of the tract of the Carpathians (*Mappa Physico-geographica*), are now lying before me, and do not exhibit the name of a single plant, except very few (*four* and *one*) incidentally in marginal explanations. The language in which it is written, I regret to say, prevents me having any knowledge of the work of Schouw; but, judging by the translated extracts which have appeared in the *Edinburgh Philosophical Journal*, this author also uses colour in lieu of names. There is, however, a chart by Humboldt, in which the distribution of plants is in some degree shown by the position of their names. The same occurs partially in a map accompanying Barton's *Lecture on the Geography of Plants*. In several instances, also, the altitudinal limits are shown by the names placed at the particular heights in a scale; but the best botanico-geographical maps yet published I apprehend to be in the works of the three first-named authors. (Such readers as may feel interested in this subject, I beg to refer to Murray's *Encyclopædia of Geography*, in which is an outline of botanical geography from the pen of Dr. Hooker, embracing a general sketch of the labours of Wahlenberg, De Candolle, Humboldt, and others. A perusal of Mr. Swainson's remarks on the distribution of birds, in the same work, will repay even the botanist; because most of the general laws must apply to both, and Mr. Swainson's primary divisions widely differ from those usually taken by botanists.)

Now what is the best manner of constructing such maps, or any diagrams in substitution? this being the essential point. Before replying to the question, we should call to mind the different matters which it may be wished to represent, and the degree of precision to be sought in such representation. It may be wished to display the distribution of individual forms known as species and varieties, or the groups of technical botany called orders and genera; or the object may be to exhibit the local physiognomy of vegetation *en masse*, in connection with differences of climate, physical configuration, soil, &c. The maps will vary accordingly.

To represent the distribution of individual forms or species, let us first imagine a common geographical map, in outline, of such dimensions as would render it possible to mark every locality for any given species, by some sign, or spot of colour, covering a corresponding space of the map. This would give an exact picture of the topographical distribution; but, as it would require to be made on the scale of at least a yard to the mile, it is obviously quite out of the question. With less precision, though still keeping sufficient exactness for useful purposes, we might greatly reduce the scale by indicating all localites within certain distances of each other as single ones, the distances depending on the size of the map. In maps on a very small scale, localities many miles asunder would necessarily be reduced to units, and single stations of trifling extent would be exaggerated, much as we see the breadth of rivers, roads, and canals in ordinary maps. On botanical maps of this kind, the political divisions and names of places might be given, or omitted, as found convenient. Another mode of representing the distribution of species, would be by an outline map, in which the only places named should be those where the species was known to grow, larger or small topographical divisions (townships, parishes, counties, &c.) being adopted according as the species was more or less generally diffused. Additional information respecting the greater or less abundance of the plant, its claims to be considered native, and the authority for its existence in the places, might be conveyed by a corresponding variation in the size or character of the letters composing the names, as usually done to distinguish cities, towns, and villages. In these cases, a map would require to be devoted to each species, and the cost be very great.

But it is by no means impossible to give a general sketch of the distribution of several species by means of a single map, though precision of detail must be sacrificed if many are introduced into the same map. To convey pretty full details of

a few species, we might adopt some arbitrary sign (see Mr. Hinds's Paper before referred to), composed of parts, any of which could be subtracted at pleasure. Each part should represent a given species, the whole sign representing all the species. On any spot of the map, the whole or part of this sign could be placed, according as all or fewer of the species were known to exist in the locality which it would thus point out. It would be a more simple, although a less precise method, to write the name of each species, within the outline of a common map, in characters extending over a larger or smaller space, according to the actual extension of the species. As the size of the letters must correspond to the space over which the names would be extended, a single glance would, in most, cases teach the prevalent vegetation of a country; a closer inspection becoming necessary to discover its rarer plants, the names of which would be written in small characters at their particular localities; as we see the names of villages and towns in less conspicuous characters than those used for counties or kingdoms. Unless in the case of particular species of much importance or interest, it could hardly be worth while to attempt any of these methods, as being far too expensive for ordinary publication, and the advantage gained not being equivalent to the cost; since all the information could be conveyed by language alone, assisted by a common geographical map. The superiority of maps over printed pages rests in the former presenting a picture to the sense of sight, all seen at a glance; whereas words excite only an imaginary picture in the mind, often a very imperfect one, and rapidly fading from memory.

The distribution of orders and genera might be shown exactly in the same way as species, by regarding these groups as individuals; and the plans suggested for depicting the distribution of several species on one map, would be well adapted to exhibit that of orders and their included genera, or of genera and their included species. But these imaginary groups, into which it is found requisite to arrange vegetable forms for the convenience of technical botany, appear to have so little of necessary connection with geography, or even of direct relation to it, that we must be regarded as studying coincidence, rather than dependence and causation, when seeking to connect them. This assertion is at variance with received notions, but I am unaware that it can be disproved.

It is, of course, altogether otherwise when the general stamp or physiognomy of vegetation, as affected by differences in the climate and physical peculiarities of countries, comes under consideration. Here botany and physical geo-

graphy are directly and inseparably connected in the relation of cause and effect. Here, therefore, we most need to call in the aid of maps; and here, fortunately, we shall find them most easily applicable, and at a cost comparatively small. As in this investigation we represent vegetation in the aggregate, not according to technical details, a single map may be made to include the whole flora of a country; and one in which its physical peculiarities are well represented should be selected for the purpose. On such a map the divisions and subdivisions into vegetable regions could be marked nearly in the same manner as we see the extent of kingdoms, counties, &c., laid down. Since nature, however, does not admit the precise and abrupt lines of demarcation seen in political and parochial divisions, it would be wiser to avoid attempting boundary lines; shadings or conventional marks being substituted instead, such as might be gradually intermingled in proportion to the intermingling of the real vegetation. Colours might be used in place of the marks, but would scarcely answer so well; or the names of places in different characters could represent their vegetation.

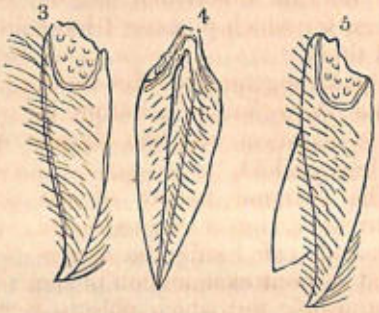
I have remarked above, that nature does not admit of precise boundary lines; yet hitherto lines have been almost invariably resorted to for the purpose of indicating distribution in botanico-geographical maps. In the distribution of species (and other superior groups necessarily follow the same laws), we usually see a definite extent of country over which each respective species is copiously scattered. Whichever way we depart from these head quarters, the number of specimens or individuals is found to decrease; large intervals then occur without a plant of the species being seen; and, finally, a few localities may be found, scores of miles apart, and without a single specimen between them. How can such distribution be represented by lines? If we connect the extreme localities by lines, they must be drawn across, and also include, a large tract where the plant does not grow; and thus they will convey to the eye an appearance of abrupt termination which has no real existence. Signs more or less thickly placed, and shadings more or less intense, are obviously far better adapted to depict the realities of nature. Thus, we come nearly to the plan suggested in an early Number of this Magazine; and if the skeleton maps there proposed can be carried into effect, they will form a most important aid to the geographic botanist. See II. 342.

Ditton Marsh, Surrey, Nov. 1835.

ART. VI. *On the seed-dispersing Apparatus of the musk-scented Heron's Bill (Erodium moschatum* W.). By ROBERT MALLET, Esq.

HAVING some plants of the Erodium moschatum in cultivation, I have been struck with admiration in observing the arrangements for the dispersion of the seeds; and, having looked into many books, and not found any particular notice of this, I am induced to send a description of it, for the benefit of those who admire the innumerable and beautiful contrivances of the Almighty Architect.

Each seed (of which there are five to each flower) is enclosed in a capsule [carpel] (*figs.* 3, 4, 5.), attached by its upper extremity to a tail, or awn, which possesses the most wonderful hygrometric sensibility; as, indeed, does every other part of the plant. These five awns lie in grooves in the receptacle of the flower [and this receptacle is central to, and is the axis of, all parts of the flower and fruit] (as in pelargoniums, geraniums, &c.); and a magnified section of it is shown in *fig.* 6.; and, also, a section of one of the awns as it lies in the groove. *Fig.* 8., shows the general appearance of the calyx and receptacle clothed with the seeds. When the whole system has arrived at a certain point of *aridity*, the awns, which are provided with an exquisite power of torsion, twist themselves out from their grooves (*fig.* 9.), and, at the same moment, a number of downy filaments, hidden at the back, or inward face, of the awns, bristle forth: they all together become, now, detached, and fall to the ground, as in *fig.* 10.

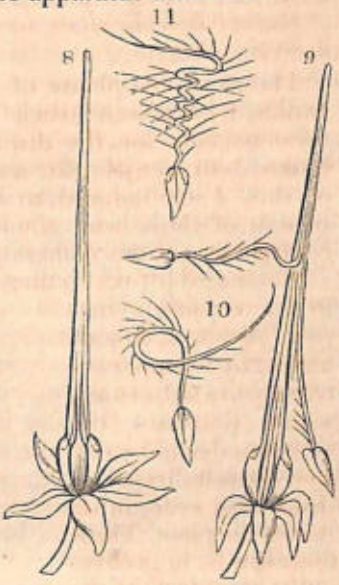






But here they still continue to twist; and, from the position in which they always lie, keep tumbling over and over, *and thus receding from the parent plant*, until they have twisted themselves into the form of *fig.* 11., in which they are perfect balloons, ready to be wafted away by every zephyr. The awn attached to each capsule [carpel] assumes, in the progress of twisting, the sections *a*, *b*, c, (*fig.* 7.) as viewed microscopically. But

motive power has not ceased to the apparatus attached to the seeds when this has twisted itself into this balloon shape; the slightest hygrometric change produces motion, either backwards or forwards, in the awn; and the constant tendency of this motion is to *screw the seed into the ground.* Such is the shape and great sensibility of the awns, that they may be readily applied to form most delicate differential hygrometers, for which purpose I have used them.



The arrangement of the seeds of the Pelargònium peltàtum is almost identical with the above, but less marked.

The extreme beauty of the contrivance, thus attempted to be described, can hardly be appreciated without examination of the plant itself; for which object, as well as for its appearance as a border plant [and the high musky odour of its herbage], it is worthy of cultivation.

It seems to me that no part of the organisation of plants is so well worthy of attentive examination as the contrivances for effecting the dispersion of the seeds: these in all cases show the benevolent provisions of the Creator, that vegetable food may be spread abroad, and increase, and that the earth may be full. Each solitary contrivance of dispersion strikes the mind as above human invention, and as defying human imitation; but when we wander from one to another, and see their almost infinite variety, admiration of individual contrivance is lost in the plenitude, the apparent wantonness of immeasurable design, every where different, and every where perfect.

Capel Street, Dublin.

ART. VII. *Particulars on Appearances of Instances of Aurora Borealis at High Wycombe, Bucks, on Nov.* 18–19. 1835, *Jan.* 7. 1831, *Sept.* 9. 1835, *and Sept.* 13. 1835. By JAMES G. TATEM, Esq.

THE aurora borealis which was observed last night, November 18–19. 1835, was too splendid, and too extensively seen,

not to claim the attention of the correspondents of your Magazine. Allow me, therefore, to state the appearances at this place, in the hope that others, better qualified than myself, may add to the report of their observations their thoughts on the origin or cause of this beautiful and interesting kind of phenomenon.

At 9 P.M. the aurora was first seen by me, although some indications had been noticed more than an hour before. At this time the whole sky, from the N.E. point of the horizon to the S.W., was highly illuminated: at the base was a brilliant elliptic arch of bright yellow; above which, at some distance, was a second luminous arch, surrounded, at the apex and for some distance on each side, with points, those nearest the centre forming isosceles triangles: the space below the first arch was of a ferruginous purple colour, while that which separated the two arches assumed a brighter blue tint, approaching nearer to the general colour of the sky at night. From these arches frequently emanated long streams of light, some of a bright red, and others of a greyish blue, colour, which extended considerably to the southward of the zenith; at times the whole body of light was much increased, as if a discharge had taken place, when streams like to those before-mentioned were ejected, and coruscations, having the appearance of tidal waves flowing on a level shore, were noticed. These flickered in an extraordinary manner, and their undulations were extremely rapid as they passed off into the distance. By 10 P.M. the rays and coruscations had ceased, and the lower arch of silvery light alone remained; but about 11 o'clock the grey rays were again ejected, but did not continue for any length of time; from this hour, until 5 o'clock the following morning, the north-western quarter of the heavens was illuminated by a silvery light, like that of the rising moon, rendering distant objects distinctly visible. What most excited my surprise is, that, at the time the aurora was brightest, a few streams of red light seemed to cross those issuing from the arches almost at right angles. A fresh breeze blew from the westward during the time; the barometer rose a little, and the thermometer, which stood at 41° 50′ at 10 P.M., fell to 35° 25′ in the night; some rain fell on the night of the 19th. The accompanying sketch shows the appearance about half-past 9 o'clock (*fig.* 12.)

The appearance of aurora borealis above noticed was by much the most splendid one that has been seen at Wycombe during my residence at it (nearly thirteen years). The other instances in which they have been deserving of particular attention occurred on January 7. 1831, and on September 9.

and 13. 1835: the following is a copy of my notes on these, made at the time: —

January 7. 1831.—The most splendid aurora borealis that has been seen in these parts for the last thirty years, was observed this evening. About 7 o'clock, the whole atmosphere from the E.N.E. to the N. was brilliantly illuminated by a deep yellow light; from the first-mentioned point several curved

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and divergent rays issued; at intervals streams of a greyish-blue light shot up with great velocity, and, passing the zenith, vanished in a few seconds; these appearances continued for nearly an hour, when the radii assumed a deep red tint, and the whole light spread further to the westward; at one time two red rays took the shape of a very pointed arch, like that of a lancet window; with little variation as to form and brightness, the rays continued, until past 9 o'clock, still extending more to the westward, and reaching from the E.N.E. to the

W.S.W. After this hour the aurora gradually became fainter, but had not entirely disappeared until after midnight.

September 9. 1835.—This evening the most brilliant aurora borealis that has appeared here since January 7., 1831, was observed. The whole north-western quarter of the heavens was illuminated by a pale yellowish light, from which rays of nearly the same colour shot forth, and extended beyond the zenith: these appearances continued for nearly the space of two hours.

September 13. 1835.—The aurora was again visible this evening, when the rays were of a red tint, and rose nearly to the zenith; but were not so bright, and did not continue so long, as on the 9th. The wind, on both occasions, blew fresh from the westward, and these phenomena were succeeded by rain.

It may be well to notice, that the wind blew from the westward when the aurora of January 7., 1831, was visible; that the barometer was very high, and that the thermometer fell fifteen degrees below the freezing point during the night, but afterwards gradually rose; and that rain fell on the night of January 9.

Wycombe, November 19. 1835.

ART. VIII. *Particulars on Appearances of Instances of Aurora Borealis at Swanswick, near Bath, on Nov.* 17–18, 18. 1835. By ——— ———.

THE beautiful phenomena of the aurora borealis having been displayed, with unusual splendour, on the evening of November 18., and, in various parts of the country, excited more than ordinary attention, it may be interesting to some of your readers to record the following memoranda of their appearance; and these may, by affording means of comparison with the observations of more scientific individuals in other and distant parts of the country, be useful in a meteorological view.

The aurora borealis had been marked on the night of the 17th, and early in the morning of the 18th. The prevalence, however, of an almost uniform stratum of cloud prevented, at the time of my observation, any other appearance than that of considerably diffused and reddish light along the northern horizon. About 1 A.M., this light was equal in intensity to strong moonlight in a clouded night.

On the evening of the 18th, circumstances were highly favourable for observation. Soon after sunset, considerable light was seen to be diffused along the northern horizon, assuming, about 8 P.M., the appearance of a broad and ill-defined bank

of hazy light. From a quarter before nine, till a quarter past nine P.M., the phenomena were of the most striking description. A broad, elliptical, but ill-defined, arc of light extended from about E. by N. to W. by N. The altitude of the centre of this arc of light, which, at a quarter before nine, P.M., was about 30°, became gradually less; the arc itself finally, as it were, dissolving, and leaving only a general and faint light along the horizon. Meanwhile, however, streams of light, varying in intensity and breadth, were sent up from different parts of the arc, at irregular intervals, towards, and reaching, the zenith; sometimes appearing stationary; at others, visibly moving with great velocity. But the most remarkable feature of the phenomenon was the rapidity and intensity of the coruscations, often thrown up simultaneously from almost all parts of the arc of light, and producing an effect somewhat similar to the consecutive and concentric waves on a pond after throwing in a stone: there were certain parts of the heavens in which these waves of light were usually much more brilliant than in others. These coruscations were very similar in appearance to those in the imitative-aurora electrical experiment in the exhausted flask; and they followed, often, so rapidly, and in masses of such breadth, as to have somewhat the effect of immense clouds of luminous striated smoke.

The arc of light, when first observed, about a quarter before nine P.M., passed across the stars α and β (the pointers) in Ursa Major. The principal stars in that constellation were visible through the luminous arc, but somewhat feebly. About the zenith, and extending eastward as far as the Pleiades, the clouds of luminous matter darted sometimes from E. by S. towards the N., and sometimes from E. to W. A considerable breadth of the heavens between the N.W. and the W. was overspread with a dull red light. About nine P.M. a bright meteor, or falling star, was observed; it appeared about the middle of the constellation Camelopardus; its direction was opposite to that of the auroral coruscations, darting towards the N.E. point of the horizon; and its train visible, probably about 10° or 15°.

The barometer, which, at the place of observation, stood, on the 13th, at 29·86, had gradually sunk, at nine A.M. on the 18th, to 29·49, but at ten P.M. had risen again to 29·52.

The minimum temperature of several preceding days had varied from 30° to 36° Fahr.; but in the night, between the 17th and 18th, had not been lower than 42°.

The wind had gradually veered from N. on the 15th, to N. by W. on the 16th, and W. by N. on the 17th, to W. on the 18th, and blew steadily, and rather briskly, during the whole

of the evening of this day. The morning of the 18th presented extensive and almost continuous sheets of cumulo-stratus, followed by ·03 of fine rain; but, excepting a few clouds, ranking under the denomination of cirro-cumuli, the night was clear and beautiful.

The auroral light was sufficient to throw considerable, though indistinct, shadows of near objects on a whitened wall. About eleven P.M. no trace of the aurora remained, except a faint luminosity in the northern horizon.

The minimum temperature of the succeeding night was 37° Fahr., and the barometer rose to 29·59, the morning being fine and clear, with the wind N. by W.

P. S.—I may add, that the *minimum* temperature of the 21st and 22d has been 50° Fahr. — *Swanswick, about two miles north of Bath, November* 20. 1835.

ART. IX. *Particulars on Appearances of Instances of Aurora Borealis observed in the Neighbourhood of London, on November* 17–18. *and* 18. 1835; *and on Events in the Weather subsequently: with Remarks relative to the Question of the Shower of Meteors annually occurrent about Nov.* 13. By W. H. WHITE, Esq.

THE two beautiful exhibitions of aurora, on Tuesday and Wednesday evening last, must have afforded great pleasure to every lover of meteorological science who witnessed them. The first of them appeared about 11 P. M. on the 17th, and played about the N. and N. W. for about an hour, exhibiting every variety of form and colour that imagination could well picture: indeed, so much did the appearance resemble a natural fire at a distance, that we are told by a paragraph in the *Times* of Thursday, that "sixty men and twelve fire-engines" hastened towards some "dreadful conflagation!" About midnight, clouds intervened, and the fire became extinguished; but the aurora again burst forth about 3 A.M., so that the firemen were again on the alert; and so completely were they deceived by the appearance (though I regret I did not witness this second exhibition myself), that several of the fire-engines actually went as far as to Hampstead, and others to Kilburn, before the men were undeceived. This aurora was followed by a steady gale about 4 P. M. on Wednesday, which lasted about two hours, and terminated by a heavy shower; after which the evening was calm, clear and mild; and

An Aurora of a very different character appeared about 8

P.M., which sent forth dartings of white light, which appeared not much unlike that beautiful playful lightning often witnessed on a clear summer's evening. A little before 9 P. M. columns of white light shot up from an immense arc, about 30° of altitude, which was stretched across the horizon from N.W. to N.N.E. This luminous arc appeared to form a part of a circle, the greater portion of which was below the horizon, and of which, I should suppose, the sun formed the centre, as the arc gradually moved towards the east, and at the same time diminished in its altitude, as the *aurora* became more faint: few traces were left at 11 P.M. The streams of light, which "reared their heads" as high as the zenith (and sometimes beyond), and which issued from the arc, and sometimes from within it, followed each other in swift undulatory motion, stretched from W. to the Pleiades, over which it appeared sometimes as if a veil of the finest texture was thrown, as they were perfectly visible through it. Few, if any, of the columns were tinged with colour. Rain followed on Friday morning, when the massive clouds that followed indicated a stormy atmosphere.

The meteoric Shower, expected about the 12th of the present month, I fear has not been very distinctly seen this year. I have only seen one meteor, and that was on the night of the 12th, at 10 minutes before 11 P.M. It appeared near the North Pole Star, and passed off just below the Pleiades, leaving a short train of light behind. Evenings were generally cloudy and unfit for observation.

Old Kent Road, Nov. 20. 1835.

ART. X. *Notices of Facts in Application to the Question of the Occurrence of an extraordinary Display of Meteors every Year, on about Nov.* 13.; *and on the Displays of Aurora on Nov.* 17. 18-19. 1835. By the Rev. W. B. CLARKE, A.M. F.G.S., &c.

THERE was no meteoric display seen here on the night of Nov. 12–13. 1835, nor on any preceding or succeeding night up to this date. The sky was clear and favourable on the 12th, 13th, and 14th: it had been for several days obscured, as also on the 15th and 17th. The wind in the east, and north-east, and north, from the 10th to the 17th; on the 17th it came from the west: the cold previously inconvenient to the feelings; thermometer exposed, 35° to 50° at noon. On the 6th, at 7½ A. M., a splendid meteor was seen at Bristol, in the east, about 20° high, emitting blue and red sparks, with

a long train, the circumference nearly as large as a man's head. Rain followed at noon, lasting till night. On the 15th and 16th falling stars, not numerous, but frequent, a little to the south of the zenith, at this place; direction generally to the north-east. Clouds immediately followed, obscuring the stars, before seen distinctly. No snow or frosts here this autumn, save one or two hoar-frosts. On the 17th, at 7 P. M., in the *south*, the aurora rather bright, streaming from a very black cloud, extremely low in the atmosphere.

Stanley Green, Nov. 19. 1835.

[An addition subsequently made by Mr. Clarke.]

12th.—At 9½ P. M. a splendid meteor rushed from the Pleiades to Ursa Major, leaving a train of sparks and balls of fire, which were visible several seconds after the meteor vanished.

14th.—Very sudden cold, with frost and snow, at Strasbourg; thermometer there at −7° R. Cold more intense in other places of Rhenish Bavaria; the thermometer at −12° R.

17th.—Clouded; aurora in the *south*, about 30° high; night very dark.

18th.—Splendid aurora, with merry dancers, from half-past 7 P. M. to 1 A. M. on 19th; the beams and coruscations shot up past the zenith; a triple arch formed. The cloud upon which the lowest was formed gradually disappeared to the north. By the accounts from Lincolnshire, Cumberland, Middlesex, Kent, &c., it appears that auroræ were visible all that night over those counties; but, by comparison of the time, it also appears that the auroræ travelled northerly, appearing later constantly in that direction. There must have been many that night; and, from observations made here, I think they were not very high, but greatly extended. The magnetic needle vibrated perpendicularly during each fresh jet and rush of the light to the zenith.

18–19th (night).—Tremendous gale at Hamburgh and Cuxhaven from the north-west, producing great inundation.—Ice broke up at Riga. The wind changed in the south of England to west, with rain, just before the aurora. During the time it was brightest, several meteors shot along the line, perpendicular to the auroral rays; and one or two along the edge of the cloud, leaving trains, immediately after which the wind freshened.

Stanley Green, Dorsetshire, Nov. 28. 1835.

ART. XI. *Remarks on Appearances of the Display of Aurora on November* 18. 1835, *as observed in Norfolk.* By Mr. SAMUEL TAYLOR. Extracted from a Letter to the Conductor.

DID you see the aurora borealis last night (18th)? I certainly never witnessed any thing so splendid. The whole northern hemisphere seemed a blaze of mild white light: an immensely wide-spread arch, or bow, from which issued the most brilliant coruscations; sometimes shooting up in long flashes, or flakes, as it were; and at others rolling upwards like waves, only with infinitely greater rapidity. These rapidly succeeding waves of light reminded me of mist driven by a strong wind up the mountain sides. Have not you seen such? What is the cause of this phenomenon? It seems intended as a provision for light; but, if so, why does it occur so seldom? Many of our nights are totally dark; though I suppose, at these very times, other and more northern regions are benefited by the aurora. The day with us had been unusually stormy, with occasional heavy rain; but the evening was uncommonly clear, and the stars displayed great brilliancy. This morning the air was mild, the sun shone brightly, but the evening was cloudy. I do not know why, but the wise in such matters tell us we are to have a hard winter; of which, as they say, the early appearance of woodcocks, and other birds of passage, is a sure indication. Has the aurora borealis aught to do in this matter? I should fancy not; because I remember that two years ago, though not so brilliant as last night, still very brilliant it assuredly was; and yet we had a mild winter, as, indeed, we had last year.

Whittington, Stoke Ferry, Norfolk, Nov. 19. 1835.

ART. XII. *A Statement of the Condition of the Weather, chiefly the Direction of the Wind, before and after Instances of Aurora Borealis, observed at Dundee in* 1833 *and* 1834; *and an Account of Instances of Aurora Borealis, and other Meteoric Phenomena, observed at Dundee in Dec.* 1834, *and in part of* 1835. By Mr. WILLIAM GARDINER, Jun.

AGREEABLY to the desire of Mr. W. H. White (VIII. 345.), I supply a few statements respecting the direction of the winds before and after the time of my observing of the instances of the aurora borealis, in 1833 and 1834 (VIII. 94—96.).

In the first column of the following tabular view, the dates of the auroral appearances are given as registered in VIII.

95, 96.; in the second, the prevailing winds preceding the displays, and in the third, those succeeding them.

1833.		
April 5.	1—4. east, strong; 5. west.	6. E.; 8. S.W.; rain and thunder, 7 and 8.
11.	9. W.; 10. S.W., stormy; 11. N.	12. N.W.; 13. S.W.; 18. N.W.; 19—29. W. and S.W.
May 16.	12. S.W.; 15. S.; 16. S.W.	17. south-west.
17.	17. south-west.	19. S.E.; 21. S.W; 25. N., strong
June 4.	May 31. S., thunder; June 1. S.W.; 4. E.	6. S.W.; 12. N., strong; tremendous thunder storm, on 11.
Aug. 6.	4. W.; 5. N., strong; 6. S.W.	7. S.; 8. E.; 9. N., thunder and heavy showers.
20.	11. N.W.; 13. N.E.; 17—20. N.W.	21. S.; 22. S.W., strong gale.
Sept. 1.	Aug. 31. N., strong; Sep. 1. N., strong.	2. S.W.; 3. N.; 5. S.W.
9.	8. east; 9. the same.	10. south-west and south.
12.	11. south; 12. west.	13. south-east; 15. east.
17.	17. north-east.	18. north-west.
18.	18. north-west.	19. north-west.
19.	19. north-west.	20. var.; 21. S.W.; 22. S.E., very strong; 25. S.
Oct. 6.	2. east; 6. west.	7. south-west.
8.	8. south-west.	9. south-west.
10.	10. south, strong.	11. south-east to south-west.
11.	11. south-east to south-west.	12. north-west.
12.	12. north-west.	14. south-west, strong.
15.	15. south-west.	16. N.E.; 18. W.; 20. stormy at night; 24. east.
Nov. 2.	1. N.W., hard gale; 2. var.	3. west, strong.
3.	3. west.	4. north-west, strong.
5.	5. south-west.	6. south-west, strong gale.
6.	6. south-west.	7. north-west.
7.	7. north-west.	8. evening, south-west.
8.	8. north-west — south-west.	9—13. south-west.
15.	14, 15. south-east.	16. south-east.
16.	16. south-east.	17. W.; 18. S.W.; 21—22. S.W., violent gale.
23.	23. south-west.	25. N.W.; 28. S.E., violent gale.
Dec. 4.	3. north-west; 4. south-west.	5. S.W., stormy, lightning; 6. W.; 7. S.W.
9.	9. south-west.	11. S.W. to N.W.; 13. S.W.; 21. N.; 25. N.W.
29.	26. south-west; 29. strong gale	31. north.
1834.		
Feb 9.	4. south-east; 6—9. S.W.	10. south-west; 13. west.
Mar. 5.	1. S.W.; 2. W.; 3—4. S.W., violent gale.	6. south-west, violent gale.
6.	6. south-west.	7. south-west, calmer.
7.	7. south-west.	8. S.W., violent, gradually dying away.
9.	9. south-west.	10. north-west.
10.	10. north-west.	12. S.W.; 13. S.E.; equinoctial gale, 22, to 25.
30.	28. S. stormy; 29. N.W.; 30. S.W.	31. south-west.
31.	31. south-west.	April 2. west.

April 4.	3. north-west; 4. south-west.	5. N.W.; 7. S.W.; 8—11. N. and N.E.
28.	24. S.W.; 28. N.E., stormy.	29. north-east; May 2. east.
May 3.	3. south-west.	4. south-west.
5.	5. south-west.	6. south-west.
7.	7. south-west.	9. north-west.
12.	11. south-west.	13. S.W.; 15. E.; 18. W.; 22. E.
June21.	9—21. mostly south.	23. var.; 29. east.
July 18.	15. S.W.; 18. N.E., strong.	19—20. north-east, stormy.
25.	25. north-east.	26. N.E. strong gale; 31. S.W.
Aug.31.	27. north-west; 30. south-west.	Sep. 1. south-west.
Sept. 1.	1. south-west.	2—5. south-west.
6.	6. north-west	8. N.E.; 13. S.W.
Oct. 1.	1. south-west.	2. south-west.
3.	3. south-west.	4. S.W., strong gale.
4.	4. south-west.	5. south-west.
5.	5. south-west.	6. south-west.
6.	6. south-west.	7. N.W., strong; S.W., even.
7.	7. north-west.	8—9. S.W., strong gale; 17. N.W, violent.
23.	21—23. north-west boisterous.	24. north-west, loud.
26.	26. west.	27. south-west.
29.	28—29. south-west.	30—31. S.W., very stormy.
Nov. 2.	1—2. south-west, stormy.	3. to 5. almost a hurricane.
3.	3. south-west.	6. north; 17. S.W.
Dec. 4.	1. S.W., very stormy; 2. N.W.; 3. S.W.	5. south-west.
5.	5. south-west.	6. south-west.
6.	6. south-west.	7. S.W., very stormy; 8. N.W., strong.

In December, 1834, there were two auroræ observed here, additional to those recorded in VIII. 96., the one on the evening of the 21st, and the other on that of the 22d. The 21st was a most delightful day, and made one fancy that midwinter was wed with midsummer; for the trees, shrubs, and herbage, though denuded of their green glory and blossomy grandeur, were profusely decorated with beautiful frost-flowers, among which the sun's light sported in all the glowing tints of a warmer season; the air was clear and healthful; and the flocks of finches and larks that bivouacked about the hedges and fields, evinced, by the sprightliness of their motions, and their half-warbled ditties of gladness, a much greater share of vivacity than is usually shown by them at this season. The manifestation of the aurora in the evening was splendid, but that on the succeeding night was much more brilliant and extensive, and the streamers kept up their airy revels till next morning. On the 19th, a hard frost had set in, which continued till the afternoon of the 29th, with the exception of a thaw of short duration on the 23d. The wind was chiefly westerly until the 29th, when it shifted to the S.W., and brought fresh weather, with an ample outpouring of rain during that night and next

day. These auroræ were followed by a very dense hoar-frost, but no immediate fall of rain in this locality, although in Dorsetshire (see VIII. 144.), there was rain on the evening of the 24th.

Up to this date, in the present year, 1835, there have been only *six* manifestations of the phenomenon, and none of these of very great brilliancy. The first occurred on the evening of January 4th, consisting of a beautifully stratified arch of light and shade, rising to a considerable distance above the horizon, and throwing out a few rather vivid streamers. The wind was S.W., with a strong frost, and on the 5th, 6th, and 7th, the sky was obscured, and the streets whitened with a hoar-frost that was falling like a shower; or, in the homely words of our good old dames, there was "a smore o' rime to th' very doors." There was a thaw on the 6th, but of short continuance, as the frost overcame it in the evening. On the 10th, there was a lunar halo; and on the morning of the 11th, a large and well-defined halo encircled the sun, showing distinctly all the colours in the prismatic spectrum, and curiously intersected by long streaks of whitish clouds. The wind veered to N.E. in the evening, and there was a heavy fall of snow, followed next day by a thaw with rain; wind S.E. On the 19th, there was a violent snow-storm; and, on the 20th, the frost was so intense, that the Perth steamer was stopped from plying on account of the state of the river with ice. Mild fresh weather succeeded; the sky-lark was in full song on the 29th; and on the 30th, the blackbird and thrush poured the rich sweetness of their mellow song. The next aurora was on February 7th, and vivid. On the 5th, the wind was N.W., and the 7th S.W., and on the 8th N.W. again, and stormy, with rain and snow. On the 3d of March there was an aurora, but neither brilliant nor extensive; and on the 4th a fire-ball, wind N.W. The weather was very stormy from the 25th of February to the middle of March. On the 5th, the wind was S.W., with much rain in the evening, and on the 7th N.E., with a heavy fall of snow. On the 25th, there was another aurora, without coruscations; wind N.W., accompanied with much hoar-frost, and followed by cloudy weather, but no rain till the the 31st, when a good quantity fell. Wind N.E. on the 27th, S.W. on the 28th, and E. on the 31st.

There were no more auroræ until the 24th of September; but on the 11th of August there was a thunderstorm of such awful intensity, as will render it memorable in this quarter for many a day. It began about seven o'clock in the evening, and continued till past midnight, during which period a scene of such terrific grandeur was presented as is seldom witnessed, except

in tropical climates. The approach of the storm was indicated by a distant growl, which grew louder as it advanced, and the lightnings streamed from the gathering clouds. As the darkness increased the lightnings became more vivid, and revelled in all the exuberance of their wayward fancy, darting from cloud to cloud their forked splendours, and tossing from heaven to earth, and from earth to heaven, their broad sheets and bright balls of living flame. About ten o'clock, the storm reached the acme of its magnificence, and was then dreadfully appalling. The darkness was now so intense that the tops of the houses in the streets were rendered invisible; but the gloom was only momentary, for the lightnings flashed incessantly, and with more brilliancy than ever; the thunder was one wild and deafening roar, —

> " Peal on peal
> Crushed horrible, convulsing heaven and earth,"—

and the rain rushed down in an almost unbroken torrent. The rain was not of long duration; but the thunder continued to bellow tremendously till nearly midnight, when it gradually died away in the N.E., and the lightnings were seen to flash for two or three hours longer. In Forfar a young man fell a victim to the fury of the elements in his own bed; and property in various places sustained different degrees of injury.

On the evening of September 24th, there was an aurora with coruscations betwixt ten and twelve o'clock, but not extensive; none of the streamers rising above Ursa Major. On the 23d and 24th there was a brisk gale from S.W., which increased in strength on the 25th, but slackened about noon; and rain fell from one till four, and again in the evening. On the 27th there was much rain; on the 28th a cold stormy breeze, rain with and lightning; and on the 29th a violent gale.

The last aurora observed here was on October 21., and, though not of great brightness, attracted the attention of those who were gazing towards the western sky at the dim form of Halley's comet. It was accompanied with many shooting-stars. From the 12th to the 20th the wind had been S.W.; on the 21st it was N.W., and on the morning of the 22d S.W. again, but shifted to E. during the day, and blew in violent gusts in the evening, with rain from eight till ten o'clock. On the 26th, there was a severe storm of wind and rain, which was much more terrible in its consequences than the thunder storm of August 11. The 25th was cold, with an easterly wind, the barometer suddenly sunk very low, and in the evening rain began to fall, and continued till next day, being very heavy

about midnight. At an early hour on the morning of the 26th, the wind began to blow from N. or N.E. with terrific violence, and continued till noon. The streets were strewed with fragments of chimney-cans, bricks, slates, stones, mortar, &c.; and the lead was torn from the roofs of the churches and houses, and hung dangling in the gale. The chimney-stalk of the engine-house at the top of the first inclined plane of the railway fell with a dreadful crash, and killed two men on the spot. The destruction of wood was immense. On the estate of Burnside, near Forfar, it is said 1100 trees (some of large size) were torn up by the roots; the wood of Turin was in ruins; and the road between Forfar and Glammis was blocked up with huge trees. In Balgay wood, in the vicinity of Dundee, after the storm, I counted upwards of 100 large trees, principally alders and larches, laid prostrate on the earth; and in other places I saw instances of trees with their trunks snapt asunder at a few feet from the ground, where they measured 3 ft. or 4 ft. in circumference. The river Almond, the Water of Leith, the N. and S. Esk, and other streams, were so much swollen that they overflowed their banks, and did much damage to the adjacent country. The Tweed rose 10 ft., and the Tyne 7 ft., above their usual level. At Stonehaven the hurricane tore up trees by the roots and dashed them about, and threw down stacks of corn, and scattered the sheaves over the fields; and was accompanied with torrents of rain, which made the Carron burst its boundaries and inundate the town. Banff was also flooded; and the destruction of property there, as well as at other places, was very great.

Dundee, Forfarshire. Nov. 13. 1835.

ART. XIII. *A Notice of the Display of Aurora on Nov.* 18. 1835, *as observed at Norwich.* By SAMUEL WOODWARD, Esq.

ON Wednesday evening, November 18., at from nine to ten o'clock, this phenomenon was more brilliant than I had ever seen it. The movement of the luminous particles so strongly reminded me of the play of light on the surface of the sea on a warm summer evening, which, although the agent is a minute *Medùsa*, the ruling cause is no other than electricity. To a common observer, the movement of the aurora on this evening would have been attributed to the wind; as the electrical current which produced the flashes, affected also the remaining foliage of the trees, in the same way that a current of air would; the wind at the time was southerly. — *Norwich, November* 28. 1835.

ART. XIV. *On the Fossil Remains of Elephants, and other large Mammàlia, found in Norfolk.* By ROBERT BAKEWELL, Esq.

DURING a visit of some weeks in the present autumn (1835) to Cromer and the eastern side of Norfolk, I have examined many of the fossil remains of large Mammàlia, particularly those of the elephant, which are found so abundantly in this part of the kingdom that it might be geologically called the Land of Elephants. I believe the number of grinders and bones of the elephant that have been recently discovered on the north-east coast of Norfolk exceeds the aggregate amount of all that have been elsewhere found in Great Britain of which we have any record.

It is only within a few years that these fossil remains have been generally known. Mr. R. C. Taylor, formerly a resident in Norfolk, published a brief account of the geology of the eastern part of that county, in the *Philosophical Magazine*, in 1822, accompanied with a print of a mutilated grinder of an elephant, from a drawing by himself: this it may be presumed he would not have given had perfect specimens been as abundant as at present. The fishermen who formerly dredged up large bones and teeth from the oyster banks at Hapsborough, threw them away, or broke them to pieces in ignorant sport.

I propose, in the following observations, to notice the more remarkable fossil remains of the elephant, the hippopotamus, the rhinoceros, and the mastodon, which I examined in different collections near Cromer, and at Norwich, and to mention the state of preservation in which they occur in the principal situations where they are found. In a future Number I intend to offer some further remarks on this great deposition of mammalian remains, and to say something respecting the beds of sand and gravel which in Norfolk are provincially called "crag," wherever they occur. Had these beds retained the common designation of sand and gravel, they would never have acquired the geological importance they have so absurdly attained. Strangers, who were unacquainted with the meaning of the word "crag" in Norfolk, supposed, when it was introduced into geology, that it was something novel and important, different from the beds of ancient sand and gravel on Hampstead Heath and other parts of the Vale of Thames. From this error I have been relieved by my late visit to that county. The occasional and irregular occurrence of shells is an accidental and not an essential character: but of this more hereafter.

Among the large Pachydérmata of Norfolk, I have placed the mastodon, which, however, I have done doubtfully, for reasons that will be stated.

The Elephant. — The fossil remains of this animal are far more numerous than those of the other genera. I believe there were more than one hundred grinders in the collections I examined, and I was informed that the single collection of the Rev. J. Layton, formerly of Catfield, Norfolk, but now removed to Sandwich, contains not less than one hundred grinders of the elephant: very few tusks have been discovered entire, but numerous fragments are constantly found. The bones that are the most common in collections are, as might be expected from their great size, the pelvis and the femur: very few vertebral bones have been preserved. The entire head of an elephant, with the tusks projecting from the sand, was discovered at Cromer a few weeks before I was there; the boys who found it amused themselves with breaking the tusks, and beating to pieces the skull. The jaws, with grinders in them, escaped mutilation, and are now in the possession of Mr. Wyndham of Felbrook Park, where I examined them; they are of an enormous size.

Cabinet naturalists might please themselves with the discovery of several species of elephants among the remains found in Norfolk; but I am persuaded that many, if not all, of what would be regarded as specific differences in the form of the grinders, are mere variations, arising from age and the different stages of developement. In several specimens, the plates or laminæ of the teeth, presented, in one part, the character of the Asiatic, and in another part of the same tooth that of the African species. The laminæ at one end of the tooth sometimes resembled the pointed tubercles on the tooth of the mastodon. The peculiar mode of dention of the elephant occasions a great diversity of form in the grinder of the same individual; this is so clearly and briefly described by Cuvier that I will translate the passage: "The distinctive character of the elephant consits in the grinders (*machelières*), the body of which are composed of a certain number of vertical laminæ, formed of a bony substance enveloped in enamel, and bound together by a third substance called cortical, such as may be seen in the teeth of the guinea pig and other gnawing animals (*rongeurs*). The grinders of the elephant succeed each other, not by being pushed up vertically like human teeth, but they are driven forward from behind by the new grinder, as the old one wears away. Thus the elephant has sometimes one, and sometimes two grinders in each jaw; that is from four to eight on the whole, according to the epoch of dentition. The first grinders have few laminæ; those which succeed them have

always more. It is said that certain elephants change their grinders eight times. Their tusks are only changed once." (*Règne Animal*, tom. i. 239.) [*Mag. Nat. Hist.*, vi. 392, 393.] Such being the mode of dentition, it is evident that the grinders of the elephant, from the same individual, admit of a great diversity of appearance. In the new grinder, before it is gradually brought into action the upper surface of the laminæ, presents a succession of rounded ridges; but at one end of the grinder they are often pointed and tubercular, like the smaller tubercles on the tooth of the mastodon, and a portion of the grinder broken off in this part, might be, and I believe has been, mistaken for a part of a grinder of the latter animal. In a few grinders which I examined, the laminæ appeared nearly as broad as those of the Mástodon látidens from Java.

The Hippopotamus. — The remains of this animal are far more scarce than those of the elephant. I only saw three grinders in the different collections, and a few of the incisive teeth. Mr. S. Woodward of Norwich has in his collection a very large canine tooth or tusk with the same singular undulations and markings on the surface as may be seen on the tusk of the recent hippopotamus, of which there is a head in the Norwich Museum. Part of a similar tusk was given to me at Cromer.

The Rhinoceros. — Of this animal I saw only four molar teeth, three of which were perfect. As the living animals of this genus have a great number of teeth (according to Cuvier twenty-eight), it may be inferred that the rhinoceros, as well as the hippopotamus, was a comparatively rare animal at the epoch when elephants flourished so abundantly in northern latitudes: it is true that the teeth of the rhinoceros, being much smaller than those of the elephant, may be more difficult to find. However this may be, it is probable that, as the hippopotamus and rhinoceros require the vicinity of large rivers for their accommodation, they were never so numerous as the elephants, which enjoy a wider range of country, and are naturally gregarious.

The Mastodon. — The remains of this animal have not hitherto been discovered in any part of England, except in the county of Norfolk; and even there, I think their occurrence at present problematical.

A fragment of a tooth, said to be of the mastodon, found at Bramerton near Norwich, was shown to me in the museum; and when I first examined it, I had little doubt that it was correctly named, but after I had seen several grinders of the elephant, in which the parts not brought into action presented

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always more. It is said that certain elephants change their grinders eight times. Their tusks are only changed once." (*Règne Animal*, tom. i. 239.) [*Mag. Nat. Hist.*, vi. 392, 393.] Such being the mode of dentition, it is evident that the grinders of the elephant, from the same individual, admit of a great diversity of appearance. In the new grinder, before it is gradually brought into action the upper surface of the laminæ, presents a succession of rounded ridges; but at one end of the grinder they are often pointed and tubercular, like the smaller tubercles on the tooth of the mastodon, and a portion of the grinder broken off in this part, might be, and I believe has been, mistaken for a part of a grinder of the latter animal. In a few grinders which I examined, the laminæ appeared nearly as broad as those of the Mástodon látidens from Java.

The Hippopotamus. — The remains of this animal are far more scarce than those of the elephant. I only saw three grinders in the different collections, and a few of the incisive teeth. Mr. S. Woodward of Norwich has in his collection a very large canine tooth or tusk with the same singular undulations and markings on the surface as may be seen on the tusk of the recent hippopotamus, of which there is a head in the Norwich Museum. Part of a similar tusk was given to me at Cromer.

The Rhinoceros. — Of this animal I saw only four molar teeth, three of which were perfect. As the living animals of this genus have a great number of teeth (according to Cuvier twenty-eight), it may be inferred that the rhinoceros, as well as the hippopotamus, was a comparatively rare animal at the epoch when elephants flourished so abundantly in northern latitudes: it is true that the teeth of the rhinoceros, being much smaller than those of the elephant, may be more difficult to find. However this may be, it is probable that, as the hippopotamus and rhinoceros require the vicinity of large rivers for their accommodation, they were never so numerous as the elephants, which enjoy a wider range of country, and are naturally gregarious.

The Mastodon. — The remains of this animal have not hitherto been discovered in any part of England, except in the county of Norfolk; and even there, I think their occurrence at present problematical.

A fragment of a tooth, said to be of the mastodon, found at Bramerton near Norwich, was shown to me in the museum; and when I first examined it, I had little doubt that it was correctly named, but after I had seen several grinders of the elephant, in which the parts not brought into action presented

a cluster of tubercular projections, like the smaller tubercles on the tooth of the mastodon, I became very uncertain respecting the animal to which the tooth in the Norwich Museum really belonged. In the collection of Miss Johnson of Norwich there is a fragment of an elephant's grinder, which bears as close a resemblance to that of the mastodon as the specimen in the Museum, and yet there can be no doubt of its belonging to the elephant, as similar tubercles may be seen in other teeth, in which the greater part of the laminæ present the true elephantine character of parallel laminæ. Mr. Woodward has a fragment of the same tooth as that in the museum, but it is too small to determine its character. The question might perhaps be determined by an examination of the internal structure. The tooth of the supposed mastodon, described by Mr. William Smith, I have never seen. There can indeed be no reason alleged, why the remains of the mastodon may not be found in England, as they have been found in several countries in Europe. I have in my collection a large well-characterised grinder of the mastodon, which was found near Grenoble, along with teeth and bones of the gigantic tapir and the rhinoceros. A large and perfect grinder of the mastodon was found at Alpnach in Switzerland, under 300 ft. of solid strata of limestone and sandstone. I saw it in the museum of Professor Meisner of Berne, who presented me with specimens of the strata, and a correct drawing of the tooth, which is copied in the fourth edition of my *Introduction to Geology*, and which distinctly shows the small tubercles at the end, precisely similar to the tubercles on some of the grinders of the fossil elephants of Norfolk.

The number of the mammalian remains lately discovered on or near the coast between Cromer and Hapsborough, a distance of about twelve miles, cannot now be ascertained. Mr. Woodward in his *Outline of the Geology of Norfolk*, published in 1833, says, "that the grinders found on the oyster-ground of Hapsborough, warrant us in concluding that upwards of five hundred elephants were deposited in that limited space." These fossil remains also occur imbedded in a thin stratum of blue clay, covered by a stratum of gravel, near the bottom of the Cliffs at Cromer, and extending thence to the sea, where the chalk on which these beds rest may be traced during very low tides, ranging along the coast. As the Cliffs of Cromer are chiefly composed of sand and of clay, which has little tenacity, they are annually falling down and receding, and the elephant stratum becomes more and more exposed. Beside these localities, in which the remains are embedded, the action of the tides is constantly throwing bones and grinders among the shingles and on the sand, where

they are collected, and are sold to the visiters of Cromer, and distributed over the kingdom, or deposited in private collections in Norfolk. It has already been mentioned that numerous specimens were destroyed before their value was known.

The total amount of these elephantine and other remains recently found is very great; but it is impossible to form a conjecture respecting the numbers that have been turned up by the tides and destroyed in preceding ages. It appears highly probable that flocks of elephants have lived and perished at no great distance from the land where their remains are now so abundantly distributed: but I must, for the present, postpone my remarks on this subject and on the Norfolk crag, and shall conclude with some observations on the state of preservation in which these fossil remains are found.

The bones and grinders thrown on the coast by the tides are, as might be expected, often more or less waterworn, particularly the vertebral bones: the teeth are frequently very little abraded. The remains from the oyster-beds of Hapsborough, which, I believe, are chiefly gravel, are often in high preservation, and are very hard, from the mineral matter with which they are penetrated. It is well known that organic remains of all kinds generally receive a colour from the stratum in which they are imbedded; thus the bones from the gypsum and gypseous marl of Montmartre are almost always nearly white, while those in the dark lias clay are black. The grinders from Hapsborough gravel-bank have generally a reddish-brown colour, derived from the oxide of iron in the gravel: they have, also, frequently a glossy kind of varnish on the surface. The remains imbedded in blue clay have commonly a blueish-grey colour, and are sometimes penetrated by pyrites, and have undergone a degree of chemical decomposition. In some specimens, the colour approaches to dark or blackish-brown. Some of the bones are still porous, the gelatine and other animal matter has been removed, and the place has not been supplied by the substitution of mineral matter: other bones are extremely hard. The specific gravity of a polished portion of a fossil grinder I compared with that of a portion of a polished recent grinder from India. Both specimens were very compact, and appeared to have been cut from grinders of nearly the same size.

Specific gravity of the grinder from India, 2·08
of the fossil grinder from Cromer, 2·73

It thus appears, that the fossil tooth had gained an accession of weight of nearly one third.

In describing the fossil teeth as being often very perfect, I refer to the crown and body of the tooth; for, in many specimens, where these parts have undergone no abrasion, the lower part or roots are more or less wanting; yet I am inclined to believe that they have not been water-worn or chemically decomposed. If the teeth of the elephant are protruded from behind, their original roots must be more or less absorbed to admit of the tooth being moved forward in a nearly horizontal direction; and this mode of dentition may explain why many of the fossil grinders, in other respects perfect, have their roots very much shortened.

The head of the elephant before mentioned, found near Cromer, had suffered little from mechanical action when first discovered; and it is scarcely possible to believe that this head with its tusks had been drifted very far from the place where the animal perished: if this be admitted, it will render a similar inference probable respecting the other mammalian remains in its vicinity.

Hampstead, December 12. 1835.

ART. XV. *A Description of the Geological Conditions of the Chalk, and Argillaceous Beds, at Ballingdon Hill, Essex, with Inferences.* By JOHN BROWN, Esq.

THE observation of your intelligent correspondent [Mr. Hunter] in speaking, in VIII. 597., of the limestone quarries and petrifying spring of Pounceford, Sussex; and in his allusion to what Dr. Fitton says, that no opportunity should be omitted of examining and measuring strata in highly cultivated districts, is perhaps as applicable to the spot under review as the locality which he has so ably illustrated, although it be another portion of the field of geological inquiry; as, in both localities, agricultural pursuits are carried out to their full extent: and, perchance, another reason will avail us here, for briefly noticing the geology of this interesting locality, namely, the level and unbroken surface, and the generally monotonous character of the Essex strata. These are some of the reasons why I communicate an observation or two that occurred to me during a brief survey of this part of our county.

A favourable opportunity has been offered, during the last spring and summer, for ascertaining the geological structure and the mineral contents of one of the highest hills in this part of the county of Essex, by removing the upper part of Ballingdon Hill for about 30 ft., in a vertical direction from the top, and for a considerable way down; and carrying the earth to the lower part to improve the London road.

The upper parts of this hill are composed of a stiff clay, interspersed with nodules of chalk, and numerous large boulders of granite, gneiss, and of other members of the primary class; accompanied by pebbles and boulders of the secondary and trap rocks, and many organic remains, those from the lias formation being the most numerous. The beds of clay are horizontally stratified from the chalk on which they repose to the summit of the hill. According to my measurement, the superincumbent clay is 123 ft. in thickness. The colour of this clay, near the surface, is dark brown; but lower down, it is of a dark blue colour. The latter colour, and the character, of the organic remains found in it (which may be seen in the accompanying list) would indicate that it is the lias formation which has contributed most to its accumulation.

Mr. Woodward, in his *Outline of the Geology of East Norfolk*, makes the same observation on the Cliffs between Hasbro' [Hapsborough] and Cromer.

This clay forms the surface of the country, and the upper parts of many of the hills in this neighbourhood, both in this county and in Suffolk adjoining; and it has been notorious, for many years past, that *Ammonites*, Gryphites, Belemnites, beautifully preserved, with many other organic fossils of the secondary rocks, have been frequently turned out of the soil by the plough, and in agricultural processes.

I collected, at intervals, the mineral specimens and the organic fossils which compose the following list, while the works were in progress; and I have no doubt but the list might have been much longer had more time been devoted to it.

Mineral Specimens found in the Clay.

Primary rocks. — Granite, gneiss, chlorite schist, quartz rock.

Seconday rocks. — Red sandstone, calcareous sandstone. Two other modifications of calcareous sandstone. Silicious sandstone. Mountain limestone. Black marble in a large boulder. Lias, in large boulders. An ætites or eagle stone. Septària. Green sandstone. Concretions of iron pyrites, with casts of shells.

Tertiary rocks. — Freshwater limestone, with shells.

Trap rocks. — Compact felspar, with crystals of hornblende and felspar (porphyry). Dark-coloured and compact felspar, with crystals of glossy felspar (porphyry). Compact felspar, with quartz and crystals of felspar (porphyry). A variety of the last. Compact felspar, with crystals of green hornblende, and glossy felspar (porphyry). Compact felspar, with crystals of the same decomposing. Red felspar, with crystals of glossy

felspar. Hornblende and felspar (basalt). Compact hornblende rock. Three other modifications of hornblende, in separate large boulders. Greenstone. Sienite.

Organic Remains found in the Clay.

Radiàta. — Pentacrinite.

Annulàta. — Sérpula.

Conchífera. — Gryphæ`a dilatàta, Gryphæ`a incúrva, Gryphæ`a arcuàta. Avícula. Plagióstoma. Cyclas. Cyrìna. Cardìta. A'rca.

Mollúsca. — Three species or varieties of ammonite. Belemnìtes. Pleurótoma?

Pisces. — Vertebræ of a species of *Squàlus.*

CHALK.

The upper surface of the chalk in this locality appears to have been subjected to violent abrasion and waste, previous to the deposition of the clay upon it, by its broken surface, and the suddenly truncated ends of its strata at their terminations.

It is impossible te conclude that such heavy and compact bodies, as the large blocks and boulders which are found in the clay above, and are evidently foreign to this locality, could have been rolled along over the surface of the chalk without scooping out, and wasting its surface; or that its surface should be otherwise than we find it, namely, lacerated and broken.

In support of this breaking up of the chalk strata, previous to the deposition of the clay, I shall adduce one or two facts. At the village of Lamarsh, about four miles from Ballingdon, as we descend the stream of the river Stour, on its southern side, are to be seen a group of large blocks of green sandstone: one, 6 ft. long, and about one ton in weight; from which I detached a good characteristic specimen. To the transporting cause which brought the large blocks and boulders of granite, gneiss, &c., from their native beds, we may, perhaps, attribute the formation of the mound or hill of large angular flints which is so strikingly displayed at Acton, within three or four miles of Ballingdon: noticed in VIII. 352. And may we not add the formation of the whole of our heterogeneous gravel beds to the same cause? It is curious and interesting, at least to persons following these pursuits, to observe the outsides of some of the boulders, being highly polished, without doubt by the friction which they must have undergone on their journey hither. This polish is particularly evident on the outsides of the hard limestone boulders found here.

At a quarry, near the foot of this hill, the chalk is delved to the depth of 37 ft. from its junction with the clay. This gives

us a depth of 160 ft. in a perpendicular direction; at this depth, the water rises and inundates the sinkings so much as to prevent further progress downwards. All the chalk strata that I have seen at this locality are, generally speaking, horizontal, Although its strata seams are, in many quarries, undulatory or wavy. Its flinty nodules are here irregularly dispersed, and not in straight and parallel lines, as we often see them in other chalk districts. Although in the parish of Hartest, distant about seven miles in a northerly direction from the spot we are speaking of, there occurs chalk, with its strata dipping rapidly to a southerly direction with its flinty nodules in straight lines, and dipping at the same angle as the strata.

The clay appears to have had no subsequent disturbance since its deposition; but that the subjacent chalk has been displaced is, I think, evident, by the thick shells of the Inocéramus, and the shells of other genera, being not only very much broken, but that the fragments are scattered and intimately mixed up in the chalk. It is a very rare circumstance here, to find a whole shell of an *Echinus*; although there is no scarcity of the fragments of that fossil. The flints being irregularly disseminated throughout this chalk, and the seams of its strata being crooked or wavy, upon the small scale, is, I submit, indications of subsequent displacement. The natural partings of this chalk are covered with the black dendritical appearances alluded to by Mr. Bakewell, in his *Introduction to Geology*, as indicative of the presence of magnesia. Radiated concretions of iron pyrite are frequently found in the chalk here.

Some of the Organic Remains found in the Chalk.

Radiàta. — Ananchìtes. *Spatángus.*
Conchífera. — Inocéramus. *Chàma.* Plagióstoma.
Mollúsca. — Belemnìtes.

Comparing my list of the mineral substances, of which the boulders and pebbles found in theclay of this hill are composed, with those found occurring in the clay cliffs on the coast of Norfolk, as described by the different writers, as well as from my own observation, I find there is a striking similarity; and the organic fossils, so frequently found in the intervening localities, strengthen the analogy. Mr. R. C. Taylor, in his *Geology of East Norfolk*, gives us a list of boulders washed out of the cliffs west of Cromer, of very nearly the same properties as my own: his are primary, secondary, and trap specimens; so are those found in the clay of Ballingdon Hill: and Mr. Woodward, in his *Outline of the Geology of East Norfolk*, tells that the blue clay cliffs which extend from Hasbro' to Cromer are evidently the wreck of the lias. With the assistance

of these facts, it does not appear straining analogy too far to conclude that the same cause has operated throughout the whole space from the eastern coast of Norfolk, to that part of Essex I have been considering, and even much further. — *Stanway near Colchester, Essex, November* 11. 1835.

[*Fossil Bones of the Elephant and Deer found near Ballingdon, Essex* (VIII. 353, 354.) — Mr. Brown sent a drawing in illustration of the preceding communication, and to indicate the site in which the fossil bones of the elephant and deer were found: see VIII. 353, 354. To the definition of this site, given in VIII. 353, 354., it may be added that] " from the spot where the bones were found to the top of the hill, is about three quarters of a mile." [Mr. Brown has communicated, besides, that] " at the same spot, about a month ago, a further discovery of two molar teeth of the elephant was made. They are in fine preservation, and I had the pleasure of seeing them on my last visit to Ballingdon."

Art. XVI. *Short Communications.*

Geology. — *A notice of a rather recently discovered Locality for some Fossil Remains of the Elephant.* — These remains consist of two tusks and a molar tooth, and were found, some time since, in a bed of sandy gravel at Betchworth in Surrey, near where the river Mole runs through the parish. The tusks were about 3 ft. in length, and were rather decomposed; the tooth was about 7½ in. long, and had twenty plates, the usual character of the common fossil tooth. The gravelly deposit is superimposed on the greensand of the district, having an area of two to three miles, and consists of angular and rounded fragments of chalk flints, and the more ferruginous portions of the greensand — *John Morris. Kensington, Oct.*, 1835.

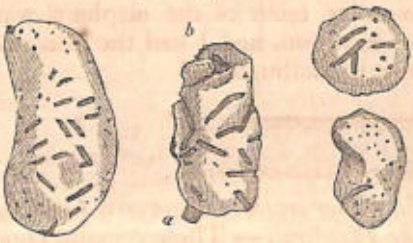
Modern Conglomerate.—A small piece of puddingstone was this summer found upon the beach at Cromer, by Mr. Hartt Eade, of Marsham, near Aylsham, in whose possession it now is, which contains a farthing of George the IV., a small white metal button, and some pieces of lead; probably the contents of some poor shipwrecked sailor's pocket. The farthing and button are in contact, the lead is on the opposite side of the stone, and near the button is the impression of a bent iron nail dissolved by the action of the salt water and air, and to which the conglomeration of this strange assemblage may be attributed. The matrix is the common beach sand, on the surface of which are three ironstone pebbles, one of yellow flint, and a small one of discoloured quartz

There was, I believe, only one coinage of farthings in the last reign, namely, that of 1822, and supposing that the full term of 13 years had been occupied in forming the mass, it is a curious fact; but I conceive half that time would be as much as we could fairly allow. Might not indestructible garden walks be formed by mixing small fragments of iron and common salt with the gravel?—*S. Woodward. Norwich, Nov.* 28. 1835.

ART. XVII. *Queries and Answers.*

What are those Bodies, some circular, some oval (*fig.* 13.), *which are to be found in the Gault at Folkstone?* — They are not unlike the coprolites figured in the Geological Society's *Transactions*, discovered by Dr. Buckland in the oolitic group, and some of them have the appearance of containing undigested remains, which is the case with those of Dr. Buckland's communication; of this sort is *b*, of which I have sent a sketch above, the prominence marked (*a*) resembling part of a limb of a crustaceous animal. They are covered with furrows and small punctures, and are of a light-yellowish clay colour, internally black, very heavy, and difficult to break. They are in great numbers, and of all sizes. The four sketched above seem to me characteristic of all the specimens I observed. Query: Have coprolites been yet mentioned as found in the gault? and, if they be coprolites, to what animals can they have belonged? to fish? or to the few Reptilia yet discovered in the cetaceous group? — *H. Hastings*, 1834.

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[The reply to enquiry made subsequently to the receipt of this communication is, that the bodies have been long known; and that Dr. Fitton will allude to them in his forthcoming memoir on the greensand.]

ART. XVIII. *Retrospective Criticism.*

ON the Animals designated in the Scriptures by the Names of Leviathan and Behemoth. (p. 193—197. 305—320.) — Mr. Thompson's opinions on this subject, expressed in his treatise

upon it in p. 193—197. 307—320, are discussed in the *Edinburgh New Philosophical Journal*, the Number for October, 1835, by a writer, whose name is not given, who has conceived "Mr. Thompson's conclusions .... to be erroneous; and" has "set down some of what appear to" him "the most decisive proofs that they are so." His own conclusions are, that the leviathan was the crocodile of the Nile, and that the behemoth was "one of the larger herbivorous mammalia," and "some large .... species of the bovine genus of Linnæus." The treatise occupies from p. 263. to 281., and is learnedly written.

It would not have been more than was due to the *Magazine of Natural History*, had the title of this work been allowed to appear as the repository of a printed exposition of Mr. Thompson's views: this is not the case throughout the thesis cited. A second instance of this injustice occurs in a communication in the same Number of the *Edinburgh New Philosophical Journal*, entitled, "On the Falls of Niagara, and the Reasonings of some Authors respecting them. By Henry D. Rogers, F.G.S., of London, &c." Refer to Mag. Nat. Hist. III. 117—130.

Metamorphosis in, and Habits of, Crustaceous Animals. (II. 244, 245.; IV. 256—259.; VIII. 261—277. 467—469. 482—486. 550, 551.)—There is contained in the *Entomological Magazine*, No. 13. October, 1835, in p. 275—280., a "Memoir on the Metamorphosis in Porcellana and Portunus. By J. V. Thompson, F.L.S., Deputy Inspector-General of Hospitals," illustrated by three figures; and, besides, other information on the deemed metamorphoses of crustaceous animals and on the habits of certain species of them, this notification is made:—"We have, perhaps, ourselves been somewhat to blame in not allowing it ['Crustaceology'] a more prominent place in our pages than we have hitherto done. We now announce our intention of repairing this error; and, aided by the valuable contributions of Mr. Thompson, we hope that no future number will appear without, at least, one article on Crustacea."

I have stated, in VIII. 468., that ecdysis and transformation are subjects not identical: they are identified, on reasons, in the *Ent. Mag.*, p. 293. of the Number cited above. — *J. D.*

Phyllosòma; Mr. Lukis has proposed the epithet, sarniénse, to designate the species that is described and illustrated from him in p. 459—462: *a correction of two errors in the description.* — My absence from this island prevented my seeing the article introduced in p. 459., relating to a species of Phyllosòma, taken on this coast; consequently I could not answer

the suggestion affixed to it in p. 462. In reply, I beg to state that the species of Crustàcea there described, although different, in some particulars, from the genus of Leach and Latreille, as published in the *Malacóstraca* of De Blainville, may still, with propriety, be left among the Phyllosómata, to prevent the multiplying of terms and families. My individual appears to have been undescribed; and, in proposing a name, I conceive Phyllosòma sarniénse, from its locality, Guernsey, to be less objectionable than applying to it one derived from its form or other peculiarity, which, in a genus as yet little known, may be liable to variation in relative significance. May I draw your attention to an incorrect reference made under *fig.* 38. in p. 459.? where it is said, "*a*, a representation of the animal," &c., "the aspect ventral;" it should be aspect dorsal; and *b*, "the aspect dorsal," should be aspect ventral. — *F. C. Lukis. Guernsey, Oct.* 22. 1835.

[Mr. Lukis's correction, in the cases mentioned, renders necessary the additional one of reading *a* for *b*, in p. 461. line 9.]

ART. XIX. *Man's Progress in the Diffusion of the Knowledge of Natural History.*

THE Islington Literary and Scientific Society.—This Society gives direct attention to natural history: among the subjects which it facilitates the acquisition of the knowledge of, zoology and astronomy are subjects enumerated in a short list of lectures sent; the zoology to be treated on by Dr. Grant, the astronomy by J. Wallis, Esq. The rayed animals (Radiàta or Cycloneùra) are the subject of four lectures by Dr. Grant, and a syllabus of these is given in the printed circular sent: all of these will have been delivered before the publication of this notice. The whole must, from Dr. Grant's character, be rich in interesting information and views. This Society has a library and museum. "The museum is enriched with collections in various departments of natural history and science."

The Royal Geological Society of Cornwall held its twenty-second annual meeting on October 9. 1835, and reported on the events that had transpired relative to it through the past year. Considerable additions have been made to the museum, partly by purchase and exchange, but principally by donations. The curator, assisted by the secretary, has been engaged in reducing to order the various series of geological specimens that had accumulated. Several treatises have been commu-

nicated and read. The funds, though somewhat less than last year, are still prosperous. The council expect to commence printing the fifth volume of *Transactions* before the next meeting; but "they do not expect that it will be ready for publication until the year following, on account of the numerous tables and illustrations that will be required." There has been an increase in the number of members. (*From an authorised report in the West Briton of Oct.* 26. 1835.)

REVIEWS.

Art. I. *Notices on Works in Natural History.*

Cook, Captain *S. E.*, R.N., K.T.S. F.G.S.: Sketches in Spain during the Years 1829, 1830, 1831, and 1832; containing Notices of some Districts very little known; of the Manners of the People, Government, Recent Changes, Commerce, Fine Arts, and Natural History. In 2 vols., 8vo, above 600 pages. London, Boone, 1834.

The portion on natural history includes some particulars on vegetation, on birds, and on subjects in geology.

Jenyns, Rev. *L.*, M.A. F.L.S. Z.S. Ent. S., and of the Cambridge Philosophical Society: A Manual of British Vertebrate Animals: or Descriptions of all the Animals belonging to the Classes Mammalia, Aves, Reptilia, Amphibia, and Pisces, which have been hitherto observed in the British Islands: including the Domesticated, Naturalised, and Extirpated Species: the whole systematically arranged. 8vo, 590 pages. London, 1835. 13*s.*

The forthcoming of this work has been announced in VI. 442, 443; VIII. 248. 359.

Extracts from the Preface. The descriptions are, as far as possible, original. In a large number of instances, they are derived from recent specimens. The name of the author from whom any thing is borrowed is, in almost all cases, subjoined. When the accounts of what have appeared the best authorities differ, the discrepancies are pointed out.

By some it may be thought that the descriptions are too long; but when it is considered how many species have been overlooked from their supposed identity with others; how many, some even of the most common occurrence, have been misunderstood, and referred to others, which, perhaps, are not inhabitants of this country; and that these and similar

errors have arisen, not merely from the imperfect, but, it must be added, careless descriptions which have been given of such animals, it is hoped that the pains which have been taken to render this portion of the work as complete and accurate as possible, will not be thought entirely thrown away.

In the class of birds, the different variations of plumage, arising from age and season, have been pointed out and characterised, so far as they are known. Appended to the description of each species [in all the classes], are a few general remarks illustrative of its habits; more especially those connected with locality, food, and propagation. In classification, the system of no one individual author has been rigidly adhered to. Regard has been paid to what has been written on this subject by the most recent writers in each department, of all the larger groups, as well as, in most instances, their mode of collocation has been derived from such sources.

The author has exercised his own judgment in the adoption of certain genera and subgenera, [and has referred, for his principles on these, to his expression of them in this Magazine: see VI. 385—390. VII. 97—99.] The subgenera are inserted in such a manner, that any one who chooses may place them on the same footing with the genera, or take no notice of them at all.

[The author expresses his acknowledgements to the following parties who have assisted him in the fulfilment of his undertaking.] To Mr. Yarrell, in particular, for the able help which he has experienced at his hands. This help has been especially felt upon the subject of the British fishes. Assistance has been not the less afforded him in the other classes. Mr. Yarrell's well-known practical acquaintance with our British birds has enabled the author to detail more at length the change of plumage to which some species are liable, and to correct a few errors into which previous writers had fallen on this subject. The same gentleman kindly volunteered an accurate description, accompanied by measurements, of the egg of every species of which his extensive collection afforded specimens. To Mr. Gray, for the readiness with which he has, at all times, allowed him to consult the specimens in the British Museum. To the officers of the Zoological Society for similar liberty to examine a few specimens contained in their collection.

[The author is of opinion that] even the vertebrate animals of our country are far, yet, from being thoroughly understood; [and solicits] such observations, notices of new or rare species, and, where it may not be inconvenient, specimens, as it may be in the power of any of his readers to supply.

In the *Analyst*, No. xiii., published in Oct. 1835, are three treatises, which merit the attention of naturalists. The titles of them, and the pages they occupy, are: — Remarks conducive to the improvement of ornithological nomenclature, p. 26. to 35.; a retrospect of the literature of British ornithology, p. 78. to 99.; on the study of Latin, more especially as regards the interests of the medical profession. In the second, the majority of the works published from 1678 to Sept. 1835 are characterised. The *Analyst* is now published quarterly. "Arrangements have been made by which the proceedings of the learned bodies" in the populous and intellectual towns of the midland counties "will be fully and accurately reported" in it. "The transactions of the several institutions will be thereby quickly disseminated, instead of being, as hitherto, buried in the recesses of their lecture-rooms."

Mrs. Perrott's Illustrations of Selected Species of British Birds. (VIII. p. 523, 524.)

It has been objected to this work, in the *Analyst*, No. xii., that it is without plan or order. The authoress regards as exonerative of this charge, the following statement in her published prospectus: — "As the work is published in numbers, opportunity will be afforded for the insertion of any new discovery; and the *arrangement* being deferred to the *conclusion*, allows a *probability* that a better form of *classification* may be adopted, which may reconcile the conflicting opinions of authors, *establish more order* in the system, and *elucidate* the obscurity and *confusion* in which many of the genera are involved."

Lindley, J., Ph. D. F.R.S. F.L.S. and G.S., Professor of Botany in the University of London, and in the Royal Institution of Great Britain: A Key to Structural, Physiological, and Systematic Botany. 8vo. 1835. 4*s.* 6*d.*

The most comprehensive work on these branches of botany of any that has been yet published in Britain. Not any person interested in botany should be without it. The matter on the structure and physiology of plants is an improved edition of that in the author's *Outline of the First Principles of Botany*; the matter on the systematisation of plants, is an improved edition in English, except the denominative terms, of that in the author's *Nixus Plantarum*, published in Latin in 1833. The *Nixus* is noticed in VI. 505, 506.

Partington, C. F., Author of various Scientific Works, and Editor of *The British Cyclopædia*: Introduction to the

Science of Botany; illustrated on an entirely new principle, by a Series of highly finished Delineations of the Plants, coloured to represent Nature; including Characteristic Details of the Physiology, Uses, and Classification of the Vegetable Kingdom. 1835. 1 vol., 8vo, 150 pages, and 1 plate of 4 coloured figures: some wood-engravings are in the pages. The coloured delineations of plants are detached, are of 4to size, in a set of 10, or one of 14, with stands, and placed in an ornamented case. The volume, and either of the sets of coloured delineations, are purchasable separately. London, Harvey and Darton, Orr and Smith.

The author's manner is sketchy and sentimental; the getting-up of the book is what may be termed elegant; and the detached pictures are beautiful. Those of the technical points of botany, to which the author's work introduces, are the terms of the more obvious parts of plants, and examples of them: the Linnæan classification, and the classification according to the natural orders. The volume, and the detached pictures, may avail those who have not a vigorous appetite for a stricter knowledge of botany, and can afford to purchase them.

Watson, H. C.: The New Botanist's Guide to the Localities of the Rarer Plants of Britain; on the Plan of Turner and Dillwyn's *Botanist's Guide.* Vol. I. England and Wales. 1835, sm. 8vo, 408 pages. London, Longman & Co.

"This volume includes all the counties of England and Wales, and will form a complete work in itself, if the publication of a second volume should be prevented by any unforeseen circumstance. The counties of Scotland, with the adjacent isles from Man to Shetland, are intended to be comprised in the second volume, which will be ready in 1836. All communications of localities, for insertion therein, should be made as early as possible in the year. By adopting a smaller and much closer type than that of Turner and Dillwyn's *Guide*, the present volume has been reduced to one half the bulk, notwithstanding that the large additions to the species and localities of flowering plants, in many of the counties, will more than counterbalance the omission of cryptogamic plants, which comparatively few persons take the trouble to collect. On a rude estimate, from a few pages taken at random, it appears probable that the volume contains between 15,000 and 20,000 localities or stations (habitats, according to the phraseology of many botanists), and most of these include more than one proper name to each, some even half a dozen."

Henslow, Rev. *J. S.*, M.A., Professor of Botany in the University of Cambridge; A Catalogue of British Plants, arranged according to the Natural System, with the Synonyms of De Candolle, Smith, Lindley, and Hooker. Second edition, 8vo, 66 pages. London, Rivington and Hatchard, 1835.

Of the species registered, the author has indicated by signs those which he considers to be in any of the four following conditions:—Possibly introduced by the agency of man. Naturalised species, *certainly* not indigenous. Occasionally found wild, but not even naturalised, extinct, or erroneously introduced; and which ought to be excluded from our floras. Included in the flora of Cambridgeshire. The author has referred, in his preface, to his views exhibited in this Magazine (Vol. VIII., p. 84—88, not "Vol. VII." as cited), relatively to, at least some of, these distinctions. It is intended to present, in a future number, a list, taken from the author's catalogue, of such species as he may have designated relatively to the views there proposed.

The Transactions of the Entomological Society of London. Vol. I. Part II., 8vo, 96 pages, 6 plates of figures, some of the figures coloured. 1835. 7*s.* 6*d.*

The contents of the *first part* are enumerated in VIII. 62, 63. The subjects treated of in the second part are as follows:—

Rémphan Hòpei Waterhouse, "a new species of longicorn beetle, from the East Indies." G. R. Waterhouse, Esq. has described and named this: it is illustrated by a coloured figure. It is of the family Priónidæ. Its body is 2 in. 11 lines long.

Amýcterus [*a*, without, *muktēr*, a proboscis.] Scōnhérri Hope, "a new curculionideous beetle, from the Swan River," in New Holland. This is described and named by the Rev. F. W. Hope, and is elucidated by figures. Its thorax bears tubercles in longitudinal rows, and its elytra spines in longitudinal rows.

"Observations on the osculant Crustaceous Genus Arcturus of Latreille; with the Description of a British Species. By J. O. Westwood, F.L.S., &c." The species described is identical with the Astacílla longicórnis *Flem.*, illustrated by Dr. Johnston, in this Magazine, VIII. 494—496. Mr. Westwood's treatise is illustrated by a plate bearing 30 figures.

"On the Apparent Identity of Sphinx ephemeræformis of Haworth, with Psyche plumifera of Ochsenheimer. By J. F. Stephens, F.L.S., &c." A figure is provided of the species of insect that Haworth described.

" Notice of the Habits of Odynerus Antilope. By J. O. Westwood, F.L.S., &c." In this Magazine, V. 109, 110. 206., are facts, some of them communicated by Mr. Westwood, on one or more species of Odynèrus.

" Observations on certain Species of the Genus Dromius. By Charles C. Babington, M.A., F.L.S., &c." Thirteen species, and varieties besides, are described: four species are figured. Descriptions by Mr. Babington of two of the thirteen species are published in this Magazine, V. 327, 328.

" Thysanuræ Hibernicæ, or Descriptions of such Species of spring-tailed Insects (Podura and Lepisma, Linn.) as have been observed in Ireland. By R. Templeton, Esq., R.A. Corr. Member of the Natural History Society of Belfast: with Introductory Observations upon the Order, by J. O. Westwood, F.L.S., &c." This is a contribution which will much enrich every one who will appropriate the information imparted in it. The number of species treated on is as follows: Lepísma sacchárina, enumerated; Forbicìna polýpoda, described and figured; Petròbius marítimus, enumerated; Orchesélla, 2 sp., described and figured: Podùra, 7 sp., described and figured: Achorùtes, 2 sp., described and figured; Smynthùrus, 2 sp., described and figured, and one other species enumerated.

Microxylobius Westwood*ii* Chevrolat, a species of beetle of about 1 line long, and, broad, the third of a line, from St. Helena, is illustrated by a description by M. A. Chevrolat, M.E.S. of France, &c., and by figures.

" Descriptions of new Species of Indian Ants. By Lieut.-Colonel W. H. Sykes, F.R.S., &c." Three species are described and figured, and interesting facts on their habits are communicated.

" Monograph on Mimela, a Genus of Coleopterous Insects. By the Rev. F. W. Hope, F.R.S,, &c." Thirteen species are described.

" Note upon the British Genera Acentria, Acentropus, and Zancle. By J. O. Westwood, F.L.S., &c." These are identified as one, and it is argued of this that it belongs to the order Lepidóptera.

" Observations on the Ravages of Limnoria terebrans, with Suggestions for a Preventive against the same. By the Rev. F. W. Hope, F.R.S., &c."

" Description of a new Species of Australian Moth. By G. R. Gray, Esq., M.E.S. France and London."

" Observations on Insects producing Silk, and on the Possibility of rearing Silk Crops in England. By the Rev. F. W. Hope, F.R.S., &c."

"Remarks on some Mechanical Peculiarities noticed in a Spider's Web, observed at Wandsworth, Surrey. By W. W. Saunders, Esq., F.L.S., &c." These remarks are kindred to those of Mr. Spence, in this Magazine, V. 689—691.

"Observations upon the Habits of Copris Midas. By Lieut.-Colonel W. H. Sykes, F.R.S., &c."

These treatises occupy 66 pages. A continuation of the "Journal of Proceedings" follows them, and occupies 29 pages. This includes very varied matter; as records of donations made, memoirs read, and exhibitions made. The instances of donations of works on insects and of specimens of insects are numerous; events advantageous to the Society's thrift.

"The period for receiving the prize essays upon the turnip fly," is extended "until the anniversary meeting in January, 1836."

Various Contributors: The Entomological Magazine, No. XIII. October, 1835.

See in *M. N. H.*, xi. 48. In this Number of the *Ent. Mag.* are, besides, two contributions of noticeable interest. One, an elaborate monograph, "On the Species of Platygaster, &c.: by Francis Walker," assisted by Mr. Haliday: the other, "Remarks on the Entomology of Epping and its Vicinity: by Edward Doubleday." In the first are described, of Platygáster, 101 species and some varieties; of Inostémma *Haliday*, 8 species and some varieties; of Iphitrachèlus *Haliday*, 1 species. A plate of 21 figures is supplied in illustration of certain of the species described. The monograph occupies 58 pages. Mr. Doubleday's "Remarks" are of noticeable interest in this Magazine, from the fact that he has appended to them a "Catalogue of Birds which have occurred in the neighbourhood of Epping," and, added, remarks upon certain of the species, as to the rate of the frequency of occurrence, and on other points.

Art. II. *Literary Notices.*

Mr. Bushnan, the author of the *Introduction to the Study of Nature*, is preparing for the press a work to be entitled *The Elements of Ichthyology:* it is to be illustrated by numerous woodcuts.

The Zoological Journal: it has been announced that No. xx., and Part v. of Supplementary Plates, have been published, and that the work is now complete.

THE MAGAZINE

OF

NATURAL HISTORY.

FEBRUARY, 1836.

ORIGINAL COMMUNICATIONS.

ART. I. *Observations on the Cow Bunting of the United States of America.* By GEORGE ORD, Esq.

OF all the known birds which are indigenous to North America, perhaps there is not one whose habits are so interesting as those of the bird denominated cow bunting, cow bird, cow-pen bird, or cow blackbird (the *Fringilla pécoris* of Latham); and yet there is hardly one whose history has hitherto been involved in greater obscurity.

Wilson was the first writer who made public the fact, that this species does not construct a nest for itself; but, like the cuckoo of Europe, deposits its eggs in the nests of other birds, and confides to strangers the care of its offspring.

A habit so singular as this had early awakened the attention of the author of the *American Ornithology*. He had supposed that persons residing in the country were conversant with it; and, by diligent enquiry among them, he was enabled to collect some information which was deemed authentic. But, had our ingenious ornithologist relied more upon his personal observations than upon the testimony of vulgar observers, he would have avoided some errors, which it is the intention of the writer of this article to point out.

The following propositions have been assumed: —

There is never more than one egg of the cow bunting deposited in the same nest.

The egg invariably hatches before those of the foster-bird.

The foster-mother, in seeking food for her first-born, neglects her own eggs; and their embryos, consequently, perish.

The birds selected by the cow bunting, as nurses of her progeny, are always smaller than herself.

That all these propositions are untenable, will be evident from the facts related in this paper. I would premise, however, that the circumstance of two eggs of the cow bunting being sometimes dropped in the same nest, became known to Wilson not long before his death; for, as he and I were pursuing our ornithological researches, near the coast of New Jersey, in the month of May of the year 1813, I found the nest of the Sylvia pinus, which contained three of her own eggs, and two eggs of the cow bunting. Wilson was not a little surprised at this discovery; and declared it was the first instance, that had ever come to his knowledge, of a deviation from what he had considered an invariable habit of the cow bird.

In Wilson's history of the cow bunting the following passage occurs: — "The well-known practice of the young cuckoo of Europe, in turning out all the eggs and young which it feels around it, *almost as soon as it is hatched*, has been detailed, in a very satisfactory and amusing manner, by the amiable Dr. Jenner; who has since risen to immortal celebrity in a much nobler pursuit; and to whose genius and humanity the whole human race are under everlasting obligations. In our cow bunting, though no such habit has been observed, yet still there is something mysterious in the disappearance of the nurse's own eggs soon after the foundling is hatched, *which happens regularly before all the rest*. From twelve to fourteen days is the usual time of incubation with our small birds; but, although I cannot exactly fix the precise period requisite for the egg of the cow bunting, I think I can say, almost positively, that it is *a day or two less than the shortest of the above-mentioned spaces*. In this singular circumstance we see a striking provision of the Deity; for did this egg require a day or two more, instead of so much less, than those among which it had been dropped, the young it contained *would, in every instance, most inevitably perish;* and thus, in a few years, the whole species must become extinct. On the first appearance of the young cow bunting, the parent being frequently obliged to leave the nest, to provide sustenance for the foundling, *the business of incubation is thus necessarily interrupted;* the disposition to continue it abates; nature has now given a new direction to the zeal of the parent; and *the remaining eggs, within a day or two, at most, generally disappear*. In some instances, indeed, they have been found on the ground near, or below, the nest; but this is rarely the case."

Before commenting upon the singularly erroneous assertions contained in the foregoing paragraph, I would take the liberty of suggesting that there must have been some mistake in the

facts related by Dr. Jenner on the subject of the cuckoo. I am unwilling to believe that any bird, as helpless as a young cuckoo is *before its eyes are open*, has the power, or even the inclination, to eject from its nest the young and eggs which it feels around it. Why should this feeble creature, so feeble that it cannot support itself upon its legs, wish to get rid of companions which in no respect incommode it; but which, on the contrary, add to its convenience? For it cannot be denied, that a single bird, when first hatched, is less comfortably situated than when it is accompanied with nest-mates, the softness of whose down has a tendency to maintain that equality of warmth which callow young require. As to the ejection of eggs by the newly hatched cuckoo, it cannot be the fact; the physical powers of the bird not being adequate to the purpose.

It is no unusual circumstance for a bird to commence sitting upon her first egg; and this frequently happens in those places where egg-destroying birds abound. Now if, on the hatching of the first egg, the vital action in the remainder were interrupted by the absence of the parent, the embryos which they contained would perish; nay, the young already hatched would also perish: but no such interruption in reality takes place. The bird that begins incubation upon her first egg, although her complement may amount to five or more, as certainly brings forth the whole brood as there are embryos contained in them. The absence of the parent is but for short intervals. Her first care, in hatching, is to remove the shells. This performed, she seeks food; and is more solicitous to remain in the nest, after the appearance of the young, than before. The conduct of the domestic hen, at the period of her hatching, is a good exemplification of that of all birds in like circumstances. Before the appearance of the young, she will not hesitate to quit her nest for the space of an hour at a time; but the moment the first chick breaks its covering, the disposition to continue incubation, instead of abating, receives a new impulse; her maternal affections are aroused; the titillation, occasioned by the contact of the chicken with her body, affords her exquisite pleasure; and so anxious is she to to guard her progeny from harm, that she would rather forego the wants of nature, than forsake her nest, until her brood have acquired sufficient strength to accompany her.

The habit which small birds have of bestowing the same attention upon their callow young, as regards brooding them, as upon their eggs during incubation, is so universal, that it is a matter of wonder how it could have escaped the attention of so observing a naturalist as Wilson was. But let it be

noted, that the state of the atmosphere invariably affects the conduct of the bird, not only in relation to the eggs, but also to the young. If the weather be cool or humid, the parent is never absent from her nest longer than a few minutes at a time; whereas, should the weather be clear and warm, the absence of an hour would occasion no detriment to either eggs or young. I have taken notice, that some birds continue to cover their young, at night, until the latter leave the nest.

The extraordinary power which eggs possess of retaining vital heat appears to have been overlooked by all those naturalists with whose works I am acquainted. It is generally imagined, that, should an incubated egg be neglected until it feels cold to the touch, its embryo would inevitably perish. A writer in this Magazine, for June, 1835 [VIII. 331.], thus expresses himself: — "Every one must know that, after the vital action within an egg has once commenced, *a very short suspension of the necessary heat is sufficient to destroy the embryo.*"

What the respectable writer above quoted (Mr. Blyth) means by *necessary heat*, I can only conjecture; and his phraseology induces me to say that his meaning is, the heat of the brooding bird. Now, between vital heat, and the heat of the brooding bird, there is this difference, that, although one is radically derived from the other, yet the latter may be suspended for a considerable period, without, in any essential degree, counteracting the effects of the former. Let us not forget the important part which the blood performs in the maintenance of vital action, and this assertion will not be considered problematical.

In confirmation of the foregoing opinion, I will relate the following facts: — On the 5th of August, of the present year, I discovered, in my wood, the nest of the chewick (Emberiza erythrophthálma *Wils.*). Contrary to the ordinary practice of this species, this nest was built, not on the ground, but on a chestnut sucker, which lay on a fence, placed around a stump, to protect it from injury. The nest contained three eggs, all of which were so cold, that I concluded they had been abandoned. This was in the morning. In the afternoon of the same day I again inspected the nest, and found the eggs still cold, and no chewick in the vicinity. The next day rain prevented me from visiting it; and on the 7th I determined to remove it; but I was astonished to find the female snugly seated in it, betraying no signs of uneasiness, although I approached within a yard of her. On the 8th of August the three eggs were hatched; and on the 17th the whole of the young departed!

On the 29th of July, a song sparrow (*Fringílla melòdia*

Wils.) laid her first egg in her third nest for the season. This nest was constructed on the ground, in my garden, amid a mass of cucumber vines. The next day another egg was laid, and she began to sit. The following day she produced a third egg. Incubation was continued, uninterruptedly, until two or three days of her hatching, when I perceived that she was absent from the garden. Three times in the course of the day, which was a warm sunshiny one, I examined the nest, but saw no bird. My last visit was at twilight. The next morning, at an early hour, I was again at the nest, but no bird appeared. Now, I do not mean to insinuate that the sparrow had not been sitting upon her eggs during the night; for I think it probable that she had been; although I neglected to ascertain whether the eggs were cold or not. After breakfast I found the sparrow returned to her station. In the afternoon of the 11th of August two of the eggs were hatched; and the third egg was hatched early the following day. The song sparrow, in common with almost all our small birds, sits twelve days.

In the month of August, one of my domestic hens, after having been sitting about two weeks, forsook her nest. I perceived that she was afflicted with the louse disease; and, on examining her, I found her cold and dying. She had been absent from the eggs for the principal part of the day; and, as they did not exhibit the least external signs of heat, I broke one, and found the embryo extremely feeble, so much so, that scarcely any signs of life were visible. The remainder were removed to two sitting hens, and they all produced healthy chicks.

One of my neighbours told me that he had known a sitting hen to be absent from her nest for a day and a night, and still the eggs hatched.

The opinion advanced by Wilson, and echoed by others, that the cow bunting's egg is invariably the first hatched, is a mere conjecture, totally unsupported by facts. It must now yield to truth; although the sentimental reader will, doubtless, regret that the profound reflections on the "wisdom of nature," which this hypothesis has given birth to, must lose much of their efficacy or application. He will, however, derive consolation from the assurance, that our venerable mother, Nature, is not so improvident as she has been represented to be.

Mr. Audubon considers it "a very remarkable circumstance, that, although the cow bird is larger than the species in the nests of which it deposits its eggs, the eggs themselves

are not much superior in size to those of their intended foster-parents." (*Ornithological Biography*, i. 496.)

If this were a fact, it would justly be entitled to the epithet *remarkable;* but that this writer is greatly overseen, would be evident by a comparison of the egg of the blue-grey flycatcher, of the chipping sparrow, or of the indigo bird, with that of the cow bunting. The relative size of these eggs would be found to be equal to that of those of the ordinary hen and the turkey.

Reasoning from this supposition, the author above quoted sagaciously notes "the adaptation of means to ends which nature has so admirably made." "The object," continues he, "has been, to secure the developement of the embryo, by adapting the size of the egg to the capability of imparting heat to it."

It sometimes happens that a plausible theory is demolished by a single fact. Had our ingenious naturalist bethought him, that the egg of a goose requires no longer term of incubation, when placed under a hen, than when under the goose herself; and that, should a hen sit upon her own eggs, mixed with those of a goose, the heat imparted to each kind, although so greatly dissimilar as to size, would be precisely the same; he would have hesitated before he uttered an opinion which should seem to bespeak a want of knowledge of one of the simplest laws of nature. Every one who has paid the least attention to the breeding of poultry must know that the plumage of a sitting bird, being a non-conductor, forms an oven, the heat of which, although not precisely equal in all its parts, is, nevertheless, rendered equally efficient to all its contents, in consequence of an invariable habit which the bird has of frequently shifting her eggs from the circumference to the centre.

Mr. Nuttall*, a more discerning naturalist than the one just named, seems at no loss to account for the circumstance of the cow bird's egg being the first hatched: its largeness bringing it nearer to the body of the sitting bird than her own eggs, it is, consequently, better warmed, and sooner hatched! But let us have his own words: — "The most usual nurse of this bird appears to be the red-eyed vireo, who commences sitting as soon as the cow bird's egg is deposited. On these occasions, I have known the vireo to begin her incubation with only an egg of each kind; and in other nests I have observed as many as three of her own, with that of the intruder. From the largeness of the strange egg, probably the nest *immediately feels filled*, so as to induce the nurse directly to sit. This

* *A Manual of the Ornithology of the United States, and of Canada.* By Thomas Nuttall, F.L.S.

larger egg *brought nearer to the body than her own, is, consequently, better warmed, and sooner hatched!*"

Mr. Nuttall appears to be the only writer who was acquainted with the fact, that the young cow bunting, and the young of the foster-bird, are sometimes reared together; and he conjectures that, "from the great size of the parasite, the legitimate young are often stifled." This author says that he has "remarked, sometimes, two of these eggs in the same nest; but in this case one of them commonly proves abortive." If one, *commonly*, proves abortive, both, *sometimes*, must hatch. Now, as Mr. Nuttall does not inform us that he ever saw *two* cow buntings in the same nest, we are compelled to infer that the circumstance of abortion is related at second hand.

"The cow bird," says Wilson, "continues to be seen so late as the middle of June; after which we see no more of them until about the beginning or middle of October." That this was an oversight of our excellent ornithologist; nay, that he himself, in the hurry of composition, stated what his own knowledge disproved; is evident from his assertion, that he had observed the yellow bird, or goldfinch (*Fringilla tristis*), performing the duty of nurse to the cow bunting. This oversight has been the occasion of Wilson's veracity being called in question by Mr. Nuttall; who, in his history of the American goldfinch, observes that, "from the late period at which they begin to breed, *it is impossible they can ever act in the capacity of nurses to the cow troopial!*" If Mr. Nuttall had taken the pains of extending his enquiries into these matters, he would have learned that the cow bunting is common in Pennsylvania in the month of July, *the season of the nidification of the goldfinch;* and that, therefore, there was no occasion to insinuate a want of veracity in one whose noblest characteristic was his inflexible adherence to truth. It will be seen, hereafter, from my observations, that a cow bunting's egg was deposited in an indigo bird's nest as late as the 20th of July. I would, finally, add, in vindication of my friend, that I myself have seen a cow bunting's egg in the nest of the goldfinch.

It appears to be the prevailing opinion, that, if the cow bird deposits her egg in a nest wherein the owner has not yet begun to lay, the nest is either deserted forthwith, or the egg of the intruder is so buried by the addition of fresh materials, that it becomes abortive. On this head I am not prepared to speak, further than that the opinion wears the appearance of probability. On the 11th of June, last year, I found the nest of the red-eyed flycatcher (Muscicapa olivàcea *Wils.*) containing a cow bird's egg, and one of her own. As, from the

smallness of the nest, the cow bird could not enter its cavity, she was compelled to sit over it; and her egg, in dropping, broke the flycatcher's. The nest was abandoned.

There is a passage in Mr. Nuttall's history of the blue-grey flycatcher, which I cannot forbear quoting, as it involves one of the most preposterous ideas that ever entered into the brain of a naturalist. After describing the nest of the flycatcher, our author adds, "In this frail nest, the cow troopial sometimes deposits her egg, and leaves her offspring to the care of these affectionate and pygmy nurses. In this case, as with the cuckoo in the nest of the yellow wren, and that of the red-tailed warbler, the egg is, probably, *conveyed by the parent*, and *placed* in this small and slender cradle, which could not be able to sustain the weight, or receive the body, of the intruder." It seems that some astute observers have lately discovered, that the European cuckoo is in the habit of transporting her egg *in her mouth*, when the situation of the nest of her selected nurse (a hole in the wall for instance) should seem to hinder her ingress to it. Mr. Nuttall, seizing upon this idea, does not hesitate to conjecture that the same stratagem is practised by our cow bunting, in the case instanced by him!

Dr. Potter, whose long letter, published by Wilson, tended not a little to mislead our honest ornithologist on the peculiar habits of the cow bunting, thus writes:—"I will not assert that the eggs of the builder of the nest are never hatched; but I can assert that I have never been able to find one instance to prove the affirmative. . . . . " How are the eggs removed after the accouchement of the spurious occupant? By the proprietor of the nest, unquestionably; for this is consistent with the rest of her economy. After the power of hatching them is taken away by her attention to the young stranger, the eggs would be only an incumbrance, and, therefore, instinct prompts her to remove them. . . . . Would the foster-parent feed two species of young at the same time? I believe not. *I have never seen an instance of any bird feeding the young of another, unless immediately after losing her own.* I should think the *sooty-looking* stranger would scarcely interest a mother, while the cries of her own offspring, always intelligible, were to be heard."

It would, perhaps, be difficult, in the whole range of natural history writing, to find as notable an instance of false reasoning as is presented in the foregoing extract. The epithet "*sooty-looking*," applied to a newly hatched cow bunting, is so entirely inappropriate, that one is led to believe the writer never saw a young cow bird. The young cow bunting, like the young of all our small birds, is clothed with a fine down, so thinly spread

over its body, that the skin is visible; and, in respect to colour, it cannot be distinguished from the young of either the Maryland yellow throat, or those of the indigo bird. In one instance, indeed, I observed that the down of the cow bunting was a shade lighter than that of two indigo birds, its nestmates.

An opinion has lately been broached, that "birds have probably the means of knowing an addle egg, for, when any such remain after the hatching of the others, they *always remove them from the nest.*" (Audubon's *Orn. Biog.*, i. 497.) I have reason to believe that birds possess no such knowledge; and I am confident that, when an addle egg is removed, it is not by the owner of the nest, but by some vagrant bird in search of food: except, indeed, in the case of its being broken, when it is invariably removed by the proprietor. To find an addle egg among nestlings is so common an occurrence, that instances of the fact, which is known to every experienced naturalist, would be useless.

I shall now proceed to detail the result of some particular observations on the cow bunting, in the hope that other naturalists may be induced to pursue a subject which is worthy of investigation.

My residence is in the county of Bucks, Pennsylvania; a retirement selected for its amenity and sylvan character, inasmuch as an ample forest lies contiguous to my dwelling. In this forest the sound of a gun is seldom heard; no vagabond bird-collector is allowed to pollute a retreat, which even the volatile schoolboy has been taught to respect, as a sanctuary of the feathered race. Here is the chosen abode of the splendid tanager, the golden oriole, and the tuneful wood thrush; and here the indigo bird, the song sparrow, and many others, construct their nests and rear their young in safety.

On the 9th of June, 1834, I discovered a nest of the wood thrush (*Túrdus melòdus Wils.*). It was placed on a horizontal branch of a low cedar, four feet from the ground; and contained two eggs belonging to the owner of the nest, and an egg of the cow bunting. The latter was smaller than the others, as the bird which laid it is smaller than the thrush; the cow bunting, according to Wilson, being 7 in. in length, and the wood thrush 8 in.

Early in the morning of the 10th of June, I found one of the thrush's eggs hatched, and the cow bunting's. They had both been hatched either the preceding night, or that morning, as I had not perceived any external signs of hatching in the evening of the 9th. In the morning of the 12th of June, the thrush's second egg was hatched.

smallness of the nest, the cow bird could not enter its cavity, she was compelled to sit over it; and her egg, in dropping, broke the flycatcher's. The nest was abandoned.

There is a passage in Mr. Nuttall's history of the blue-grey flycatcher, which I cannot forbear quoting, as it involves one of the most preposterous ideas that ever entered into the brain of a naturalist. After describing the nest of the flycatcher, our author adds, "In this frail nest, the cow troopial sometimes deposits her egg, and leaves her offspring to the care of these affectionate and pygmy nurses. In this case, as with the cuckoo in the nest of the yellow wren, and that of the red-tailed warbler, the egg is, probably, *conveyed by the parent*, and *placed* in this small and slender cradle, which could not be able to sustain the weight, or receive the body, of the intruder." It seems that some astute observers have lately discovered, that the European cuckoo is in the habit of transporting her egg *in her mouth*, when the situation of the nest of her selected nurse (a hole in the wall for instance) should seem to hinder her ingress to it. Mr. Nuttall, seizing upon this idea, does not hesitate to conjecture that the same stratagem is practised by our cow bunting, in the case instanced by him!

Dr. Potter, whose long letter, published by Wilson, tended not a little to mislead our honest ornithologist on the peculiar habits of the cow bunting, thus writes:—"I will not assert that the eggs of the builder of the nest are never hatched; but I can assert that I have never been able to find one instance to prove the affirmative. . . . . "How are the eggs removed after the accouchement of the spurious occupant? By the proprietor of the nest, unquestionably; for this is consistent with the rest of her economy. After the power of hatching them is taken away by her attention to the young stranger, the eggs would be only an incumbrance, and, therefore, *instinct* prompts her to remove them. . . . . Would the foster-parent feed two species of young at the same time? I believe not. *I have never seen an instance of any bird feeding the young of another, unless immediately after losing her own.* I should think the *sooty-looking* stranger would scarcely interest a mother, while the cries of her own offspring, always intelligible, were to be heard."

It would, perhaps, be difficult, in the whole range of natural history writing, to find as notable an instance of false reasoning as is presented in the foregoing extract. The epithet "*sooty-looking*," applied to a newly hatched cow bunting, is so entirely inappropriate, that one is led to believe the writer never saw a young cow bird. The young cow bunting, like the young of all our small birds, is clothed with a fine down, so thinly spread

over its body, that the skin is visible; and, in respect to colour, it cannot be distinguished from the young of either the Maryland yellow throat, or those of the indigo bird. In one instance, indeed, I observed that the down of the cow bunting was a shade lighter than that of two indigo birds, its nestmates.

An opinion has lately been broached, that "birds have probably the means of knowing an addle egg, for, when any such remain after the hatching of the others, they *always remove them from the nest.*" (Audubon's *Orn. Biog.*, i. 497.) I have reason to believe that birds possess no such knowledge; and I am confident that, when an addle egg is removed, it is not by the owner of the nest, but by some vagrant bird in search of food: except, indeed, in the case of its being broken, when it is invariably removed by the proprietor. To find an addle egg among nestlings is so common an occurrence, that instances of the fact, which is known to every experienced naturalist, would be useless.

I shall now proceed to detail the result of some particular observations on the cow bunting, in the hope that other naturalists may be induced to pursue a subject which is worthy of investigation.

My residence is in the county of Bucks, Pennsylvania; a retirement selected for its amenity and sylvan character, inasmuch as an ample forest lies contiguous to my dwelling. In this forest the sound of a gun is seldom heard; no vagabond bird-collector is allowed to pollute a retreat, which even the volatile schoolboy has been taught to respect, as a sanctuary of the feathered race. Here is the chosen abode of the splendid tanager, the golden oriole, and the tuneful wood thrush; and here the indigo bird, the song sparrow, and many others, construct their nests and rear their young in safety.

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Early in the morning of the 10th of June, I found one of the thrush's eggs hatched, and the cow bunting's. They had both been hatched either the preceding night, or that morning, as I had not perceived any external signs of hatching in the evening of the 9th. In the morning of the 12th of June, the thrush's second egg was hatched.

This, to me, was a period of great anxiety. I literally lived in the woods, in order to guard a treasure, which an ornithologist alone would know how to appreciate. Every thing went on as smoothly as could be desired; the nestlings improved under the care of the parents; the wants of all were alike attended to; and it appeared that the poor little cow bunting, instead of being viewed as a parasite, or an intruder possessed as great a share of the affection of the foster-parents, as that which was bestowed upon their own offspring. On the 18th of June, the cow bunting left the nest; and, as the underwood was very thick, it so effectually concealed itself, that I never afterwards saw it. The webs of its quill-feathers were about an inch in length; but it must be observed, that almost all birds of the bunting and sparrow kinds leave the nest some days before they are able to fly. Our young song sparrows will seldom remain in the nest longer than ten days; and I have known them to depart when only eight days old. The young of the Towhe bunting commonly quit the nest in nine days.

In the morning of the 20th of June, one of the young wood thrushes jumped from the nest, as I cautiously advanced to view it. I could not prevail with it to remain, although I replaced it several times; and on the 23d the last departed. None of these birds could fly.

On the same day that the forementioned discovery was made, I found another nest of the wood thrush. It was built on a horizontal branch of a small white oak; and contained three of the thrush's eggs, and an egg of the cow bunting. The nest of the wood thrush is large and substantial; its concavity is wide and commodious. On the morning of the 17th of June, at an early hour, I observed that the cow bunting's egg was hatched, and one of the thrush's. The next morning another egg was hatched; and in the afternoon of the same day the third thrush came forth. Here we have a brood, composed of a cow bird and three thrushes, all so closely resembling each other, that the most experienced observer would, probably, not have been enabled to point out the difference. As in the former instance, the nest was daily watched by myself; and I could not perceive that the parent thrushes had the least idea that they were nourishing the offspring of a bird different in its nature from themselves.

On the 26th of June, nine days after its birth, the cow bunting quitted the nest. Of the wood thrushes, one departed on the 30th, and the other two the following day.

On the 16th of June, I discovered an indigo bird's nest. It was constructed in a thick mass of chestnut suckers; and

contained one egg of a pure white, without any spot or marking whatever. The next day the indigo bird laid another egg. In the night there was a thunder-storm, with violent rain. On examining the nest, in the morning of the 18th, I found it removed from its upright position, and nearly broken loose from the shoots to which it was attached. The two eggs were lying nearly out of the cavity of the nest; and on the ground there was a cow bunting's egg, broken. It was evident that the cow bunting had anticipated the indigo bird, by taking possession of the premises, before the rightful owner was prepared to lay her third egg. The weight of the cow bunting, together with the moisture which the nest had imbibed from the rain, occasioned the accident. The nest was replaced in its former position, and secured by strings, but the owner abandoned it.

Small birds generally lay very early in the morning; hence he who would wish to observe them in the act of dropping their eggs must rise betimes. Of this fact Wilson was aware; he, consequently, was in the habit of commencing his researches at the break of day. His detection of a cow bird in the nest of a red-eyed flycatcher was the result of his early vigilance.

As I have noted the colour of the indigo bird's egg, found in the nest above mentioned, it seems proper to speak of a curious circumstance, which, it appears, is unknown to our ornithologists. The egg of the indigo bird is sometimes of a pure white, of a bluish white, of a pale blue, without any spot or marking whatever; and, again, we find it marked either as Wilson describes it, "with a blotch of purple at the great end," or with pale ferruginous spots. The egg of the American goldfinch is subject to nearly similar variations; for it is found of a dull white, and of a bluish white, without any spots; and sometimes, as Wilson has it, "thickly marked at the greater end."

Mr. Nuttall, presuming that his knowledge of our birds was superior to that of the author of the *American Ornithology*, corrects, in the most emphatical manner, Wilson's supposed error in regard to the spots on the egg of the goldfinch; and adds, that his "description was taken from eight nests, which were all made towards the close of summer, chiefly in the Botanic Garden at Cambridge." Wilson, in common with all naturalists, was liable to error, when he trusted to information derived from others; but when he had had the chance of an autoptical examination, his descriptions are entitled to the fullest confidence. Had Mr. Nuttall known this, he might not only have spared his significant rebuke about the spots; but it might also have occurred to him, that the nest of the

goldfinch may be found in other places than the Botanic Garden of Cambridge, answering to Wilson's description of it; namely, "*covered on the outside with pieces of lichen.*"

On the 14th of June, of the present year, I discovered a nest of the indigo bird, containing four eggs; two of these were those of the cow bunting, and the others belonged to the owner of the nest. The ground colour of the cow bunting's eggs being different, that is, one being darker than the other, it appeared probable that they had been dropped by different individuals. The eggs of the indigo bird were of a dull uniform white. The nest was situated on the border of my woods, on a hickory shrub, about 2 ft. from the ground; and firmly secured at the divergence of the branches.

Early in the morning of the 21st of June, I found one of the cow buntings hatched, and the other just emerging from its shell. The next morning one of the young indigo birds appeared; but the second egg, having been punctured by some insect, was addle. This addle egg had been the first laid; as it is not probable the parent would have adhered to her nest, had the eggs of the cow bunting been dropped before any of her own. The simultaneous hatching of the eggs of the cow bird proves that they had been deposited by different individuals.

By the 23d, the two cow buntings had increased so greatly in bulk, that I became apprehensive they would soon smother the diminutive indigo bird, which did not appear to be much more than one fourth of their size. I could perceive, however, that it received a full share of parental attention, its crop exhibiting an ample supply of food. It was frequently in an uneasy position, and seemed to respire with difficulty. At every movement of the buntings, the little creature would get to the bottom of the nest, and had to struggle hard to relieve itself from their oppressive weight. The following day it was no longer to be seen: it had, probably, perished in the night, and had been removed to a distance by its mother, as I sought for it in vain below and about the nest.

Neither gallinaceous birds nor domestic pigeons remove their dead young; but small birds invariably do: their habits of cleanliness are remarkable. It is well known that the young of the latter are in the practice of muting immediately on being fed; and that the excrement, which is enclosed in a pellicle, is forthwith carried away by the parent. As there is something anomalous in the excrementitious matter of the young cow bird, I shall advert to it by and by.

On the 25th, the two cow buntings were in good plight; and their pin-feathers were rapidly advancing. Their appetite

seemed to increase with their strength; for, by the 30th, the industry of the foster-parents hardly sufficed to satisfy their wants. It was now evident that the concavity of the nest was not sufficiently capacious to admit of their remaining at ease; for one was continually lying over the other; and, in their exertions to nestle side by side, the nest became considerably elongated. Early the next day, the 1st of July, they both departed. They were ten days old.

I sought for these cow buntings in vain until the afternoon of the next day; when I discovered them perched upon the limbs of a small white oak, situated within a few feet of their nest. They were accompanied with both of the foster-parents, the female of which was in the act of feeding one of them, whilst the other stood by, importuning for food, and quivering its wings. It was impossible for me to determine that these were the same birds that I had seen in the nest; but it must be admitted that the opinion of their identity is a probable one. And yet, when I took into view their size, for they were considerably larger than their foster-parents; the length of their tail, which was an inch or more; and the ease with which they fluttered from limb to limb; I was almost disposed to think that they were different birds. One fact is certain, that I saw no other indigo birds in the vicinity; and the pair above mentioned, with their clamorous wards, frequented the place for two or three days.

On the 15th of June, I found, in the interior of my forest, the nest of the red-eyed flycatcher. It was suspended at the divarication of a branch of a hickory shrub; and contained two young, about two days old, and an addle egg. As soon as the pin-feathers of these birds made their appearance, I ascertained that they were cow buntings; consequently I watched them, from day to day, with increased interest. On the morning of the 21st, I observed that they entirely filled the cavity of the nest. Their plumage was pretty well developed, their quills being 1 in. in length. In the afternoon of this day, a cat, prowling about the woods, espied the nest; and I was apprised of the fate of the poor buntings, by beholding their loosened tenement, and their feathers scattered on a neighbouring stump. As it is probable the flycatcher had laid more than one egg in this nest, when it was discovered by the cow buntings, it may be presumed that they were broken, as in the instance before mentioned.

On the 10th of July, I found another indigo bird's nest. It was placed in the top of a black oak shrub, 3 ft. high. It contained three eggs, of a bluish white, marked at the great end with pale ferruginous spots; and an egg of the cow bunting. On the morning of the 21st, my visit to the nest had

been retarded until 9 o'clock, when I observed that two of the indigo birds, and the cow bird, were hatched. As the shell of the latter, and that of one of the former, were yet in the nest, it was an evidence that the young had just come forth. In the course of the morning the last egg was hatched.

Here, then, is a proof that the cow bird's egg was deposited after two eggs had been laid by the indigo bird, which commenced sitting immediately on laying her third egg. As it is admitted that the cow bunting never drops her egg in the nest of a bird that has commenced incubation, we must infer, from the simultaneous hatching of the eggs, that their period of incubation is precisely the same, namely, twelve days.

On the 24th, all the nestlings appeared to be well; but the size of the cow bird was nearly double of that of the indigo birds. When passerine birds are newly hatched, they do not place themselves in a regular order in the nest; they frequently lie across one another; but when their eyes are unclosed, they arrange themselves side by side, so that they may conveniently be fed by the parent, and discharge their fæces. The cow bird, in this instance, appeared by no means disposed to accommodate his nest-mates; for he was continually stretching himself over them, and interfering with their convenience. The indigo birds exhibited signs of uneasiness, and appeared, occasionally, to breathe with difficulty.

On the 28th, the cow bunting had grown so large, that he could extend himself quite across the nest, which appeared completely filled. I took notice that the three indigo birds occupied one side of the nest, as if sensible of their consanguinity, and as if aware that the fosterling was not one of their kindred. The latter afforded strong evidence that he had not been slighted by his nurses: the sides of the nest, besmeared with his excrements, attested to his voracity. I before observed that there is something anomalous in the muting of the young cow bunting; for, when it is become pretty well grown, the fæces do not appear to be removed by the foster-parents, but accumulate on the sides of the nest. This day there was an easterly wind, with rain; and the next morning I found the smallest of the young indigo birds lying upon the ground, beneath the nest, dead. It had, probably, been jostled out of the nest when striving to get food from its parent. In the night of the 29th there was heavy rain; and, on the 30th, I observed another of the indigo birds lying dead in the nest. This bird had been evidently sick, as its crop showed no signs of food, and as its position was a commodious one. The remaining indigo bird was standing upon the edge of the nest, whence it escaped, in my presence, into the bushes.

The cow bunting remained until the morning of the first of August, when it departed. It will be perceived that it was eleven days old. With a view of examining the bunting, I sought for it among the bushes, without success; but I had the luck of discovering the young indigo bird, which was perched upon a limb of a small poplar, about 3 ft. from the ground; and it had evidently been in this secure place for some time, as the leaves below it were soiled with its excrements. The old indigo birds, on perceiving that I had found their young, enticed it away, and I saw it no more.

On the 5th of August, I saw the cow bunting. It was in the company of its foster-parents; and it flew with ease.

Finally, on the 4th of August, I discovered another nest of the indigo bird. It was built in a chestnut shrub; and was canopied with a thick growth of leaves, so that it could hardly be perceived. It contained two indigo birds, and a cow bunting, about three days old, as their eyes were beginning to unclose. No accident whatever happened to this brood; and on the 10th the two indigo birds left the nest. The next morning they were followed by the cow bunting.

Not to fatigue the reader with any further details on the subject of this anomalous bird, I shall close my observations with the following summary:—

First: There are sometimes two eggs of the cow bunting deposited in the same nest.

Secondly: The cow bunting sometimes drops her egg in the nest of a bird larger than herself.

Thirdly: The egg of the cow bunting requires the same term of incubation as that of the foster-parent.

Fourthly: The eggs of the foster-parent are never removed from the nest, but hatch as in ordinary cases.

Fifthly: When two eggs of the cow bunting are hatched in the nest of a bird smaller than herself, the young of the foster-bird, for the want of room, are either smothered in the nest, or jostled out of it.

Sixthly: When only one egg of the cow bunting is hatched in the nest of a bird smaller than herself, the young cow bird, and the young of the owner of the nest, are nourished and reared with equal affection, and dwell in harmony together.

Seventhly: When the cow bunting drops her egg in the nest of a bird larger than herself, the selected nurse does not eject the egg, but hatches the stranger, and nourishes it as her own.

Eighthly: The cow bunting will drop her egg into a nest which contains more than one egg.

Buckingham, Pennsylvania, Sept. 20. 1835.

ART. II. *A Supplement to the List of Species of Birds occurrent on the North-eastern Extremity of the Alleghany Mountain Range, printed in* VIII. 539, 540.; *and Information on Traits in the Habits of the Passenger Pigeon* (*Colúmba migratòria*), *and of the Wolf* (*Cànis Lùpus*). By R. C. TAYLOR, Esq., F.G.S., Member of the Geological Society of Pennsylvania, &c.

ALONG with my last communication on the geology and natural history of the north-eastern extremity of the Alleghany mountain range, in Pennsylvania (VIII. 529—541.), I stated my hope that, in a subsequent visit to this region during the present summer and autumn, I should be enabled to enlarge the zoological catalogue I transmitted to you. Having devoted four months to further explorations in this interesting district, I am now enabled to make some additional contributions, particularly in the department of ornithology, for which I am indebted to my friend Dr. Saynisch of Blossburg, on the Tioga river, who has collected nearly all the birds in the following list during the present year.

The figures indicate the number of species enumerated.

Order I. *Accípitres, Rapacious Birds.*

3. *Strix passerìna*, Little owl.
4. *Fálco uliginòsus*, Marsh hawk.
5. *Fálco sparvèrius*, American sparrow hawk.

Order II. *Picæ, Pies.*

7. *Pìcus carolìnus*, Red-bellied woodpecker.
8. villòsus, Hairy woodpecker.
9. pubéscens, Downy woodpecker.
2. *Sítta carolinénsis*, White-breasted black-capped nuthatch of Wilson.
3. vària, Red-bellied black-capped nuthatch.
2. *Cùculus* erythrophthálmus, Black-billed cuckoo.

Order III. *Passerinæ, Passerines.*

9. *Túrdus auricapíllus*, Golden-crowned thrush.
10. *Túrdus solitàrius*, Hermit thrush.
2. *Emberìza americàna*, Black-throated bunting.
3. erythrophthálma Towhe bunting.
4. *Emberìza oryzívora*, Rice bunting.
1. *Tánagra æstìva*, Summer red bird.
2. rùbra, Scarlet tanager.
8. *Fringílla cyànea*, Indigo bird.
9. purpùrea, Purple finch.
10. melòdia, Song sparrow.
1. *Ampelis americàna*, Cedar bird.
2. *Sylvia Régulus*, Golden-crested wren.
1. *Motacílla doméstica*, House wren.
1. *Lànius tyránnus*, Tyrant fly-catcher, or king bird.
2. *Muscícapa quérula*, Small green-crested flycatcher.
2. *Lóxia ròsea*, Rose-breasted grosbeak.
1. *Curviróstra americàna*, American crossbill.
2. *Caprimúlgus americànus*, Night hawk. [VII. 633. 635.; VIII. 470.]
1. *Hirúndo americàna*, Barn swallow.
2. virídis, Green-blue, or white-bellied, swallow.
3. pelásgia, Chimney swallow.
4. purpùrea, Purple martin.

Order V. *Grállæ, Waders.*

1. Trínga solitária, Solitary sand-piper.
3. *Scólopax* vocíferus, Tell-tale godwit, or snipe.
1. *A'*rdea viréscens, Green heron.

Order VI. *A'nseres, Birds of the Goose Kind.*

2. *A'*nas albèola, Buffel-headed duck.
3. díscors, Blue-winged teal.

These birds, it may be proper to remark, were all obtained at an elevation of from 1350 ft. to nearly 2000 ft. above the level of the sea, but principally from the former.

My geological investigations in the Tioga valley, during this autumn, have extended through the area which I mentioned (VIII. 535.) as having been a few years since occupied as the nesting-place of the passenger pigeon (*Colúmba migratòria*). I have found that I had materially underrated the length of this valley of pigeons, and am enabled to assert, from my own observation, that full fourteen miles in length were occupied by these birds. I am not prepared even to say that this is the utmost limit, as my opportunity for observing terminated at that point; and here the numerous felled trees and old nests showed the former abundance of these transitory visitants. I am informed that the various processes of building the nests, of incubation, and of the flight of the young birds, and the departure of the old ones, are remarkably simultaneous. The young pigeons, or "squabs," appear to quit their nests, and essay to fly, nearly all within a day or two of each other. Consequently it becomes necessary, on the part of those who seek these birds, to be on the watch, or they will be unsuccessful in capturing the game. It was stated, that comparatively a very few young birds were taken even on the third day after the general flight took place. By persons who assisted at this time in collecting a great number of the squabs from this place, I was assured that they rarely found more than one young bird in each nest. Mr. Audubon, whose account of these birds is the result of much observation, affirms that each brood generally consists of a male and a female. The relation, given by this delightful ornithologist, of the nesting of the passenger pigeon, I have found to be perfectly correct. I have never been in the vicinity of one of their roosting places.

I believe the songster of the Alleghany woods, to which allusion is made in my preceding communication (VIII. 534.), is the American wood thrush (*Túrdus mustelínus*), in whose praise the author above alluded to speaks with such enthusiasm.

At present I have little to add to the list of Mammàlia inhabiting this district. Having passed much time in the present year in an unfrequented and elevated forest region,

during which time I have slept sixty nights out in the woods, some additional opportunities have occurred to make zoological observations.

The Wolf.—In one of the rocky ravines which descend into the Tioga, near its source, is a favourite resort or den of the common wolf (*Cànis Lùpus*). Here I have recently followed the bloody track of a buck, which had evidently been pursued, and probably fastened on, by one or more wolves. The carcass was still warm, but a large portion of its flesh was already gnawed away. Three days previously I was present at the killing of one of these animals, a mile or two from the same spot. It is asserted that the common wolf of America is remarkable for its cowardice. Trappers have told me that this animal, when trapped, displays no ferocity, is silent, subdued, and unresisting. One old hunter stated that he has frequently taken a wolf out of the trap, and compelled it to lie down by his side, after threatening or giving it a few blows, whilst he reset his trap. In a case which occurred not twenty days ago, in which I was present, a fine young wolf, about fifteen months old, being suddenly attacked with a club, offered no resistance, but crouching down and coiling up, in the supplicating manner of a young dog about to be chastised, suffered himself to be knocked on the head. Such a circumstance is altogether so unusual, that, although a witness of the fact, I feel some difficulty in explaining the cause of so wary an animal permitting itself to be so attacked, and to surrender with so little effort to escape. There was no indication of disease, and it was pronounced to be a healthy animal, so far as could be judged, by numerous individuals who examined it. I conceive it may be chiefly explained by the circumstance of its being taken by surprise, as it was stealing off from a "patch" of laurel (*Kálmia*). Be this as it may, it proved a fortunate affair to my companion, as the bounty for the scalp of every wolf is here twelve dollars, and its skin is worth two more.

313. *Chestnut Street, Philadelphia, U. S.,*
Oct. 5. 1835.

ART. III. *Remarks on Trees, with Reference to their being perforated by the Titmouse and the Woodpecker.* By CHARLES WATERTON, Esq.

THE tree, that noble and gigantic son of earth, is the favourite resort of most birds; and so intimately is it connected with the charming science of ornithology, that he who has neglected to pay attention to it will often find himself at a

loss to give correct information, in his description of the habits of the feathered tribes.

The bloom, the fruit, the health and vigour of a tree, are interwoven with the economy of birds. Do you wish to have a view of seven or eight different species of Cólibri, collected at one tree? Wait, in patience, till the month of July; when a vast profusion of red flowers on the *bois immortel* (a tree well known to every planter in Guiana) invites those lovely creatures to a choice repast. Are you anxious to procure the pompadour, the purple-breasted and the purple-throated colingas? Then, mark the time when the wild guava tree ripens its fruit; and on it you will find these brilliant ornaments of the forest. Is the toucan your object? You have only to place yourself, before the close of day, at the shaded root of some towering mora whose topmost branches have been dried by age, or blasted by the thunderstorm, and to this tree the bird will come, and make the surrounding wilds reecho to its evening call. Would you inspect the nest of the carrion crow? Brittle are the living branches of the ash and sycamore; while on the contrary, those which are dead on the Scotch pine are tough, and will support your weight. The arms of the oak may safely be relied on; but, I pray you, trust with extreme caution to those of the quick-growing alder. Neither press heavily on the linden tree; though you may ascend the beech and the elm, without any fear of danger. But let us stop here for the present. On some future day, should I be in a right frame for it, I may pen down a few remarks, which will possibly be useful to the naturalist, when roving in quest of ornithological knowledge. I will now confine myself to the misfortunes and diseases of trees; and I will show, that neither the titmouse nor the woodpecker ever bore into the hard and live wood.

Trees, in general, are exposed to decay by two different processes, independent of old age.

The first is that of a broken branch, which, when neglected, or not cut off close to the parent stem, will, in the course of time bring utter ruin on the tree. The new wood, which is annually formed, cannot grow over the jutting and fractured part, into which the rain enters, and gradually eats deeper and deeper, till at last it reaches the trunk itself. There it makes sad havoc; and the tree, no longer able to resist the fury of the tempest, is split asunder, and falls in ponderous ruins. But ere it comes to this, the titmouse will enter the cavity in a dry spring, and rear its young ones there. Now, if the diseased or fractured branches were carefully cut off close to the bole, you would see the new accession of wood gradually rolling

over the flat surface, which, in time, would be entirely covered by it; and then the tree would be freed for ever from all danger in that quarter.

The second process towards decay is exceedingly curious, and cannot well be accounted for. If it takes place to a serious extent, no art of man can possibly save the tree; and sooner or later, according to the magnitude of the disease with which it has been tainted, it will fall before the force of the raging winds. Should this disease be slight, the timely prevention of rain from penetrating the injured part, will secure the tree from further mischief.

I must here observe that, in animated nature, the vital functions are internal; so that, if the part within be mortally wounded, death is the inevitable consequence. With most trees, and all of those of Britain, it is otherwise. Their vitality is at the periphery, connected with the bark, under which an annual increase of wood takes place, so long as the tree is alive. Should, however, the bark be cut away, the tree will die upwards from the place where all the bark has been destroyed. Not so with its internal parts. You may entirely excavate the interior of a tree; and, provided you leave a sufficient strength of wood, by way of wall, in order that it may be able to resist the fury of the tempest without, taking care at the same time to exclude the rain, your tree will remain in vigour from generation to generation. The internal texture of a tree will perish, without any notice by which we may be forewarned of the coming ruin. The disease which causes the destruction takes place in the oak; but more frequently in the sycamore; and most commonly of all in the ash. We will select this last tree by way of elucidation.

Often, when arrayed in all the bloom of vegetable beauty, the ash tree is seen to send forth from its bole, or from some principal branch, a small fungus, which, during the summer, increases to a considerable size. It ripens in the autumn, and falls to the ground when winter's rains set in. The bark through which this fungus sprouted is now completely dead, though it still retains its colour; and that part of the wood from which it proceeded is entirely changed in its nature, the whole of its vitiated juices having been expended in forming and nourishing the fungus. Nothing remains of its once firm and vigorous texture. It is become what is commonly called touchwood, as soft and frangible as a piece of cork, which, when set on fire, will burn like tinder. In the meantime, the tree shows no sign of sickness; and its annual increase goes on as usual; till, at last, the new swelling wood closes over the part from which the fungus had grown, and all appears to go on right again. But, ere the slow process arrives at this

state, the titmouse or the woodpecker will have found an entrance, and a place of safety for their incubation. They quickly perforate the distempered bark; and then, the tainted wood beneath it yields to their pointed bills, with which they soon effect a spacious cavity.

Here then we have the whole mystery unfolded. These birds, which never perforate the live wood, find in this diseased part of the tree, or of the branch, a place suitable to their wants. They make a circular hole, large enough to admit their bodies; and then they form a cavity within, sufficiently spacious to contain their young. Thus does Nature kindly smooth the way, in order that all her creatures may prosper and be happy. Whenever I see these sylvan carpenters thus employed, I say to them, "Work on, ye pretty birds; you do no harm in excavating there: I am your friend, and I will tell the owner of the tree that you are not to blame." But his woodman deserves a severe reprimand. He ought to have cut down the tree, in the autumn after the appearance of the fungus.

On the island where this house stands, two stately sycamores have afforded ample proof of what I have advanced.

One of these, some forty years ago, began to put on a sickly appearance; and I heard my father say that he expected to see it blown down in a heavy gale of wind. In the summer of 1800, I climbed up to the place where the brown owl formerly used to breed. The hole was full of water, in a branch leading from the bole, at about 20 ft. from the ground. Presuming from appearances that the damage was extensive, I took a wimble, and bored into the tree, at the height of 5 ft.; then at 3 ft.; and lastly, I got a chisel, and cut into it at 3 in. from the walk. Twenty-four gallons of water, having the appearance of strong coffee, were procured from these apertures in the course of the day. After this, I put a cap of lead over the hole on the high branch above, leaving an entrance for the owl, should she ever come again; and I drove two long pieces of iron into the bole below the aperture, sufficiently low to form a floor for the owl's apartment, which I made with scraps of stone covered with sawdust. In the summer of the present year, 1835, 35 years from the first operation, I enlarged the lowest hole next the walk 4 in.; and, by the help of a little iron shovel, I took from the interior of the tree four large wheelbarrows full of decomposed wood, not unlike coffee-grounds in appearance. With this substance, there came out some of the small scraps of stone, which I had used in making the floor for the owl's residence: proof incontestable, that the rain water had gradually destroyed the

internal texture of the sycamore, from the broken branch at the height of 20 ft. The tree, though hollow as a drum, "or lovers' vows," is now perfectly healthy.

At a little distance from this, is another sycamore, once a towering and majestic tree. Some fifteen years ago, it put out a fungus, about 25 ft. from the ground. I saw, by the enormous size of the fungus, that the tree must give way ere long. In 1826, during a heavy gale of wind, it broke in two, at the diseased part; leaving one huge branch, which continued to be clothed with rich foliage every succeeding season. I built a stonework on the remaining part of the trunk, by way of covering; and I made sixteen apartments in it for the jackdaws, planting an ivy root at the bottom. In the summer of 1831, another large fungus made its appearance at 8 ft. from the ground. One Sunday morning, during a raging tempest, the trunk gave way at the fungus, carrying the remaining branch, the stonework, and the jackdaws' nests, with a tremendous crash, into the lake below. I roofed the remainder of the stump again, leaving an entrance for the owl. It is now quite covered with ivy, and has sent forth a partial vegetation annually from its last misfortune. In June of the present year, another huge fungus came out at 4 ft. from the ground. I understand the warning; and I clearly foresee that the final doom of this "statio malefida" volucri is close at hand.

Thus have two sycamores, within a few feet of each other, been a prey to distinct diseases, and both of them afforded an inward retreat to birds. The first, having entirely lost its inside, by the slow-consuming process of wet entering at a broken branch, still flourishes by the art of man. The second, for centuries the ornament of the rock upon which it grew, struck at last by the hand of nature with an inward distemper which nothing could arrest, broke down at intervals in partial ruins; and probably will disappear for ever during the next fierce wintry blast.

There is still another process by which an entrance is prepared for birds in the boles of trees. Frequently a large branch fails without any apparent cause; and it remains dead on the tree for many years. At last, down it comes, having given way close to the stem. On inspection you will find that decay has entered deeply into the tree itself, without any aid from rain water. The surrounding live wood, which kept swelling gradually while the dead branch remained on the tree, now that the obstruction is removed, begins to advance over the newly exposed and distempered part. In the meantime, the birds find no difficulty in excavating this part, and

there forming a place for incubation, or for a nocturnal residence. Mice and rats will also find their way into these diseased parts of trees. I know of a crab-tree in which a mouse lives. Its hole is about 5 ft. from the ground.

I have written this paper, first, to show the true habits of the titmouse and the woodpecker relative to their choice of a place for their incubation; and, secondly, to catch the eye of the proprietor of the *American Quarterly Review*, who, I am informed, has thought fit to heap anonymous abuse upon me, with an unsparing hand. Let this sage discerner of ornithological merit turn to pages 200. and 343. of the *Biography of Birds*, and then blush for American ignorance.

Walton Hall [, *near Wakefield*, *Yorkshire*], *Dec.* 21. 1835.

[In the *Architectural Magazine*, the number for August, 1835 (ii. 361, 362.), are printed remarks by Mr. Waterton "on what is commonly called dry rot," and on a method of preventing it. In the communication above, he has treated on decay in trees; in that communication, on decay in timber, by what is commonly called dry rot. Mr. Waterton considers that "Dry rot is a misnomer. This disease in timber ought to be designated, a decomposition of wood by its own internal juices, which have become vitiated for want of a free circulation of air."]

ART. IV. *Illustrations in British Zoology.* By GEORGE JOHNSTON, M.D., Fellow of the Royal College of Surgeons of Edinburgh.

LIMAPO'NTIA NI'GRA. (*fig.* 14.)

Description.—Body limaciform; when extended, two lines in length; the back convex, protuberant; very black, smooth, naked: head rounded or truncate in front, depressed, light-coloured, the mouth terminal, subinferior: eyes two, lateral, black, sessile: foot linear-oblong, tapered behind and extended beyond the body, so as to form a small tail, whitish, with a few obscure yellowish specks.

14



a, Limapóntia nigra of the natural size; *b*, the same magnified; *c*, the same in a state of semi-contraction; *d*, the animal seen swimming in a reversed position.

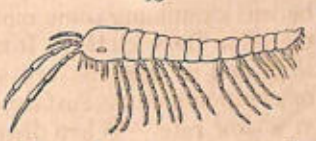
My friend, Mr. W. Baird, discovered this little snail when he was examining some marine Confervæ which had been gathered in Berwick Bay. It has a close resemblance to the black slug, and its motions are similar, creeping along the bottom, or swimming on the surface, reversed, with equal ease, although at a slow rate. When disturbed it withdraws the head under the cloak, just as the slug does, and assumes a nearly circular form, which it preserves for some time. It was fond of leaving the water, and crawling a short way up the edge of the saucer, as most littoral Mollúsca are. The quantity of gelatinous secretion which oozed from the skin seemed to be unusually great. When it was immersed in fresh water, the wrinkled state of its skin proved that the creature was pained, and it died shortly after, without excreting any coloured liquid; but after death it exhaled a very perceptible odour, which was peculiar and not disagreeable.

That Limapóntia nìgra belongs to the gasteropodous Mollúsca, I entertain scarce a doubt. The consistence and form of the foot, its distinctness from the skin of the back or cloak, the opacity of the body, and the mode of progression, convince me of this; and an attempt to examine the internal structure showed that there were various distinct viscera, although I could not ascertain their relations and nature: a stomach and intestine, however, were obvious; but I detected no trace of any structure like a lung or gills, so that the order in which the animal ought to be placed is uncertain. My impression at first was, that I had before me the mollusc of some of our minute internal shells, which seemed to be indicated by the protuberance of the back; but no shell of any kind could be detected. Limapóntia appears to me to have a close relationship to the Aplýsia víridis of Montagu; and perhaps these, and some other analogous beings, might be collected together to form a separate order of their class, distinguished by the want of gills, whose office the cutaneous envelope probably performs.

ASTACI'LLA LONGICO'RNIS, in the young state. (*fig.* 15.)

I have given (in VIII. 494—496.) a description and figure of this singular crustacean, and I return to it, for recent observations enable me to add one or two particulars to its history. The animal creeps by means of the three pairs of posterior legs, aided by the long antennæ, which are made to touch the ground so as to support it in front, and drag it in some degree forwards. Its motions in this way are slow, but, on the contrary, it swims rapidly; the principal organs of natation being the lamellar plates under the tail, for the anterior ciliated feet did not appear to be called much into action.

15

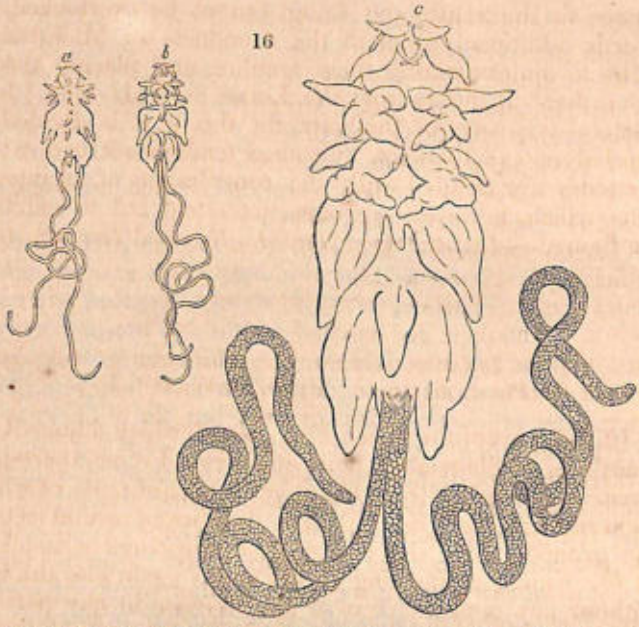


When at rest, the Astacílla clasps hold of any object in the water by its creeping legs; and, when alarmed, it bends itself at the tail and erects all the body anterior to this, having the antennæ folded under the belly more or less. In this rather grotesque attitude it resembles many caterpillars.

I have mentioned (VIII. 496.) that the ova are produced in the large barrel-like middle segment, which is true; but the animal is not oviparous, as my remarks might lead any reader to infer. The eggs are hatched within this uterine cavity, so that the animal is ovo-viviparous. The young, while yet in the uterus, are about the eighth of an inch long, and have a general resemblance to their parent; but the differences are remarkable enough, and are as follow: — 1st, There is no marked disproportion in the size of the segments, and the middle segment was not to be distinguished from the others. 2dly, The young were smooth every where: ciliæ could be detected neither on what were presumed to be the anterior legs, nor on the caudal processes; neither were claws visible. 3dly, The number of pairs of legs, or leg-like organs, was extraordinary. Besides what were conjectured to be the rudiments of the anterior legs, there were four pairs of long filaments, jointed like legs; and behind these, separated by a short space, were other two pairs of similar ones: these were followed by three pairs of shorter legs, and at the tail there were numerous appendages, apparently of two kinds, but their number and shape could not be well made out. 4thly, The head and superior antennæ were larger in proportion than they are in the adult; but, in the general contour of the body, there was no great dissimilitude between the young and mature individuals. The figure appended to this notice was drawn with care, but the softness of the specimens, which were dead and had been macerated in fresh water for a few hours, prevented them being displayed in such a manner as would have allowed the details to be given more fully and accurately. Such as it is, your readers will see, by a comparison of it with the figures in VIII. 495., the nature of the metamorphosis which the animal undergoes in its progress to maturity.

Chondraca'nthus Lo'phil. (*fig.* 16.)

Animal milkwhite, soft, opake, the body half an inch long, two tenths broad, the caudal filaments rather more than 2 in. long. *Head* tolerably distinct, convex dorsally, with two round eminences on the crown, and a narrow mesial groove running forwards to a small marginal sinus, semicircular in



a, Chondracánthus Lòphii, natural size, back view; *b*, the same on the ventral side; *c*, the same magnified.

front, narrowed behind to form a sort of short neck. Antennæ two pairs, the first pair placed on each side of the frontal sinus, small, cylindrical, with a bulging basis; the second pair lateral, pointing backwards, larger, but, otherwise similar to the first. Mouth inferior, placed at the base of the first pair of antennæ, furnished with a pair of sharp curved mandibles. *Body* oblong, divided into three portions by deep sinuations. The back convex, with a row of soft spines down the middle. There are two similar spines at each sinuation, and the posterior angles are terminated by one spine thicker than the others; the spines of the dorsal line are always six in number, exclusive of a small tubercle behind the first. Ventral surface with two pairs of unequal, unjointed, forked, rather nodulous, feet; the forks unequal, obtuse, and a single soft spine near the middle behind these, and another towards the tail. *Filaments* originating in the ventral side, near the margin, and between the lateral processes, filiform, tortuous, and compactly filled with egg-like bodies.

I found several specimens of this species, which is not described in any work to which I have access, in the pouches under the fins of the Lòphius piscatòrius. They were all alike, and adhered to the skin very closely. Its strong resem-

blance to the crustacean Calìgi cannot be overlooked, and affords additional proof of the soundness of M. Edwards's views in approximating these families, and placing them in one order. It differs from the Lernæ'æ [VIII. 565.] in the bilateral symmetry of the body, for this part is divided into two halves, exactly alike, by a clear tendinous structure; and the sides are mottled with the convolutions of an intestinal tube, which, however, we have not attempted to exhibit in the figure. — *Berwick upon Tweed.* [*Received Dec.* 23. 1835.]

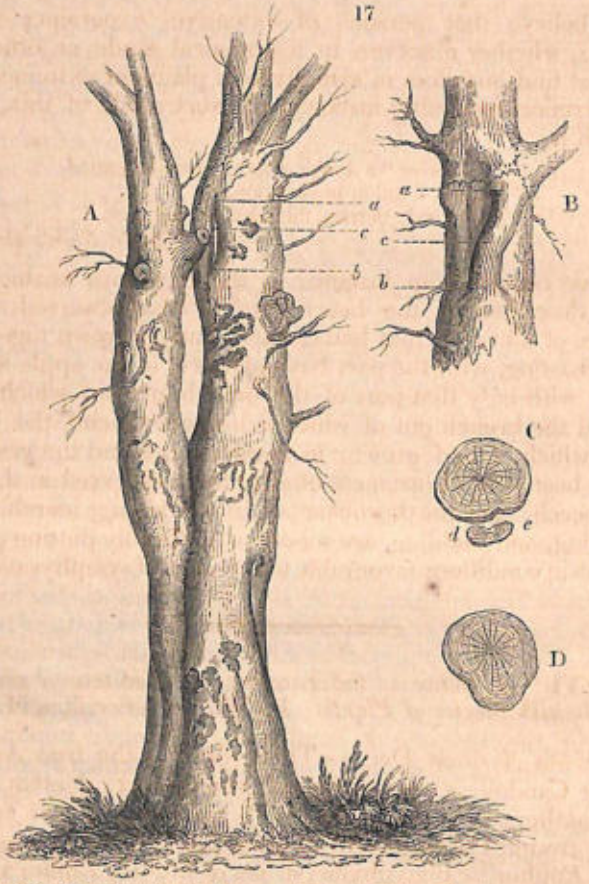
ART. V. *An Instance, perhaps Two Instances, of Symphysis in Plants described.* By B. D. WALSH, Esq.

IN that part of the Black Dog Wood which adjoins Chapmanslade, a village about four miles from Frome, there grows a remarkable beech tree (*Fàgus sylvática*), of parts of which I transmit sketches. (*fig.* 17.) At a distance of several feet from the ground, there shoots out from the trunk a small limb (*a b*), which, after rising 13 in., enters again into the trunk, without any appearance of a scar or seam in any part of it. The larger figure (A) represents the lower part of the tree, in a side view of the limb. The next larger figure (B) represents a front view of the limb, as connected with the contiguous part of the trunk. At *c*, and for some inches above and below, the bark of this small limb is perfectly smooth all the way round, and the only vestige of a juncture having taken place at *a* is a slight wrinkling and chipping of the parent stem, which makes its appearance here and there in an irregular semicircle above *a*. Supposing a horizontal section to be made at *c* (as in *fig.* C), there is a longitudinal groove both at *e* and *d*; the smaller branch being very much flattened, as shown in the figure, throughout the whole of its course. *Fig.* D represents a section at *a*.

Has this phenomenon been caused by the pressure of another branch, as appears to be indicated by the flatness of *a b*? and if so, what branch could have produced that effect? The tree has been a good deal lopped, but none of the stumps appear to have thrown out a limb in that direction. Or must we regard it as a *lusus naturæ?* which, after all, means nothing more than that we know nothing at all about the matter.

While on this subject, I may as well mention another tree remarkable for the same peculiarity, growing between Spring Gardens and Selwood Cottage, near Frome. This is an old

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From *a* to *b*, 13 in. The circumference of the small limb at *c*, 16½ in. The circumference of the trunk at *c*, exclusive of the small limb, 47½ in.

pollard maple (*Acer campéstre L.*), which has one root, but two separate trunks, growing side by side, till they unite in a head at about 3 ft. 9 in. from the ground; each being nearly cylindrical and covered on the whole of the inner and great part of the outer half by a rough and knotty bark full of seams and scars; altogether presenting an appearance not unlike the lower half of a man suffering, like Daphne, an Ovidian metamorphosis into a tree. In this case we may either suppose that the centre has rotted away, and bark formed over the wound, or that the appearance has been caused by some such practice as that mentioned by White in his *Natural History of Selborne*, letter 70.

Park Hill, near Frome, Somersetshire, July 2. 1833.

I believe that persons of extensive experience among plants, whether observers in a botanical mode or otherwise, do not find instances of symphysis in plants of extremely rare occurrence, reckoning instances of every mode of this, one of which is

> ——— "a double cherry, seeming parted,
> But yet a union in partition,
> Two lovely berries, moulded on one stem."
> *Mids. Night's Dream.*

I have observed an instance in the hawthorn analogous to that described of the beech; and I have observed an instance of a branch that had crossed, having grown together at the crossing, with the part beyond alive, in the apple and the elm; with only that part of the branch present which intervened the branch out of which it had grown and the branch into which it had grown, in the sycamore and the yew; and have been told of instances of symphysis observed in the yew, the beech, and the hornbeam. In gardening, inarching, ingrafting, and budding, are modes of artificially putting parts of plants in conditions favourable to the issue of symphysis.—*J. D.*

ART. VI. *A Notice of the Localities of Habitats of some rare British Species of Plants.* By W. A. BROMFIELD, M.D.

FE`DIA *Aurícula* Dec. — This, which is the true Aurícula of De Candolle, grows along with the ordinary dentàta of British authors (*F.* eriocárpa *Dec.* ?), in various places amongst corn around Hastings, and in profusion in an old clover field, with *Euphórbia* platyphýlla (strícta of Smith), *Lìnum* angustifòlium, &c., near Valebrook Farm, a short mile from that town. I communicated specimens to Mr. Borrer, under the impression of its being a species new to Britain, or at least very rare, when that accomplished botanist kindly favoured me with the synonymes of this and other indigenous species of the genus, when I had the pleasure of pointing the plant out to him in his visit to Hastings in July last (1835). De Candolle has given excellent dissected figures of the fruit both of his Aurícula and eriocárpa, and which admirably agree with the seed vessels of our two Hastings plants. Mr. Babington found our *Fèdia* Aurícula in the west of Ireland this season, as appears on a comparison of his own with my English specimens. The Cornish plant sent to Mr. Borrer by Mr. Bree, as *Fèdia* dentàta, differs but slightly, as I am told by the former gentleman, from our Aurícula.

Gastridium lendigerum.—I found this rare grass in a very luxuriant state, in a fallow near Hastings, last August. Knapp's figure of it (*Gramina Britan.*) is miserably deficient, and but for the accompanying dissections would hardly be recognised.

Polygonum dumetorum L.—First detected by Alexander Hankey, Esq., of London, in a wood near Wimbledon, in 1834. The spot where my own specimens were found, was in a wood immediately opposite the house of Sir C. C. Pepys, the present Master of the Rolls, facing which there is a gate, on entering which a few yards within the wood, the polygonum will be seen climbing over some low bushes, but confined to a spot of limited extent. Mr. Hankey was kind enough to point out the exact locality, from which, in July or August last (1835), I gathered specimens in high perfection, as regarded the beautifully winged fruit. It is unquestionably the *Polygonum* dumetòrum of Continental authors, as I have carefully compared the descriptions of Pollich, Krocker, Host, Wahlenberg, &c., with the recent plant from Wimbledon, and find them coincide in every respect. Wahlenberg, in the *Flora Upsalensis*, looks upon *P.* dumetòrum as merely a variety of *P.* Convólvulus; his words are, "non nisi forma magis sylvestris præcedentis;" but, in the *Flora Suecica* of the same author, published many years subsequently, the same opinion is not expressed. No one but himself seems to have entertained the same doubt, which the numerous differences in the two species, pointed out by Mr. Babington in an able paper on the genus *Polygonum*, lately read to the Linnæan Society, demonstrate to be untenable.

Scorpiùrus sulcàtus.—Three specimens of a scorpiurus answering to the above were gathered by a young lady of this town, last July (1835), amongst wheat in Battersea Fields, the attempt to determine the nature of which, by reference to Smith's *English Flora*, occasioned her, as may be conceived, no small degree of trouble and loss of time. Two of these examples, in flower and fruit, are in my possession, but were doubtless imported along with foreign corn, amongst which the various species of this genus are not unfrequent in many parts of the south of Europe. A subsequent search on the same spot was quite unsuccessful.

Méspilus germánica.—In No. 55. of this Magazine, Mr. Trevelyan, in an interesting list of new localities for rare plants [VIII. 631, 632.], mentions [p. 632.] the thorny variety of *M.* germánica as growing in hedges between Tunbridge Wells and Penshurst. The tree is by no means uncommon in the vicinity of Hastings, and is always spinous, flowering abundantly, but fruiting sparingly; the wild medlar is about

the size of a moderate walnut, very austere, and of a stony hardness. *M.* germánica is scattered over a very extensive district; as about Hastings, and at the back of St. Leonard's in many places; also about Ashburnham, between Catfield and Ninfield, in some places quite a conspicuous ornament to the hedgerows, which is not the only situation it affects, occurring apparently truly wild, though rarely, in the midst of natural woods near Hastings, as in those at the Old Road, Coghurst, &c., in which places I have found seedlings as well as trees of advanced growth, springing up perfectly spontaneously, and very remote from habitations or cultivated ground. In Guernsey and Jersey, I have often found it wild, so that its claim to be considered indigenous can hardly be questioned; besides, I have never seen it in any garden, as a cultivated fruit tree, within many miles of this place.

Bupleùrum falcàtum.— The exact station for this plant, gathered by myself in July, is in hedgerows and borders of fields between High Ongar and Chelmsford, beginning to grow exactly at the turnpike by the third milestone from Ongar, or seventh from Chelmsford. It is most abundant on the right hand of the road towards the latter town, particularly in the hedge bounding the highway, but is so confined to the field side of the hedge, that not a plant is to be seen from the road. The bupleurum is spread over a wide extent of ground, covering the banks of the fields, but never mingling with the crops; amongst which, however, I found *B*upleùrum rotundifòlium in great luxuriance and vigour, amongst barley, and in such profusion as to be a troublesome weed. On the same spot I noticed *Fèdia* dentàta, and, in the hedge first mentioned, *L*áthyrus *A*phaca and *L.* Nissòl*ia* in greater quantity than I have ever seen it elsewhere. The name of Norton Heath, given in Hooker's *Flora* as the station for the *B*upleùrum falcàtum is liable to mislead, since the land is now completely enclosed, a small portion only of common remaining.

Centaurèa solstitiàlis.—In several fields about Barton, near Bury St. Edmunds, Suffolk, as also about Rougham, in the same vicinity, but seldom found in the same spot for many seasons in succession.

Centaurèa nigréscens Willd. — This species, which has usually been considered as a var. of *C.* nìgra with radiant florets, is not uncommon in the Isle of Wight, particularly around Carisbrooke Castle, where I found it several years ago. The scales of the involucre are much less regularly pectinated, and more membranous, than in the ordinary *C.* nìgra; it approaches *C.* Jàcea in the character commonly given to that species, and is perhaps truly distinct from either.

In concluding these notices, I cannot help expressing a wish that in future the pages of this Magazine may regularly become the medium of communicating, more definitely than is usually done, the *exact stations* of all our rarer indigenous plants, by those whose *personal* knowledge of their habitats enables them to do so with absolute certainty. By following such a course these volumes would prove a most valuable "*Botanist's Guide*," and faithful record of lost or still existing stations to succeeding times, in place of those vague indications which seldom conduct the botanist to the object of his search. — *Hastings, Sussex*, 1835.

ART. VII. *An Enumeration of Species and Varieties of Plants which have been deemed British, but whose Indigenousness to Britain is considered to be questionable.* By the Rev. J. S. HENSLOW, M.A., Regius Professor of Botany in the University of Cambridge.

IN February, 1835, I sent you a communication respecting the indigenous flora of Britain [VIII. 84—88.], with a promise to forward some further remarks, or, rather, the list of plants, marked in the way I have there suggested. When I was about to do so, I found that a second edition of my *Catalogue* was wanted; and, having determined to insert these notices in it, I now send you the *Catalogue* itself, from which you can easily extract the names of those plants to which any mark has been attached.

I am obliged to Mr. Bree for taking up the subject [VIII. 386—388.]. He will observe that I do not intend to say, that *Iris fœtidissima* and *Polygonum Bistorta* are not truly native. I know that the former is plentiful in the south of England; and I have found both in Kent in abundance, and evidently indigenous. I alluded merely to *one* spot where they occur under suspicious circumstances, but have been introduced into a local flora without any comment.

Cambridge, Nov. 23. 1835.

[THE *Catalogue* sent is noticed in p. 54. In it is presented, besides some synonymes, designation of these five conditions in application to certain of the species and varieties registered. 1. An estimation as varieties of certain reputed species. 2. "Possibly introduced by the agency of man." 3. "Naturalised, *certainly* not indigenous." 4. "Occasionally found wild, but not ever naturalised; extinct; or erroneously introduced, and which ought to be excluded from our floras." 5. "Included in the flora of Cambridgeshire."

The following lists are of species and varieties designated under the conditions here prefixed to them.]

Occasionally found wild, but not even naturalised; extinct, or erroneously introduced, and which ought to be excluded from our Floras. — *R*anúnculus gramíneus, *E*pimèdium alpìnum, *P*apàver nudicaúle, *G*laúcium phœníceum, *C*helidònium laciniàtum, Matthìol*a* incàna, *C*ardámine *b*ellidifòlia, Konìg*a* marítima (*A*lýssum marítimum, VI. 54., VII. 272.), *Carrichtèra Vé*llæ, *R*esèda fruticulòsa, Heliánt.emum *l*edifòlium, Frankèni*a* pulverulénta, *C*ucùbalus baccíferus, Silène Armèria, Buffòn*ia* tenuifòlia, *H*ypéricum calycìnum and barbàtum; *T*ilia europæ`a, grandifòlia, and grandifòlia var. corállina; *L*ìnum usitatíssimum, Staphylèa pinnàta, Medicàgo muricàta, *R*ùbus árcticus, Potentílla álba, *R*òsa cinnamòmea, *C*otylèdon lùtea, *S*empervìvum tectòrum, Archangélica officinàlis, *T*ordýlium officinàle, Echinóphora spinòsa, Aspérula arvénsis, *D*ipsacus fullònum, *C*entaurèa Isnárd*i*, *X*ánthium strumàrium, *A*rtemís*ia* cæruléscens, *G*naphàlium lùteo-álbum, Filàgo gállica, Campánula *p*ersicæfòlia, *L*èdum palústre, Swért*ia* perénnis, Gentià*na* acaúlis, *E*chium itálicum and *v*iolàceum, *Datùra Stramònium*, *L*ysimàchia punctàta, Armèria *p*lantagínea, *A*marántus *Bl*ìtum, *P*olýgonum Fagopỳrum, *E*uphórb*ia* *C*haràcias, *S*cílla bifòlia, *T*ỳpha mìnor, *P*otamogèton oblóngus, Erióphorum alpìnum, *S*tìpa pennàta, *Br*òmus squarròsus.

Naturalised, certainly not indigenous. — *A*nemòne apennìna, *A*dònis autumnàlis, *A*conìtum Napéllus, *P*apàver somníferum, *C*orydàlis sólida and lùtea, Cheiránthus *Cheìri*, Barbar*èa* præ`cox, Cochleària Armoràcea, *I*bèris amàra, *H*ésperis matronàlis, Camelìna satìva (VIII. 388, 389.), *L*epídium *D*ràba, *I*sàtis tinctòria, *B*rássica *R*àpa and *N*àpus, Diplotáxis muràlis, Diánthus Caryophýllus, *A*lthæ`a hirsùta, *A*cer Pseùdo-*P*látanus, Impàtiens fúlva, *O*`xalis corniculàta, Medicàgo falcàta and satìva, *P*ỳrus doméstica, *M*éspilus germánica (see Dr. Bromfield's statements in p. 86, 87.), *Œ*nothèra biénnis; *Rìbes* Grossulària, *U*`va-crícpa; *P*etroselìnum satìvum, *C*àrum Cárui, *T*ordýlium máximum, Turgènia latifòlia, *C*oriándrum satìvum, *S*ambùcus nìgra var. laciniàta, Centránthus rùber, *Valerià*na pyrenàica, *C*entaurèa solstitiàlis, *E*rigeron canadénsis, *S*enècio squálidus, *V*inca màjor, *B*oràgo officinàlis, *A*ntirrhìnum màjus, Linària Cymbalària, *Verónica* Buxbaúm*ii*, *A*ristolòchia Clematìtis, *E*uphórb*ia* *L*áthyris; *U*lmus suberòsa and màjor (these two are those designated; and it is remarked, that "perhaps none but" montàna "is truly indigenous"); *C*ròcus, every kind of; *N*arcíssus poéticus, Muscàri racemòsum, *O*rnithógalum

umbellàtum and nùtans, *A*llium *A*mpelóprasum, *P*hálaris canariénsis.

Possibly introduced by the Agency of Man. — *R*anúnculus arvénsis, *D*elphínium Consólida, *Pæòn*ia* corállina; *P*apàver hýbridum, *A*rgemòne, *A*rgemòne var. marítima, dùbium, and *Rhœ*as; Rœmèr*ia* hýbrida (*G*laúcium violàceum), *C*helidònium màjus; *F*umària officinàlis, mèdia, capreolàta, parviflòra, parviflòra var. leucántha, and Vaillánt*ii*; *A*rabis Turrìta, *T*hláspi arvénse, *Er*ýsimum orientàle, Diplotáxis tenuifòlia, *R*áphanus Raphanístrum, Saponària officinàlis and officinàlis var. hýbrida, Silène cónica and itálica, *L*ýchnis *G*githàgo, *T*rifòlium stellàtum, *L*áthyrus latifòlius, *S*piræ*a* *s*alicifòlia, *T*amarix gállica, *B*upleùrum rotundifòlium and falcàtum (see in Dr. Bromfield's communication, above), *P*eucédanum officinàle, *C*aúcalis *d*aucòides, *C*hærophýllum aúreum and aromáticum, *C*aprifòlium perfoliàtum (Lonícer*a* *C*aprifòlium), Lonícer*a* Xylósteum, *G*àlium tricórne and spùrium; *Valerianélla* (*Fèdia*) olitòria, carinàta, dentàta, eriocárpa, míxta, and Aurícula; *C*entaurèa *C*yanus, *T*ragopògon *p*orrifòlius and *p*orrifòlius β æquàlis; *H*ieràcium dùbium, aurantìacum, aurícula, and amplexicaúle; *C*hrysánthemum ségetum, Antennària margaritàcea, *Dorónicum* *P*ardaliánches and *p*lantagíneum, Pulmonària angustifòlia (VIII. 89, 90.), and officinàlis (VIII. 89, 90.), *A*nchùsa officinàlis and sempervìrens, *A*ntirrhìnum *O*róntium; *M*éntha víridis, grácilis, and citràta; *S*tachys ánnua, *T*eùcr*ium* *C*hamæ*d*rys, *B*úxus sempervìrens; *E*uphórb*ia* platyphýlla, stricta (see Dr. Bromfield's communication, above), and pilòsa; *S*àlix Woolgar*iàna*, *C*astànea vésca, Galánthus nivàlis, *T*ùlipa sylvéstris.

[*Diplotáxis muràlis.* — I believe that this grows at Bungay, Suffolk.

Diplotáxis tenuifòlia. — Plants of this grow on walls west and east of the road by which one passes from Kensington, at the church, to Kensington Gravel Pits, in perhaps rather more than midway of the distance. The road is called Church Lane, at the Kensington end, and Silver Street at the end by Kensington Gravel Pits.

*A*rabis *Turrìta.* — In about September, 1835, Mr. Biggs, curator of the botanic garden, Cambridge, gave to me a packet of seeds for disseminating, which latter he had suggested. I sowed most of the seeds upon the north wall of Kensington Gardens, for a not long length of it east of the Bayswater gate, on the side next the Gardens.

*G*naphàlium *lùteo-álbum.* — The late Rev. George Reading Leathes, Shropham, Norfolk, once found this growing, I

believe, not sparingly, in either Norfolk or Suffolk. He introduced it into the collection of the botanic garden, Bury St. Edmunds, where it grew, and propagated itself by seeds readily. — *J. D.*]

ART. VIII. *Accounts, from American Newspapers, of Instances of Aurora Borealis observed in North America, on Nov.* 17. *and* 18., 1835; *transmitted by Dr. Dana to Dr. Dalton, and communicated, with the permission of the latter, for publication in this Magazine.* By J. H. STANWAY, Esq., Fellow of the Royal Astronomical Society.

THE *Magazine of Natural History* for the last month contained (p. 23—36.) so many interesting and circumstantial accounts of auroræ boreales which have been seen in Great Britain, and, especially, of those which were visible on Nov. 17th and 18th, 1835, that I showed it to our eminent and scientific townsman, Dr. Dalton, who, as may be seen in his lately republished *Meteorological Essays*, has for many years taken great interest in these phenomena.

He received, a few days afterwards, a letter from Dr. Samuel L. Dana, of Lowell, in the United States of America, containing accounts of auroræ seen in many parts of the United States on the *same evenings;* and as the descriptions of these auroræ, as well as of those seen in Great Britain, are given in such terms as to show that the extent and brilliancy of the appearances have rarely, if ever, been excelled, and as the occurrences happened on the same days and at the same time (an allowance of about five hours being made for the difference of the clocks at the respective places), it has been judged that so remarkable a circumstance would be particularly worthy of notice in the history of the auroral phenomena.

For this reason, Dr. Dalton has given me permission to take copies of the particulars sent to him by Dr. Dana; and I forward them to you in the hope that they will be reprinted in your scientific journal.

Old Trafford, near Manchester, Jan. 12. 1836.

From the *Newhaven Herald.*

Auroral Phenomenon.—Last night (Nov. 17.) our northern hemisphere was adorned with a display of auroral lights, remarkably grand and diversified. It was first observed at 15 minutes before 7 o'clock (mean time), when an illumination of the whole northern sky, resembling the break of day, was discernible through the openings in the clouds. About 18 degrees east of north was a broad column of shining vapour,

tinged with crimson, which appeared and disappeared at intervals. A westerly wind moved off the clouds, rendering the sky nearly clear by 8 o'clock; when two broad white columns, which had for some time been gathering between the stars Aquila and Lyra on the west, and the Pleiades and Aries on the east, united above so as to complete a luminous arch, spanning the heavens a little south of the prime vertical. The whole northern hemisphere, being more or less illuminated, and separated from the southern by this zone, was thrown into striking contrast with the latter, which appeared of a dark slate colour, as though the stars were shining through a stratum of black clouds. The zone moved slowly to the south until about 9 o'clock, when it had reached the bright star in the Eagle, in the west, and extended a little south of the constellation Aries, in the east. From this time it began to recede northward, at nearly a uniform rate, until 20 minutes before 11 o'clock; when a vast number of columns, white and crimson, began to shoot up simultaneously from all parts of the northern hemisphere, directing their course towards a point a few degrees south and east of the zenith, around which they arranged themselves as around a common focus. The position of this point was between the Pleiades and Alpha Arietis, and south of the Bee, having a right ascension of 42°, and a declination of 24°, as nearly as could be determined without the aid of instruments; but this comes so near to the pole of the *dipping needle*, and to the magnetic meridian, that we need not hesitate to conclude that, agreeably to what has been observed of similar phenomena before, the columns arranged themselves exactly in obedience to the laws of terrestrial magnetism.

Soon after 11 o'clock, commenced a striking display of those undulatory flashes denominated in the northern regions *merry dancers*. They consist of thin waves or sheets of light, coursing each other with immense speed. Those undulations which play upon the surface of a field of rye, when gently agitated by the wind, may give to the reader a faint idea of these auroral waves. One of these crimson columns, the most dense and beautiful of all, as it ascended towards the common focus (the vanishing point of perspective for parallel lines), crossed the planet Jupiter, then at an altitude of 36°. The appearance was peculiarly interesting, as the planet shone through the crimson clouds with its splendour apparently augmented rather than diminished.

A few *shooting stars* were seen at intervals, some of which were above the ordinary magnitude and brightness. One that came from between the foot of the Great Bear, at 8

minutes after 1 o'clock, and fell apparently near to the earth, exhibited a very white and dazzling light, and, as it exploded, scattered shining fragments very much after the manner of a sky rocket.

As early as 7 o'clock the magnetic needle began to show unusual agitation, and it has been since carefully observed by Mr. Loomis. Near 11 o'clock, when the streamers were rising and the corona forming, the disturbance of the needle was very remarkable, causing a motion of 1° 5′ in five minutes' time. This disturbance continued until 10 o'clock this morning; the needle having traversed an entire range of 1° 40′, while its ordinary diurnal deflection is not more than 4′.

The thermometer at 11 o'clock was at 33°; it shortly fell to 31°, and remained nearly at this point during the rest of the night — a degree of cold considerably below that of the few preceding nights. The ground this morning was covered with a copious white frost, indicating an unusual deposition of watery vapour.

At about 3 o'clock the sky grew cloudy, and, the moon rising shortly afterwards, further observations were prevented; but the continued disturbance of the magnetic needle would induce the belief, that the aurora continued through the night, and even to a late hour this morning. — O. [*Believed to be Professor Olmstead.*]

Yale College, Nov. 18.

From the *Boston Daily Paper.*

The sky presented a singularly beautiful appearance on Tuesday evening, the 17th of Nov. Between 7 and 8 o'clock, the broken clouds were tinged with a beautiful red, particularly at their edges, not unlike the appearance they occasionally assume immediately after a brilliant sunsetting in a summer's evening. At the same time the whole horizon was lighted up, to a degree fully equal to the light of the unclouded full moon. This continued through the whole evening. About 10 o'clock the light was more brilliant than before; the clouds were mostly gone, and the splendid coruscations of the aurora borealis extended entirely over the heavens, from the north quite down the horizon in the south.

Occasionally the light faded, and then again grew brighter, and arranged itself in columns and pyramids; some of which were but momentary in their form and appearance, and others were visible and unchanging for some minutes.

About 11 o'clock a mass of clear bright red light filled a circle of 8° or 10° diameter a little to the south-east of the

zenith, from which rays of the same hue and brilliancy issued in every direction. This light appeared to have a slow motion towards the south, and in about half an hour faded, or rather seemed to disperse itself through the sky.

As this phenomenon was exceedingly peculiar, differing, not in splendour only, but in form, hue, and character, from all the appearances of the aurora in this country, of which we have any record, it was doubtless generally seen; and, if it was observed with sufficient care, and in many places, it may assist in deciding how far the light itself was from the surface of the earth. This would be easily ascertained, if the angles under which it was seen at the same time in different places are compared. Here, the centre of the mass of light was, as well as we could judge by the eye, about 8° north-west of the Pleiades, at a quarter past 11 o'clock.

Also from the *Boston Daily Paper.*

The brilliant northern light which was observed here on Tuesday night was observed also at New York, though evidently, as far as we can judge from the descriptions given, with considerable variation of appearance, and also of time. It was observed also at sea, between this place and Portland, as we learn from a passenger on board a packet from that city; and, we doubt not, along the whole coast.

A brilliant light also appeared here through the whole of Wednesday evening, the 18th, extending over the whole northern part of the heavens, and, at intervals, in streams of light to the zenith.

From the *New York Daily Advertiser* of the 18th.

There was a most magnificent display of the northern lights during the early part of last evening.

At 7 o'clock, the northerly division of the horizon was illumined by an unusual light, which attracted general observation. At about 11 o'clock, the whole horizon presented a most extraordinary appearance, something like the glare of an extensive conflagration: the lights radiated from the zenith of the horizon, having the appearance of the rays of the sun when it is partly obscured by a cloud, or, as it is commonly called, when the sun draws water: the hues of the various radii were principally of a light pink, transparent as ether; others were white, and a few nearly of a lead colour. In the course of 10 or 15 minutes, they moved round towards the east, and gradually faded away. It was the most singular phenomenon of the kind that has been witnessed in these regions for many years; and, indeed, so much did it resemble

a conflagration, that many of the bells of the city sounded an alarm of fire.

From the *New York Commercial Advertiser.*

The heavens were in a glow, at intervals, last evening from the early hour of 6 o'clock until 11, and how much longer we cannot say. We viewed the phenomena from the deck of the Ohio steam-boat, between Kinderhook and Catskill. The lights were first observed as the passengers were ascending from the cabin after tea. They were streaming up from the south-west, and at times shot almost across the zenith. The colours were various, mingled with purple and vermilion, and at times of a deeper red. At one time a beautiful arch of silvery light spanned the southern heavens, so thin and transparent, that the stars twinkling through the glory seemed to sparkle with unwonted radiance. At other times myriads of columns or streams of light shot up from the western horizon, and remained stationary for a few moments, until they faded away.

The next and last change that we observed was a bank of soft phosphorescent light, extending along the horizon from the south-west, around to the north and north-east. The appearances in this city were various, and exceedingly brilliant and beautiful.

From the *Woodstock (Vermont State) Courier.*

The aurora borealis on Tuesday evening had an unusual appearance. It commenced with streams of a bright red, shooting up from the north-west horizon, intermingled with those of the usual hue, and extending nearly to the zenith. At times a considerable portion of the northern heavens glowed with red, similar to the most rosy hue of the western sky at sunset; and about 8 o'clock we noticed an extensive and brilliant appearance of this kind in the north-east, streaked perpendicularly with the common-coloured ascending rays of the northern light.

At one time a luminous, well-defined arch spanned the south-eastern portion of the heavens, rising half way to the zenith; parallel with which, and crossing directly overhead, was another luminous bow of nearly equal brilliancy.

From the *Montreal Gazette.*

We do not recollect having ever witnessed a more brilliant display of the aurora borealis than that of Tuesday evening last, Nov. 17.; nor have we met with any description of that extraordinary meteoric phenomenon which could at all compare with the beauty of that to which we now allude. At

about 7 o'clock, we first noticed a slight appearance of the aurora towards the northward, but it was somewhat concealed by a heavy bank of clouds which settled upon the horizon. These were, however, tinged with a reddish hue, and induced many to suppose that a great fire was raging at some distance down the river. Occasionally some of the smaller clouds higher up in the heavens would have the same colour, but less apparent and more flickering and changeable.

At about 10, the sky presented a complete sheet of the aurora, from north to south, and from east to west; at one time forming itself into arches, at another running into spear-like points; now shining with a clear lunar refulgence, and then diminishing away gradually. At length, after it had played its gambols about the heavens, it seemed to reserve all its extraordinary brilliancy for its final display, at about half-past 10 to 11 o'clock. Over head, as if from a centre, rays of glory shot to every portion of the heavens, reaching to the edge of the visible horizon. We can compare it only to the outstretched web of an umbrella, or of a large tent, or, perhaps more properly, to the neatly arranged silk panel of a cabinet piano.

At first, it exhibited a slight roseate hue, which at length increased to a deep red colour, varying, as the aurora flickered, between a beautiful pink and a blood-red tint. The variations were most splendid; and nothing could equal the brilliancy of the changes which each moment produced. The stars which were occasionally visible through the red flashes were each encircled with a small halo, adding much to their beauty, though their brilliancy was somewhat dimmed.

From the *Baltimore Chronicle.*

The *Charleston Mercury* states, that during the late gale at the south, whilst the schooner Laura, Captain Walker, was in about latitude 30° north, and to the eastward of the Gulf Stream, about 70 miles from land, she was visited by a very large number of land birds, which appeared to have been blown off by the wind, then blowing very hard from north to north-west. Many were swept beyond the vessel, and, in the endeavour to return on board, fell exhausted into the water, and perished. A great number came on board, and were sheltered in the cabin. Seventy-two were killed and eaten by the sailors.

As near as can be recollected, the following birds were identified — red-headed woodpeckers, reed birds, mocking birds, blue jays, stone plovers, large blue herons, and night herons. They remained with the vessel until the gale abated,

when such as were able took their departure for the land. At the same time, immense flocks of wild geese were seen flying over, some of which manifested a disposition to alight upon the rigging.

ART. IX. *Rough Notes made during a Visit to the Freestone Quarries of the Isle of Portland, on Wednesday, August 25., 1835.* By WM. PERCEVAL HUNTER, Esq., Member of the Geological Society of France, &c. &c.

THE Isle of Portland, and its vicinity, is one of the most interesting spots to the geologist in the British dominions. Setting aside the interest and curiosity every one must naturally feel respecting the quarries whence the materials for raising our most ornamental public buildings (St. Paul's, Westminster Abbey, Westminster Bridge, Somerset House, &c.) have, for a period of upwards of two hundred years, been derived, and its remarkable fossil forests of palm trees (proving to a certainty the great changes in climate, vegetation, and physical structure our own island, in common with the rest of the world, has, during the myriads of ages which fall under the contemplation of the fossil naturalist, undergone), its vicinity, for an area of fifty miles, possesses a variety and richness of geological wonders, such as few spaces of land of similar extent in Europe can equal, most assuredly none surpass. The Burning Cliff, only eight miles from Weymouth, in the strata above which I found the same silicified trunks of *Cycadöïdeæ*, though, strange to say, not reposing on the same "dirt-bed," as in Portland; the *layes* of Kimmeridge coal, so interesting from their geological position, though, I believe, of very little value as to the quantity and quality of their contents; the Isle of Purbeck, whence all the flagstones for the foot-pavements of London were, till within the last few years, procured, and where the whole range of that remarkable geological group, the Wealden Rocks, may, in Dudley Cove, from the highest to the lowest member of the series, at one glance be surveyed; the beds of plastic clay surrounding the eminence on which stand the romantic and picturesque ivied ruins of Corfe Castle, whence, when I rode by, cart-loads were being excavated and waggoned for the potteries of Staffordshire; the dunes of sand at the entrance of Poole harbour, with the magnificent sections of precipitous rocks of various strata, some perfectly horizontal, others as perfectly vertical, some slightly inclined, and others again broken into the wildest and most fantastic shapes, laid open

to the view of those who boat it from Weymouth to Poole; — all these beauties and wonders are to be seen at a few hours' journey from the Isle of Portland: while the extraordinary organic remains found in the lias of Bridgenorth and Lyme Regis; the Pterodáctyli or flying lizards, the various species of Icthyosaúri and Plesiosaúri, with their extraordinary and invaluable coprolites, manifesting to us the ichthivorous — if I may be allowed the expression — the ichthivorous and cannibal propensities of those monsters of "the vasty deep," in a world which existed millions of years before the flood; the tertiary beds of Christchurch and Hordwell, in Hampshire, and the meiocene and eocene clays, sands, and freshwater strata of the Isle of Wight, — are all within a day's distance of the same place. That such an island should have been, though often visited, so seldom described, so inaccurately and carelessly examined, is certainly extraordinary, but is nevertheless a fact. Any information, therefore, however slight, from a field naturalist respecting it will, I feel convinced, be deemed of interest by your readers; and on this account I shall make no apology for sending you the subjoined notes in the same rough, but I hope accurate, shape in which they were taken down on the spot.

The Island of Portland is about 14 miles in circumference, with a population (in 1832) of 27,280 souls. There is very little wood on the island, but the ground, being well manured with lime, produces very fair wheat, and affords fine grazing land for cattle. There are above 500 men, including surveyors, supervisors, clerks, persons employed in the shipping, &c. engaged on these quarries. The pygmy curlew, a rare bird, I believe, in most parts of England, is found occasionally in considerable abundance on the Chesil Bank, a long, elevated and narrow ridge of shingle, 10 miles in length, and 12 ft. high, which, with the exception of a narrow passage, where there is a ford at high water, though it may be passed on foot at low water, connects the island of Portland with the mainland. The whole isle rests on Kimmeridge clay, and on one side is rapidly diminishing in size; no less than 40 ft., it is said, having fallen into, or been carried away by the sea, within the last 50 years.

I. *Section of the Strata in Ring's (the largest) Quarry in the Island, from the Surface to the first* "*Dirt-bed.*"

All the strata are very much dislocated; saddles are numerous, and the marks of elevation and depression very strongly developed.

The names of beds marked with inverted commas are the names in use amongst the workmen.

	ft.	in.
1. Soil	1	0
2. 'Rubble'	3	0
3. 'Blue clay'	1	1
4. 'Slate' [This bed is used for roofing houses and walls, for which purpose it is an excellent and durable material]	3	0
5. A layer of reddish-brown clay	0	3
6. 'Bacon tier'	1	2
7. A layer of blackish-brown clay	0	4
8. 'Ash'	1	9
9. Ash burr, or soft burr	1	3
10. 'Dirt-bed'	1	0
Total	13	10

These beds vary considerably in thickness at different places, owing to the strata in many parts being, as above stated, so very much dislocated: in some places they are so disturbed and broken, that the measurement varies every foot; in other places, however, as where my measurements were made, they are only slightly inclined (having neither compass nor clinometer with me, I could not learn in what direction, or at what angle); and in a few places, Fern Street Quarry, for example, these beds are almost, if not perfectly, horizontal. The "dirt-bed" consists of a black rich-looking mould, containing, like the surface, a great many white-coloured water-worn stones; and in it, and upon it, are found the remains of groves of palms and other trees allied to the modern genera Zàmia and *Cỳcas*, now only flourishing in warm climates, evidently standing on the very spot in the dark-stained soil in which they originally grew. These trees are tolerably abundant, and their remains are scattered, more or less, over the whole quarry; some of the trunks lie prostrate on the ground, many are inclined at various angles, and some few stand perfectly upright, their roots firmly fixed in the "dirt-bed," and their stems and branches stretching upwards through the "soft burr" and "ash" above. They seldom, however, when so situated, exceed 3 ft. or 4 ft. in height. One of these trees, I particularly noticed in this quarry; it was inclined at a slight angle, about 3½ ft. high, was only half excavated, the other half being imbedded in the limestone (which, adjoining this wood, is uncommonly hard, much more so than in other places, owing to the presence of flint derived from the silicified trunks), and must have measured at least 9 ft. in circumference, and the quarrymen assured me that some are found from 12 ft. to 15 ft. in circumference. Of this petrified wood very good whetstones, for sharpening knives and razors, are fabricated by the workmen.

II. *Section of the Strata at Ring's Quarry from below the "Dirt-bed" down to the "Whit-bed."*

In the subjoined strata, which exhibit few of the marks of violence so striking in the beds above, vast clefts or chasms occasionally occur from 2 ft. to 4 ft. in width at the surface, which go down to a considerable depth, gradually decreasing in size as you descend.

		ft.	in.
	Total of the thickness of the first section - - -	13	10
11.	'Rising of the cap' - - - -	2	0
12.	'Top cap' At bottom of this a bed called 'grizzle,' abounding in shells, which none of the beds above-mentioned, nor the skull-cap below, contain, occasionally, but very irregularly, occurs. Sometimes, however, it is entirely wanting, and no organic remains are met with till we reach the roach - - -	4	0
13.	Second 'dirt bed' consists of the same black mould, with the same water-worn pebbles as the first 'dirt bed.' It contains a great many round masses of petrified wood, called by the quarrymen 'petrified crows' nests,' which, in shape and contour, they certainly somewhat resemble; but which Dr. Buckland, with much greater probability, considers to be the fruit of the trees aforementioned, which he has denominated *Cycadöideæ*, and on which he has published a long and interesting dissertation in the 2d volume of the 2d series of the *Transactions of the Geological Society of London* - - -	0	4
14.	'Skull cap' - - - - -	2	0
15.	'A layer of flint', broken to pieces, runs along the top of the roach - - - - -	0	3
16.	'Roach' - - - - -	2	6
17.	'Whit-bed,' or the very best Portland building stone	7	6
18.	A layer of flint about - - - -	0	6
	Total - - - - -	32	11

Nos. 11. and 12. "Top cap" and "rising cap," although destitute of shells or other organic remains, are burnt for lime, and are in high repute amongst the agriculturists of Dorsetshire for that purpose.

No. 16. The "roach" contains an immense quantity of testaceous remains, being in some places a complete aggregate of fossil marine shells; it forms, however, — so at least the quarrymen assured me, — a good building stone, very durable and impervious to the rains and frost. None of the other beds, save, as already stated, the "grizzle," occasionally found under the "top cap," contain any organic remains.

III. *Section of Strata measured at Fern Street Quarry, from below the "Whit-bed" Flints, to the last Bed of the Portland Building Stone.*

		ft.	in.
	Total of sections 1st and 2d	32	11
19.	A limestone, partly cretaceous, partly slightly oolitic	2	0
20.	A layer of flint	0	3
21.	Limestone	1	5
22.	Siliceous limestone	1	6
23.	A thin vein of grey-coloured flint	0	2
24.	'Carff'	1	9
25.	A layer of clay	0	2
26.	'Roach'	1	0
27.	'Best-bed,' or Portland building stone: this is not, as its name would imply, by any means so good a building stone as that furnished by the 'whit-bed'	5	10
		47	0

28. A layer of flints lying under the 'best-bed,' is succeeded by a vein of blue clay; after which occur beds, called by the workmen 'rubble,' an argillaceous freestone, containing more or less of silex, closer to the Kimmeridge clay, on which, as before stated, the whole isle rests. The workmen are paid by what they excavate, and seldom make more than two shillings a day. The highest part of the island, the head quarryman informed me, is between 300 ft. and 400 ft.

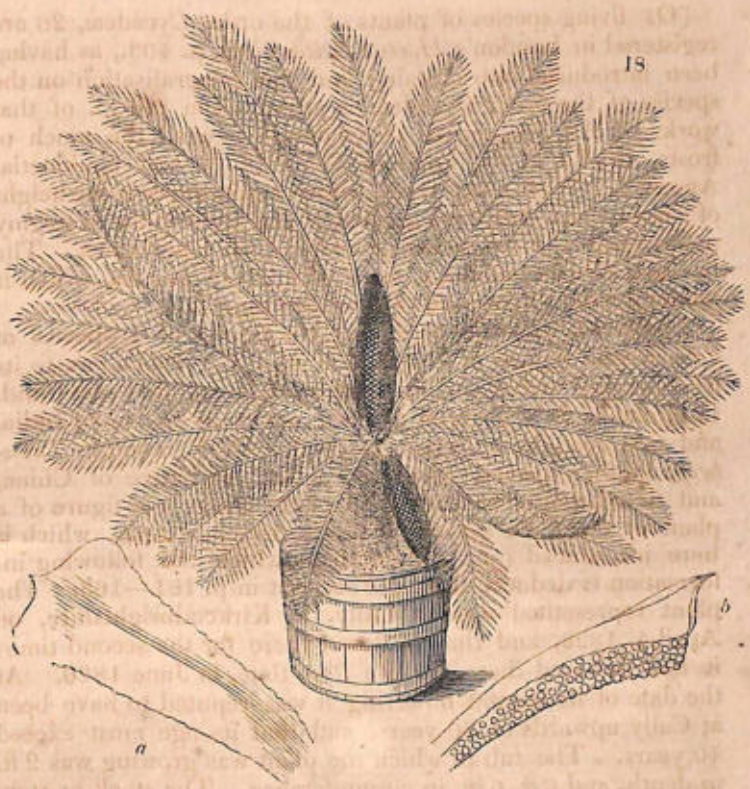
The following is a statement of the exact quantity of stone excavated and shipped from the Isle of Portland, during the last two years and a half, furnished to me by the keeper of accounts. There are sixteen square feet to a ton.

		tons.	ft.
1833.	Block or Portland stone	14773	9
——	'Roach'	1467	5
——	'Rubbish,' pieces knocked off from the above while squaring the blocks, and afterwards collected for roofing walls and cottages	4088	0
	Total	20328	14
1834.	Block	19062	8
——	'Roach'	2161	13
——	'Rubbish'	4692	0
	Total	25916	5
1835.	First six months.		
——	Block	9010	7
——	'Roach'	612	12
——	'Rubbish'	856	0
		10479	3

Isle of Valentia, Kerry, Ireland, Dec. 7. 1835.

[Of living species of plants of the order *Cycadeæ*, 26 are registered in Loudon's *Hortus Britannicus*, p. 403., as having been introduced into Britain; and this generalisation on the species of the order *Cycadeæ* is presented in p. 535. of that work. "All are natives of countries beyond the reach of frosts, chiefly of the Cape of Good Hope and equinoctial America. With a low trunk, which rarely exceeds the height of a few inches, they have the fronds and appearance of pygmy palms, and the inflorescence of gigantic equisetums. The trunk of *Cycas* contains a great quantity of fæcula, which is manufactured into a kind of spurious sago.".

In the *Encyclopædia of Plants* are figures of 4 species of *Zamia*, and figures of *Cycas circinalis L.*, female, as to its fruit-bearing spadix and the fruit upon it, and part of a frond. *C. circinalis* is registered in both works as native of India, and first brought to Britain in 1700. Of *C. revoluta Thunberg*, another species, registered in both as native of China, and first brought to Britain in 1737, there is a figure of a plant of the male sex of, in *Gard. Mag.*, iv. 162., which is here introduced (*fig.* 18.), and on which the following information is deduced from the account in p. 161—163. The plant represented was at Cally, in Kirkcudbrightshire, on April 4. 1828, and then in flower there for the second time: it had flowered there, for the first time, in June 1826. At the date of its second flowering it was reputed to have been at Cally upwards of 30 years, and that its age must exceed 40 years. The tub in which the plant was growing was 2 ft. in depth, and 6 ft. 6 in. in circumference. The stock or stem of the plant was 1 ft. 6 in. high from the surface of the soil in the tub, and 2 ft. 6 in. in circumference; covered with the remains, of a dark-brown colour, of the different crops of fronds. The fronds are produced at the summit of the stock or stem. Those of the last crop were 36 in number, in length 4 ft. 6 in., and in circumscription of the spread of the whole, 27 ft.: in colour of a fine dark green, the rachises or ribs rather lighter than the pinnæ or leaflets: the fronds of the previous crop had been all cut off. The catkin, which rose perpendicularly out of the apex of the stem, had a very short footstalk, thinly set round with leathery spathulate scales, of a dusky orange colour; was in height 2 ft. 10 in., and at the greatest circumference 1 ft. 3 in. tapering from about half way up to the top. It was set round with about 1500 of these scales, regularly imbricated, which radiated from the centre. The one shown in the figure (*a*, *b*) is of the full size, *a* the breadth, *b* a side view taken from the bottom of the catkin; the others gradually diminish in size towards its top. The



under sides of these scales, as they come into perfection, become covered with numerous globules (*c*), the anthers, which expand into little cups, out of which a quantity of yellow powder, pollen, falls, of a beautiful shining orange colour, which emits a very exhilarating resinous fragrance. The remains of the catkin produced in 1826 still hung down under the leaves, a number of the scales having fallen or been rubbed off from its top.]

ART. X. *A Notice and an Enquiry on a rare Species of Fossil Shell discovered in a Chalk-Pit near Lewes, and deemed to be a Species of Cônia.* By ROBERT HUDSON, Esq.

THE accompanying drawing [copied in *fig.* 19.] is an accurate representation of a fossil shell, which I found some little time back in a chalk-pit near Lewes, and which I believe



is unique. Mr. Mantell (that indefatigable investigator into the treasures of the chalk, whose museum at Brighton contains one of the finest collections from that stratum in the kingdom) found some fragments of the upper chamber of a similar shell from the same locality, which he has named in his *Geology of the South-East of England* (8vo. edition, p. 130.) Hippurites Mórton*i*. I am, however, inclined to doubt whether it is a hippurite at all, believing it to be rather a gigantic species of barnacle; and in this opinion I am borne out by the testimony of the able president of the Geological Society, Mr. Lyell, whose *Principles of Geology* will always entitle him to the best thanks of every admirer of this most interesting branch of natural science. Mr. Lyell, to whom I sent this specimen with an intimation of my doubts of its being a hippurite, states in his answer, "You are quite right in supposing that your fossil is not a hippurite, but of the *B*álanus family: it belongs to Leach's genus Cònia, a balanus with four, instead of six, divisions or plates; so we have no hippurite from the chalk. It is, however, a beautiful specimen as a Cònia; and no fossil Còniæ were known before, as far as I can learn." I have lately heard that similar specimens have been discovered in the chalk, since mine, but I have not seen any one. I should, therefore, feel obliged to any of the contributors to your Magazine, if they would inform you, whether they have found any similar fossil, and, if so, whether their specimens differ from this; by which means we may be enabled to class this properly. My specimen is as nearly of the size of the

drawing as possible. It is a multivalve shell, hollow at each end, and has the commencement of another attached to it; all round the edge, as may be seen in the drawing, are parts of some bivalve shells firmly attached to it.

Clapham Common, Jan. 14. 1836.

ART. XI. *Short Communications.*

MAMMIFEROUS ANIMALS AND BIRDS. — *The Musical Ratcatcher.* — Many quadrupeds, as well as serpents, &c., are so extremely fond of music, that their ferocity becomes in a great measure subdued, and they fall an easy prey to the sportsman. The following anecdote is given me by my son, who is just returned from Calcutta, and who has repeatedly witnessed the following successful mode of capturing rats on ship-board. As soon as evening commenced, the ship's steward baited his traps, and placed them near the rats' holes; then took his flute, and played some lively airs: the rats were attracted by the music*, and came into the traps, quite unconscious of that danger which, without any allurement, instinct taught them to avoid. In this simple manner, from fifteen to twenty rats have been captured in about three hours †; a number which would have required three or four weeks to capture by bait only: hence,

"Music hath charms to soothe the savage breast."

I wonder whether English rats are as fond of music as the rats of India? If so, it would be worth while for many a farmer to learn the flute or violin, the expense of which might soon be saved *in grain.* — *W. H. White. Old Kent Road, London, Nov.* 2. 1835.

Combat between a Hen and a Rat. — A few days ago, a singular combat was witnessed in the yard of Mr. George Johnson, razor-manufacturer, between a hen and a large rat. The rat approached the place where the hen was brooding her chickens, as it appeared, to take a share of some grain with which they had been fed; when the hen attacked it. The rat stood on the defensive, and fought for five minutes, but was killed by its antagonist. The hen was severely bitten in the engagement, but is recovered. (From the *Sheffield Independent*, July 1835.) [Contributed to this Magazine by Mr. White, with the preceding.]

* I have myself repeatedly seen mice come from their holes, and listen attentively to the playing of a flute or violin; but retire as soon as the music ceased.

† This feat obtained for the ship's steward the appellation at the head of this anecdote.

Birds. — *A Robin has mistaken a dead stuffed Robin for a live one.* — To-day we observed a robin fly into the drawing-room, and perch upon the branch of a mimosa beside a stuffed specimen of a bird of the same species. We watched its movements for some time, and, after flying round the room, showing no inclination to depart through the opened windows, we placed the stuffed bird on the edge of a flower-pot, and then the poor robin came and placed itself close to it, and warbled a sweet, low, tender strain; and then, flying again round and round in narrowing circles, it pecked at the lifeless robin, and, again chirping, flew further off. It thus continued, for a quarter of an hour, chirping and singing, flying off, or pecking at the other; and, appearing, at last, to despair of arousing the insensible creature, it flew out of the window, chirping as it went. (*From the Manuscript Diary of my Cousin Lucilla, dated Valentine's Day*, 1835.) — *Aliquis* [who had proposed humorous associations, on the coincidence of robin's acting as described on Valentine's day. It may be advantageously associated with other facts kindred in their relation to what J. Rennie, Esq. (since Professor Rennie) has denominated, in I. 373., "mistakes of instinct:" several such facts are in I. 68. 332. 373, 374. 496.; III. 50.; IV. 157. 498.; V. 276.; VI. 67. 68. 81. 145. 394—398. 513, 514.].

The Grasshopper Warbler (*Sylvia locustella* Latham) is said to be a very scarce species; to be remarkably shy and timid; and to utter its chirping notes, for the most part, during the dusk of evening. I observed several birds of this species among the furze and bramble bushes on the extensive bed of shingle in the neighbourhood of Eastbourne, on the Sussex coast, in July and August this year (1835). They were then in moult, but uttered their usual sibilant cry. I often heard them in the afternoon. They did not appear peculiarly shy; on the contrary, when disturbed, they frequently rose into the air, hovering above my head, and at the same time repeating their cricket-like note. Mr. Selby observes, that, in order to obtain specimens, he had been obliged to watch for a considerable time before a distinct view of the individual, and an opportunity to fire at it, could be obtained. In the breeding season they may be more timid and wary, but among these bushes I might have shot a considerable number, as they often perched, several together, on the top of them. In the last week in August, I observed one cast to shore by the waves: this had probably been overtaken in its attempt at migration by a contrary wind, which accompanied a thunder-storm; and, unable to withstand the tempest, had yielded to its fury. I did not hear these birds afterwards. Mr. Rennie, in his edition of *Montagu's Ornithological Dic-*

tionary, states that the grasshopper warbler has no long claw behind. In the specimens which I shot, the hind claw was of considerable length. It was from this circumstance, I presume (with deference to the opinion of the learned professor), together with its somewhat similar markings and colour, and, moreover, its habit of rising in the air, and singing or chirping on the wing, that it obtained the appellation of grasshopper lark. — *C. J. Oct.* 24. 1835.

Swallows, an extended String is used as a Perch by certain. —During my stay, last midsummer (1835), down at Dover, I was much amused with watching the numerous flights of swallows that disported daily around the venerable ruins of its ancient castle. My being delayed rather later in the season than I expected, gave me a pleasing opportunity of observing the congregations of these birds before taking their annual departure. One of the chief places selected for their rendezvous (and curious enough, from the apparent inconveniency of its situation) was a string, which, after running for some considerable distance from the window of the cell of the debtors' prison across the castle moat, is attached to a little bell which overhangs a box, on the side of the road, "for the relief of the poor debtors," &c. It was on this that the swallows perched in considerable numbers, and, as I was then told, have continued so to do for many years past. Habit seems to have entirely reconciled these birds to the oddness of their station, as, every time the string is pulled to implore the "charity of passers by," the birds rise just a few feet in the air, but almost instantly alight again, making all the time a busy chattering. — *A. Tulk. Richmond Green.*

[In VI. 455, 456., is a notice of two broods of swallows being reared in two nests built, one in one year and one in another, on the crank to which a bell-wire was attached in the passage of an inhabited house; the bell in use. The young of one of the broods, when they had become full feathered, roosted on the bell-wire, or the crank—it is not clear which.]

A kind of Duck, deemed a wild Hybrid, between the Pintail Duck and the common Wild Duck. (VIII. 509.) — A case pretisely similar occurs in the museum of Mr. Reid, of this town. *pe F. O. Morris. Doncaster, Sept.* 18. 1835.

W *The Woodcock sometimes breeds in Britain.* (VIII. 612.) — ny instances are registered in II. 86, 87., communicated a/ Mr. Bree.]

Insects. — *Flies seen with a Globule of Fluid at the Tip of the Proboscis, and observed alternately to absorb and regorge it: a Notion on their Motive in doing this.* (VII. 531.) —The

first time I ever observed the occurrence noticed in VII. 531. was several years ago, when sitting one day, about the middle of summer, with a dessert of fruit and cowslip wine. A little of the wine, having been spilt upon a plate, was immediately surrounded by many flies (*Musca* doméstica), which attacked it with great avidity. One in particular I noticed, more thirsty than the rest, who, after distending his paunch to nearly twice its original size, stood for some time wiping his proboscis, brushing his wings, and rubbing his fore legs together, with evident satisfaction; and then disgorged a portion of the fluid, which appeared at the end of his proboscis, exactly as described in VII. 531.; and, after a second or two, disappeared, again appeared, and again disappeared, for many times in succession: the abdomen diminishing and increasing in size, according as the fluid was alternately expressed and imbibed. My first impression was, that my uninvited, though not unwelcome, guest was "not, as he should be — ipse, but, as he should *not* be — *tipsy;*" but the manner in which, after a little more pluming, he flew away, discountenanced this supposition. However this may be, I have observed this process *so frequently* since that time, at all periods of the summer, and in almost all cases in individuals in perfect health, that I cannot look upon it, as J. D. seems to do (VII. 531.), as an evidence of incipient disease. These facts, together with the pleasure the insect *appears* to experience in the act, dispose me to consider it as a voluntary one, and have suggested to me the idea of its being an analogous process to that of rumination in the ox, &c. I am no entomologist, but merely an occasional observer of the insect race. I therefore content myself with mentioning the fact, and throwing out the foregoing suggestion for the consideration of those better capacitated, in every respect, than I am for making future observations and correct deductions. — *J. Aaron, M. R. C. S. Birmingham, Oct.* 29. 1834.

REVIEWS.

ART. I. *Notices of Works in Natural History.*

SOWERBY, *G. B.*, jun.: A Plate of Figures of Natural Objects, as Specimens of the Author's Ability in Delineating and Engraving Objects of the Kinds. The plate, 4to, with the figures coloured, 2*s.* 6*d.*

The subjects are Emys concéntrica, a dorsal and an abdominal view of; the gold finny (Crenilàbrus cornùbicus),

fossil *Lucíscus oeningénsis*? with the vertebral column of another fish in the abdomen, Hépatus maculàtus, *Squílla*, *Mántis*, Phòrus agglùtinans. A copy with the figures coloured, and one with them uncoloured, have been seen. The sight of them has been a treat.

Eyton, T. C., Esq.: A History of the Rarer Species of British Birds; illustrated with Woodcuts. Intended as a Supplement to the History of British Birds, by the late Thomas Bewick. To be completed in three monthly parts. Part I. 3*s.* 6*d.*

The Egyptian vulture, red-legged falcon, blue-throated redstart, Alpine accentor, fire-crested wren, shore lark, white-bellied swift, mealy redpole, white-winged crossbill, Virginian cuckoo, wood pigeon, migratory pigeon, black stork, red-breasted snipe, buff-breasted sandpiper, pectoral sandpiper, Temminck's sandpiper, are the names of the species described and figured in Part I.

Hewitson, W. C.: British Oology; being Illustrations of the Eggs of British Birds, accompanied by letter-press. Nos. XXIII. and XXIV.

A double number has been issued for November, which completes volume 2d. The eggs of the red ptarmigan (*Lagòpus británnicus*) are especially beautiful: nor are those of the nightingale, the redbreast, the grebes, the linnet, the curlew, the crow, &c., less worthy of commendation. The author has followed the advice given in this Magazine (V. p. 699.) of requesting correspondents to furnish him with information, which will be published at the conclusion in the form of a supplement. We particularly wish to direct attention to the list of desiderata, some of which, as those of the shingle plover (Pluviàlis cantànius), we should suppose it not very difficult to obtain. We reckon full three hundred birds as British; Mr. Hewitson has figured the eggs of nearly half this number. — *S. D. W. Nov.* 3. 1835.

The 25th Number of this work has been published.

Baxter's Illustrations of the Genera of British Flowering Plants.

No. 40., published Nov. 1., completes vol. 2d., even to the indexes, title page, and dedication. The author has announced that the price of the future numbers will be raised, as "the work has not nearly paid the actual expenses." It is to be hoped that the subscribers will respond to the author's hope,

that they will not object to this. A work so elaborately executed, and enriched with so much matter of worthy quality, will be cheap at the advanced price. Since the writing of the preceding, No. 41. has been seen: better paper is employed in it than in the cheaper numbers.

Geological Society, Pennsylvania: The Transactions. Vol. I. Part I. 8vo, 180 pages. Published by the Society. Philadelphia, 1834.

We hail the appearance of this number, as affording satisfactory evidence of the labours of our transatlantic brethren in this department of science. At the end of the volume it is announced that numerous geological surveys of several parts of the United States are in progress, and it is probable that in a few years we shall possess a correct geological outline of the whole of North America. Our limits will not allow us to do much more than announce the principal contents of the present number.

The first article is by R. C. Taylor, F.G.S., "On the geological Position of certain Beds which contain numerous fossil plants of the Family Fucöìdes, near Lewistown, Mifflin County, Pennsylvania." The description is elucidated by several well-executed drawings and sections. These fossil fucöides occur in a succession of sandstone beds, which Mr. Taylor refers to the grauwacke formation.*

The second article is, "An Essay on the Gold Region of the United States, by James Dickson, F.G.S." "The gold region of the United States of North America, so far as it has been at present developed by mining operations, is considered to extend from the Rappahannock river, in the State of Virginia, to the Coosa river, in the State of Alabama." But Mr. Dickson adds, that indications of gold ores have been met with as far south as the Gulf of Mexico, and, in a northern direction, to Vermont. Mr. Dickson is also of opinion that, from the vicinity to the wood, rivers, inland seas and bays, and the cheapness of labour (slave labour), and considering, also, the health and excellence of the climate, the gold region of the United States possesses greater advantages than any of the gold regions in South America, or the ancient continent. It has been calculated that not less than six millions of dollars in gold have been extracted from the branch gold mines of the United States since the commencement of mining operations.

* For an account of the fucöides, by Mr. Taylor, see *M. N. H.*, Jan., 1834 [VII. 27—32. 163.]. Professor Harlan refers their geological position to compact sandstone subjacent to the coal-measures.

The most important article in the present number is entitled, "Critical Notices of various Organic Remains hitherto discovered in North America, by Richard Harlan, M. D." The subject will be continued and completed in a subsequent number; when we propose to take a review of the whole, pointing out the remains which appear to be peculiar to the American continent: we may also revert again to some other articles in the present number.—*B.*

Silliman, B., M.D. L.L.D., &c.: The American Journal of Science and Arts, No. LIX. Oct. 1835. O. Rich, London.

"Observations on the bituminous Coal Deposits of the Valley of Ohio, and the accompanying Rock Strata: with Notices of the Fossil Organic Remains and the Relics of Vegetable and Animal Bodies; illustrated by a geological map, by numerous drawings of plants and shells, and views of interesting scenery. By Dr. S. P. Hildredth, of Marietta, Ohio."

This is, perhaps, the most important geological memoir that has been recently published, if we take into the account the amount and extent of the mineral treasures which it developes, and their immense value to the rapidly increasing population of the United States on the western side of the ranges of the Alleghany Mountains. The memoir occupies the whole of the last number (for Oct. 1835) of that valuable work "*The American Journal of Science and Arts, conducted by Professor Silliman, of Yale College, Connecticut.*" The extent of the region described comprises about five degrees of latitude, and as many in longitude, on each side of the river Ohio. The mineral treasures are precisely those which are most available to the comfort and prosperity of an industrious and enterprising people: rock salt, or rather brine springs, containing 15 per cent. of salt; coal in numerous beds, some many yards in thickness, and of an excellent quality; ironstone of various qualities; lead ore, limestone, and millstone, &c. The coal of this vast region occurs in regular strata, scarcely troubled by the faults and dislocations which so much impede mining operations in other districts. In general the strata have very little inclination, and present great facilities for working. The salt springs are bored for, in many situations, to the depth of 600 ft., and even 900 ft. When the bed which contains the salt water is first pierced, there is generally a great rush of carburetted hydrogen gas emitted: it has, in some instances, been so violent as to blow up the boring rods. The memoir is accompanied by explanatory sections, which

present at one view the thickness and succession of the strata, and is, in every point, deserving of the attention of the geologist, and of all who feel an interest in studying the resources and future prospects of the western United States. The memoir occupies 154 pages, and is accompanied by 36 plates, besides a large map of the region.—*B.*

Art. II. *Literary Notices.*

Histoire Naturelle des Iles Canaries, par. MM. P. Barker Webb, et Sabin Berthelot. —The coming of this work has been spoken of for some time; at length a prospectus has been issued. It is to consist of 3 volumes, quarto: the first on the historical miscellanies; the second on the geography, geology, and the zoology; the third on the botany. The work is to be accompanied by an atlas of from 25 to 30 large plates, and the whole work is to include about 300 engravings or lithographs. It is to be published in 50 parts, one every 15 days. Barthes and Lowell are the London agents for the sale of it.

Curtis's cheap edition, edited by Dr. Hooker, *of his Botanical Magazine.* — The publication of this work was commenced in numbers, the first of which is noticed in VI. 267., and one volume is completed. It is proposed in future to publish it in volumes, and the second volume is in preparation. In this edition the subjects are placed in the order of what is called the natural arrangement, by which kindred species are brought together: this renders this edition more readily illustrative of the species treated of, than the first edition; and the text is improved with new matter.

Royle's Illustrations of the Botany and other Branches of the Natural History of the Himalayan Mountains, and of the Flora of Cashmere. Part VIII. has been published.

A Catalogue of Birds which have occurred in the Neighbourhood of Epping, Essex with Remarks on certain of the Species, by Mr. Edward Doubleday, are published in *The Entomological Magazine*, No. xiii. Oct. 1835, vol. iii. p. 290—292. The catalogue includes 113 species.

THE MAGAZINE

OF

NATURAL HISTORY.

MARCH, 1836.

ORIGINAL COMMUNICATIONS.

ART. I. *A Sketch of the Natural History of the Neighbourhood of Dijon, France, in* 1835. By GILES MUNBY, Esq.

BEING at Paris during last summer, and wishing to explore the natural history of some part of France, I fixed upon Dijon as a place likely to furnish a great variety in its natural productions.

I, consequently, left Paris on the 9th of July, and proceeded up the river in a steam-boat as far as Montereau. The beautiful scenery on the banks of the Seine, is too well known to need any comment here. I observed floating in the stream the leaves of Sagittària sagittifòlia, which, instead of their usual arrow-shaped form, were several feet in length, and resembled more the linear leaves of a *Spargànium*. I passed through Sens, Joigny, &c., and reached Auxerre, where I proposed stopping for a day or two. This small town is very pleasantly situated on the river Yonne, and contains above 11,000 inhabitants. The cathedral is considered to be one of the finest Gothic edifices in France: it is celebrated principally for its painted glass windows, the colours of which are extremely rich. The celebrated statue of St. Christopher, which was upwards of 30 ft. high, was destroyed in 1768, by order of the chapter of Auxerre. The town clock is curious in having a double circle of hours marked upon it. The neighbourhood is very rich in vineyards. The celebrated white wine of Chablis is produced at a village situated about 10 miles from Auxerre. *Sálvia Sclàrea* was abundant in the trenches, outside the town walls.

About 30 miles further, on the road towards Dijon, is a small village called Rouvray, the neighbourhood of which is rich in entomological productions. I took the *Bupréstis*

nítida. A very rare plant, peculiar to granitic formations, the *Senècio adonidifòlius*, is found in the woods near this place; I also gathered the *Antirrhìnum Oróntium* in the corn fields. The Medicàgo falcàta was very common on the road sides. The vineyards here are less frequent, the country being principally sown with wheat, the crops of which seemed very fine, and were nearly ripe.

Vitteaux is a village about 30 miles from Dijon, and is most beautifully situated in a ravine, through which flows the small river Breune. In the churchyard I gathered the *Céterach* officinàrum, which was growing out of the walls, together with *Asplènium Trichómanes*. In the neighbourhood, on the road side, I gathered the Galeópsis ochroleùca. The country between Vitteaux and Dijon is very beautiful, especially near Sombernon, near which place is found the rare *Epipáctis* (Cephalanthèra *Richard*) rùbra.

In approaching Dijon, I passed the small village of Pont de Pasny, near which place is the immense forest of that name, which clothes the north-western slope of the Côte d'Or. In the forest there is abundance of wild boars and roebucks, but very few wolves. We here pass from the basin of the Seine to that of the Rhone. At Pont de Pasny I gathered the Digitàlis lùtea, *Bupleùrum* falcàtum, *Prunélla* grandiflòra, Diánthus Carthusianòrum, Globulària vulgàris, *Teùcrium* montànum, Coronílla mínima, *Helléborus* fœ'tidus, and *Lìnum* tenuifòlium. I also took, on elevated ground in the neighbourhood, a specimen of Chrysomèla cereàlis, and several individuals of *Melolóntha àtra*.

I reached Dijon on the evening of the 12th of July, the approach to which is not very striking, as the road lies on low ground following the course of the river Ouche, and overhung on one side by limestone rocks, upon which grows the *Onònis Nàtrix*, forming a conspicuous object from its yellow flowers: another species of *Onònis*, viz. the *O.* Colúmnæ, also occurs, but it is much rarer, and seldom exceeds an inch or two in height.

The department of the Côte d'Or is one of the four formed out of the ancient province of Burgundy. It takes its name from a chain of hills which extends towards the south-east from Dijon, as far as the river Dheune, and is called Côte d'Or, on account of the excellent wines which are grown on it. The department is composed principally of an immense fertile plain, bordered, especially on the west, by hills of considerable elevation. The natural meadows on the borders of the Saône are very rich. The lower part of the hills is partly planted with fruit trees, and partly with vineyards; and their more elevated surfaces are covered with forests, filled with

game, which consists principally of hares, rabbits, and roebucks. It is the principal department in France, in respect to the extent of its forests, and the fifteenth in respect to its cereal productions. It contains many iron mines, coal pits, quarries of marble, porphyry, alabaster, gypsum, &c. It also contains many mineral, as well as saline, springs. All the cereal productions are cultivated; lentils, melons, truffles, &c. Beet root is cultivated in great quantities, for the purpose of manufacturing into sugar. The forests occupy a space of 243,088 hectares, and the vineyards 20,053 hectares. The wines are celebrated in the order following:—Côte de Nuits, la Romanée Conti, la Romanée Saint Vivant, le Clos Vougeot, la Tache, le Chambertin, leTart-sur-Morey, le Saint Jacques-sur-Gevrey, Côte Beaunoise, Vollenay, Pommard, Beaune, Alaxe (Corton), Savigny Chassague, Monthélie, Auxey, and Santenay.

The chief town (chef lieu) of the department is Dijon, formerly the capital of Burgundy, whose population is 25,552: it is situated in a fertile basin which extends as far as the mountains of Savoy, and is about four miles from the foot of the Côte d'Or. The cathedral is a prominent object on entering the town, and is surmounted by a spire 330 ft. high. The botanic garden is as yet in its infancy, and was founded by a M. Legouz. It has two considerable streams of fresh water running through it; and use is made of them to form artificial marshes, as well as to ornament the grounds. I saw here an experiment which seemed somewhat novel; it was that of grafting the chestnut on the oak: the individuals that I saw seemed to be thriving exceedingly well. The country about Dijon consists principally of chalk, upon which the chestnut will not grow, whilst the oak thrives vigorously. In some of our botanical excursions, a man from the botanic garden accompanied us into the woods, for the purpose of grafting the oak trees. They wish to have the chestnut tree naturalised, as well on account of its fruit as its wood. A museum of natural history is also attached to the garden, of which M. Nodot is curator; a gentleman of considerable practical knowledge in ornithology and entomology. The museum, as well as the garden, is yet in its infancy. A public promenade, called the Park, is a small enclosure close to the town, planted with trees, and is the favourite resort of the inhabitants of Dijon on a summer's evening.

A lover of natural history may, however, here find other beauties of nature to admire, than those which she has placed at the head of her innumerable varied forms. In the recesses of the thick plantations is found the *Asarum europæum*, to-

gether with the Hepática tríloba; and the children walking on the paths, being struck with the singularity of the flowers of the *Orchis fúsca*, cannot refrain from nipping off the heads of this rare plant, to satisfy their curiosity. The short grassy turf is here and there adorned with the beautiful deep blue flowers of the *Sálvia praténsis*. I was particularly struck with the beautiful and graceful flight of the *Papílio Podalírius* (scarce swallow-tailed butterfly), which is very common in the Park at Dijon. Instead of the ordinary fluttering motion of the common butterflies, it sails round in circles, continually hovering over the same spot, unless another of the species chances to come within a short distance, when immediately a furious chase commences, and each tries to deprive the other of the elegant colourings and forms with which nature has so beautifully enriched them. I was fortunate in procuring four specimens of that rare coleopterous insect, Trichius eremìta: I dug them out of the decayed stumps of some of the lime trees which form the alley leading towards the Park. In the same station, I also took a specimen of Elater (Lùdius) ferrugíneus. *Bupréstis* (Lámpra) rùtilans was common enough on the trunks of the trees, but immediately made its escape upon the approach of any person; so that I with difficulty caught three or four specimens. I also took *Bupréstis* læ'ta and nitídula. Among butterflies, the large silver spot, the silver-washed, and the Queen of Spain, (fritillaries) were abundant, as also the comma and great tortoiseshell.

That part of the neighbourhood of Dijon which is most rich in productions of natural history, especially botanical treasures, is the "Combe" of Gevrey. It is a wild deep ravine, about six miles s. w. of Dijon, the sides of which are very abrupt, and thickly clothed with vegetation. From the elevated points of the Combe, Mont Blanc and Mont St. Bernard may be distinguished, at a distance of upwards of 200 miles. It would be too long a task to enumerate in this place all the botanical riches which this place affords; but I may be permitted to mention a few of the most striking. The Digitàlis lùtea, or parviflòra, is a very conspicuous object in the lower parts of the Combe, together with the *Aconitum* lycóctonum, *Chrysánthemum* corymbòsum, *Orobánche* cærùlea, *Phalángium* ramòsum and Liliago, *Centaurèa* montàna, *Phyteùma* spicàtum, and *Thalíctrum* mìnus. Whilst in the more elevated parts I found *Anthýllis* montàna, *Onònis* Colúmnæ, Helianthemum apennìnum and cànum, *Trínia* glabérrima, Epipáctis microphýlla, Globulària vulgàris, *Inula* montàna and squarròsa, Gàlium glaúcum and harcýnicum, *Athamánta* Libanòtis, *Laserpítium* gállicum and ásperum, *Cytisus* capi-

tàtus, Diánthus sylvéstris; *T*rifòlium rùbens, alpéstre, and montànum; *G*enísta pilòsa and prostràta, *E*uphórb*ia pi*nifòlia, *P*hyteùma orbiculàre and spicàtum, *A*lýssum montànum, *D*ràba *a*izöides, *R*anúnculus gramíneus, *A*nemòne *Pulsatílla*, *C*érasus *Mahàleb*, *R*hámnus alpìnus, &c. The vineyards near Dijon produce the *R*ùmex scutàtus, *A*llium sphærocéphalum, Centránthus angustifòlius, *A*lthæ'a hirsùta and *c*annábina, Mélica ciliàta, Diánthus prólifer, *L*epídium ruderàle, *E*uphórb*ia* verrucòsa, *L*àmium rugòsum, &c.

Near Nuits, which is distant from Dijon about 12 miles, grows the *R*ùta gravèolens; near the same place, in the woods, I met with the *O*'robus nìger, Monótropa Hypópitys and *A*'sarum europæ'um. A butterfly, the Sátyrus Hermìon*e*, was very abundant in the copses. I took a considerable quantity of the Cyclóstoma élegans in the neighbourhood of Nuits; also two specimens of Hèlix melanóstoma *Drap.* A little to the S. E. of Nuits is situated Cîteaux, which presents a very marshy and low country, the botanical products of which differ considerably, as might be expected, from those I have just been describing. Amongst others, I may mention the Lindérn*ia* pyxidària, *L*ýthrum *h*yssopifòlium, *C*ucùbalus báccifer, Potentílla supìna, *G*naphàlium lùteo-álbum, Hydrócharis mórsus ràn*æ*, and Gypsóphila muràlis; this last plant growing in the moist corn fields, along with *L*áthyrus hirsùtus. I took a specimen of Cerócoma Schæ'ffer*i*, a heteromerous coleopteron; as also a larva of *M*ántis precatòrius. I saw several times the Vanéss*a* Antiòp*a*, but was unable to capture it.

At Cîteaux are the ruins of a large monastery, formerly belonging to monks of that order. Part of the ruins is now converted into a dwelling-house, and the rest into an extensive manufactory of sugar from beet root, which is grown in the neighbourhood. Near Cîteaux I first observed Indian corn, or maize, cultivated on a large scale: it is generally made into cakes with water, but sometimes mixed with wheaten flour, for the purpose of making bread. The hoopoe seems to be frequent near here, as I saw them flying across the road. The golden oriole is common at certain seasons of the year.

In the immediate neighbourhood of Dijon is some rocky ground, called the Quarries of the Carthusian Friars (Carrières de Chartreux), being near the ruins of a monastery belonging to monks of that order. I was very much delighted with the large blue flowers of the Scutellària alpìna, which is there abundant, and was gathered in this locality so long ago as the end of the 17th century, by our countryman Sherard. (See Morison, *Plant. Oxon.*, part 3. sect. xi. p. 416.) Arenària fasciculàta, *T*rìticum *N*árdus, *O*nònis *N*àtrix and Colúmn*æ*,

Heliánthemum cànum, *I*nula montàna, Scrophulària canìna, *Cúscuta Epíthymum, Glaúcium lùteum*, and Diánthus Carthusianòrum, are common enough. The Clausília mínima is very frequent under stones, together with Pùpa marginàta, secàle, and variábilis, and Cyclóstoma maculàta.

A little further from Dijon, going westward, are situated Mont Afrique, and the hill of St. Joseph. Near the latter place grow the rare *C*ynoglóssum Dioscóridis, and still rarer *B*ùnium viréscens. Specimens of Limodòrum abortìvum occur occasionally, as also *Satýrium* hircìnum, but neither of them common. In the woods clothing Mont Afrique I found the Dentària pentaphýlla, Genísta sagittàlis, *Gentiàna* lùtea, *Cýtisus* capitàtus, *M*elampỳrum cristàtum, and *Amelánchier* vulgàris. In the corn fields I met with Aspérula arvénsis, *S*tàchys ánnua, Saponària vaccària, A*'juga C*hamæ*'*pitys, *Lò*lium arvénse, *Caúcalis* grandiflòra and *d*aucòides, Nigélla arvénsis, and *C*entaurèa lanàta. At the Combe of St. Joseph I gathered the beautiful *Gentiàna* cruciàta, also Buffòn*ia* ánnua, Micropus eréctus, *P*olycnèmum arvénse, *B*upleùrum *O*dontìtes and rotundifòlium, Heliánthemum Fumàna, and *Erýsimum* lanceolàtum. I observed a great number of butterflies, among which I recognised Hippárchi*a* Ascàniu*s*, and Sátyru*s* Hermìon*e*. I took Chrysomèla cereàlis in abundance on the elevated plateaux; as many as eight and ten specimens under one stone.

It now only remains for me to sketch over the productions of the low grounds lying to the east of Dijon, which I will do as briefly as possible. I regret not being able to give any information respecting Val Suzon, which lies to the north of Dijon, as I omitted visiting it any further than passing through in the diligence. As far as I could learn, however, its botany resembles that of the Combe of Gevrey, which I have described. The river Seine takes its rise at this place. The aspect of the country towards the east of Dijon is very flat, and is watered by the small river Tille, which empties itself into the Saône. The vine is here entirely neglected, and gives place to fields of corn, hemp, mustard, turnips, &c. The natural marshy woods are, as may be supposed, very favourable to the botanist.

In the neighbourhood of Arc-sur-Tille, I met with the rare *A*llium senéscens, together with *I*nula *Helèn*i*um*, *Sisýmbrium* supìnum and ásperum, *Gàlium* ánglicum and tricórne, *Aconìtum* Napéllus, Aspídium *T*helýpteris, A*'tropa Belladónna*, Gratìola officinàlis, Pimpinélla mágna, *I*nula *salícina*, *Brò*mus arvénsis, *Hippùris* vulgàris, Myriophýllum spicàtum and verticillàtum, and *Dipsacus* laciniàtus. This last plant is pro-

bably only a variety of *D.* sylvéstris, with which it grows, and from which it differs only by its deeply pinnatifid leaves. I took specimens of Cryptocéphalus hístrio and Moræ*i*, and Adimònia halénsis, and a few other common coleopterous insects. Butterflies seemed to be extremely abundant, but not many rare species.

Upon the whole, I did not much enrich my entomological cabinet during my short stay at Dijon; for, although there are, as I have been given to understand, many rare insects in its neighbourhood, yet they are not easily to be got at by a stranger ignorant of their localities. The Clytus massiliénsis and *Gazélla*, together with Stenópterus rùfus, were abundant on every cluster of flowers of the common milfoil. The Purpurícium Kóchler*i* and Hóplia squamòsa are equally common. Of Galerùca lusitánica and Leptùra hastàta I took single specimens only. The *M*elolóntha àtra and Hóplia rurícola are plentiful on the road sides. The *M*elolóntha fúllo, which is so common at Lyons, is not found, I believe, near Dijon. The Cántharis vesicatòria, or common blistering fly, is extremely abundant in certain localities. I saw an ash tree hanging over the road so crowded with them, that their excrement literally blackened the ground; and, on passing underneath the tree, I felt my face as if bit by gnats. They have a disagreeable sickening smell, which may be perceived twenty or thirty yards off, according to the direction of the wind. They are sold at about 6*s.* per pound, when dried.

I have thus brought to a close the result of my observations during a fortnight's stay at Dijon; and, although this paper professes to be a sketch of its natural history, I am afraid it will afford but a meagre account of its productions in any branch of that science, except, perhaps, phanerogamous botany.

7. *Broughton Place, Edinburgh, Jan.* 4. 1836.

ART. II. *Observations made during a Visit to Connamara and Joyce's Country, Ireland, in August*, 1835. By CHARLES C. BABINGTON, M.A. F.L.S. F.G.S., &c.

HAVING last summer (1835) paid a short visit to those little known western districts of Ireland, denominated Connamara and Joyce's Country, I think that a short account of them, particularly of their natural history, will be acceptable to the readers of your Magazine. Many of my readers have often, I doubt not, desired to see a country so well known as the land of promise in all departments of

British natural history, but have despaired of ever being able to obtain a share in the rich harvest which awaits the traveller in those distant parts of the sister island. The false notion, so generally current in England, that it is difficult, nay almost impossible, to travel in the wilder or more distant parts of Ireland, without personal danger, or, at least, very great inconvenience, from the religious and political feelings of the people, and the almost total want of accommodation in the smaller towns, has, I doubt not, prevented many an enterprising naturalist from leaving his fireside to pursue his researches in the counties Mayo, Galway, or even in Kerry, with the single exception of Killarney.

Such being the case, I shall proceed at once to give a short, but very imperfect, account of those parts of the county of Galway which are mentioned at the head of this paper. After attending the meeting of the British Association at Dublin, I proceeded, in company with two friends (Messrs. R. M. Lingwood B. A. and J. Ball, both of Christ's College, Cambridge, the first a botanist and entomologist, the other a geologist), to the town of Galway. This is a large and interesting place; but, as an excellent account of it is contained in Mr. Inglis's *Tour in Ireland*, I shall not describe it here. From the bridge, in Galway, we were much interested by noticing great numbers of salmon on their way to the large expanse of Lough Corrib, or the mountain streams communicating with it. The river which they were ascending is wide, with a swift stream running over a rocky bottom, and therefore giving to the current a very turbulent character. The salmon were lying in such dense masses in the hollows formed by its rocky bed, that I consider myself fully justified in stating that many hundreds must have been present within fifty yards of the bridge.

From Galway we proceeded nearly due north-west through a rather flat, and far from interesting, country, which, however, became gradually more and more hilly as we approached Oughterard; and, although for the most part totally devoid of trees, it was plain, from the excellence of their growth near to several gentlemen's seats, that the climate and soil were not the causes of their deficiency. On both sides of the road the country consists almost wholly of low rocky hills and bog; but several views are obtained of that extensive sheet of water denominated Lough Corrib. This lake is more than thirty miles in length, extending from the centre of the Ma'am Turk Mountains to within a few miles of Galway; and is about eight miles in width between Oughterard and Cong. The gillaroo trout is found in it; a fish celebrated for having a

strong muscular stomach, resembling the gizzard of birds. It is generally considered to be a variety of the common species (*Sálmo Fàrio*). (See Jenyns's *Manual of Vertebrate Animals*, p. 425.)

At about three miles before reaching Oughterard, the road is carried over a natural bridge formed of carboniferous limestone. By following the stream from this spot, for rather more than half a mile, the geologist will be gratified by seeing a most curious succession of natural arches, apparently forming part of a once continuous cavern through which the river flowed. The fields on both sides of the stream, judging from the abrupt depressions of the surface which occur in many places, are probably supported by a succession of similar caverns. This singular structure appears to terminate at a point which is well marked by a fine old castellated tower in pretty good preservation. This building is very interesting from its architecture, but still more so from its situation, being built over the river, upon the last and loftiest of these natural arches. Judging from the state of some of its outworks, it appears not improbable that this castle was built before the surface of the land near to it had sunk in the manner described above. The river must then have been quite hidden, and the site of the castle have appeared as a slight elevation in a flat country. At a short distance beyond the natural bridge, and close to the road, a small quarry of black marble is worked in the carboniferous limestone.

Oughterard is pleasantly situated near the shore of Lough Corrib, upon a small river, which, just above the town, is broken by a succession of rapids nearly approaching in character to a waterfall. Near the centre of the town stands a new and handsome Roman Catholic chapel, just below which the upper bank of the river has a highly interesting structure, the limestone of which it is formed presenting the appearance of half an elliptical arch over the water, of which the other part has been destroyed by the action of the stream. Here the Dabœ`*cia polifòlia* (Menziè*sia polifòlia*) first shows itself in its full beauty, ornamenting every *dry* rocky spot of ground with its large elegant flowers and conspicuous foliage. It may be as well to observe, once for all, that this plant first appears at the distance of a few miles to the east of Oughterard, in very small quantity, but is plentiful throughout all the country to the west of that place, as far as the Atlantic.

In the neighbourhood of Oughterard, the banks of Lough Corrib are quite devoid of grandeur, being bounded by a vast extent of bog, out of which rise a few low rocky hills, partially cultivated: still, an expanse of water, eight miles in

width, and studded with numerous small islands, can never be totally without interest. The shore of the lake, and its islands, consist of carboniferous limestone, having a very bituminous odour. The upper part of this stratum is full of organic remains, such as Euómphalus, *O*strea, encrinites, and corallines. Good specimens of most of them may be obtained by the road side, near to a house belonging to Mr. Martin of Ballinahinch," and commonly denominated his "gate-house," being the point where the road enters his property.

On the side of the town furthest from the lake rises a hill consisting of quartz rock, and covered up to its top with large boulders of granite. The range behind it, formed of mica slate and quartz rock, has no granitic boulders; nor did we observe them in any other part of the district. The base of all these hills appears to be mica slate underlying and passing into quartz rock. The boulders are made more interesting by the fact, that the granite does not rise to any great elevation in this part of Ireland; its highest point, in these districts, being near Roundstone, where it reaches, as we were informed, the height of 200 ft. or 300 ft. The broad valley, stretching inland from Oughterard, consists of bog, having granite, and, in some spots, primary limestone, appearing through it. My friend, Mr. Ball, mentions his having noticed old red sandstone near to the lake, at the distance of a few miles west of Oughterard.

No traveller, who is interested in architectural remains, should leave Oughterard without visiting the ruins of the old church, in which are several windows of forms which I have never before noticed. Not being skilled in architecture, I am unable to describe them, but may add that they have great similarity to several which occur in the old castle noticed above. It may be as well to observe, that Connamara is considered to begin at Oughterard, that town not forming part of it.

Our next station was Ma'am, a small but excellent inn, at the head of Lough Corrib. The road from Oughterard to this place is carried through a moderately level district, bounded by two ranges of rather lofty mountains. It passes, in many places, over the bogs, and along the banks of several pretty lakes, which contain small wooded islands, although their shores are totally devoid of trees. The borders of these lakes are made very interesting by the occurrence of Eriocaúlon septangulàre and Dortmánn*a* palústris (Lobèl*ia* Dortmánn*a* Linn), in the greatest plenty. Clà-dium *Mar*iscus, although less common, may also be found

growing in small detached clumps of three, four, or even a single flowering stem; presenting a striking contrast to its appearance in the fens of Cambridgeshire (at Upware, for instance), where it covers hundreds of acres, to the total exclusion of all other plants. In Connamara, also, it invariably grows in the water, or the very wettest bogs, which is far from being uniformly the case in the English fens.

At about eight miles from Oughterard, the road to Ma'am leaves that leading to Clifden, and, turning to the right, gradually ascends a pass between two lofty mountains, from the highest point of which the first view of the inn at Lough Corrib Head is obtained. That house stands upon the bank of a small river, at about a mile above its junction with the lake; it is backed by a lofty mountain range, and commands in front a view over an extensive boggy plain, enclosed on all sides by mountains, most of them forming part of the Ma'am Turk range, and rising to an elevation of about 2500 ft. *Saxífraga umbròsa* is peculiarly plentiful upon all these mountains: indeed, it appears to supply the place of all the other species, v. th the single exception of *S.* stellàris.

These mountains consist of mica slate and quartz, the latter predominating towards the summits, which are generally flat, and either bare rock or bog. Their base would appear to assume a granitic character; but the ground is so much concealed by bog, that it is very difficult to determine. It is worthy of remark, that the bogs are not confined to the valleys and flat parts of the mountain tops, but, in many places, cover their steep slopes, in some instances occupying the shelving top of a crag, or even extending their spongy bituminous masses some inches beyond its verge.

We ascended a lofty mountain opposite to the inn (called Shanafolia), nearly equal in elevation to Ma'am Turk itself; and our labour was fully repaid by the extensive view obtained from its top. On one side there is a complete district of mountains; not a single range, but a succession of lofty summits, following close upon each other, extending far into the county Mayo, and terminated towards the east by Lough Mask and Lough Corrib. In the opposite direction, the scene is totally changed. The country there appears, from this elevated point, to be a dead flat, consisting almost wholly of bog, including a surprising number of small lakes (we counted 175, without being particularly exact), and bounded on the horizon by the Atlantic, on the coast of which there are several rather lofty mountains. The top of this mountain is quite barren, being nearly all bare rock.

The only plant of interest noticed upon it was *Juniperus nàna*, which occurred in very small quantity.

We observed *Saxífraga Gèum* in only one spot in Connamara, that is, by the side of a small waterfall upon the second brook passed on the road from Ma'am to Lenane.

After spending some days at Ma'am, we took a car to convey us to Tully, Clifden, &c., and back to Ma'am. I cannot, perhaps, give a better idea of the country than by stating our observations during that trip of about eighty English miles. Our first stage brought us to Lenane, a very small hamlet at the head of the Killery Harbour. The country between Ma'am and this place consists of a mass of lofty mountains, covered to their very tops with herbage, and affording excellent pasturage for numerous sheep and oxen. The valley contains very little cultivated land, being mostly occupied by bog; but we noticed several small patches of oats, which promised a plentiful return for the labour bestowed upon their culture.

The situation of Lenane is one of peculiar grandeur. The Killery Harbour is a deep narrow inlet of the sea, many miles in length, and seldom more than a mile in width, bounded on both sides by lofty and precipitous mountains, and curved in such a manner as to resemble a Highland lake, perfectly hemmed in by rocky summits, presenting, as I am informed, almost exactly the appearance of a Norwegian fiörd.

At Lenane is a small inn, kept by a person named John Joyce, who is well known for his extensive influence over the people of that mountain district denominated Joyce's Country, claiming to be the representative of its ancient chiefs. He is a man of great stature and immense bodily strength; these being, indeed, the characteristics of his whole clan. I have never seen a finer race of men than the Joyces of that country. He is an extensive farmer, and proposes soon to enlarge his house so as to make it more convenient for the reception of strangers. At a short distance above Joyce's residence is a small but interesting waterfall, well worthy of a visit, both for its own intrinsic beauty, and the grand mountain views afforded by its elevated situation.

We observed clay slate in the neighbourhood of Lenane, but had not time to ascertain its extent: and near to Mr. Joyce's house there occurs a bed of clay extending for some distance along the valley, of about 20 ft. in thickness, and containing rounded masses of clay slate, quartz, mica slate, and iron ore, in horizontal layers. Of this a good section is exhibited by an excavation formed in making the new road.

On the shore we noticed the usual sea-side plants, such as *G*laúx marítima, Armèria marítima, *P*lantàgo *C*orónopus, *A*'ster *T*ripòlium, &c. After coasting the estuary for about one third of its length, we turned to the left over an extensive bog, part of which the proprietor is endeavouring to bring into a state of cultivation, until we reached the north side of the Twelve Pins of Bunarola, having fine mountain views on all sides, particularly on the south and east.

This boggy country rests upon a rock, much resembling greywacke, in some places quite full of rounded masses of the older rocks, forming a very curious conglomerate.

After crossing the bog, the road skirts a lake prettily situated in the midst of mountains of the most rugged and picturesque forms, their descent to the lake being, in many places, quite precipitous. Our object being to visit Tully and Renville (the station for *A*'rabis ciliàta, which we did not succeed in finding), we turned to the right immediately on leaving the mountains, and traversed a wide heathy district, extending quite to that place. Tully is situated near the shore of the Atlantic, and not far from the foot of a lofty hill, from the lower elevations of which there is an extensive sea view to the north, including the mountain summits of Achill Head, Coraan, Mullrea, Croagh Patrick, &c. The foreground is occupied by numerous rocky islands, some of which are of considerable height. Here we noticed *C*ýtisus *s*copàrius, and Ammóphila (*A*rúndo) arenària, in the greatest plenty.

The more level land between this place and the hill consists of mica slate alternating with and passing into quartzose sandstone. The hill is similar in structure to the other mountains of this district; namely, mica slate running into quartz rock near the summit.

The road to Clifden, although it has little to detain the naturalist, is far from uninteresting to the traveller, being a continual succession of hill and valley, presenting fine views of several extensive estuaries, and distant glimpses of the Twelve Pin Mountains.

Clifden is situated at the head of a deep estuary, termed Ardbear Harbour, and is a thriving town, having far the most respectable appearance of any place in these districts. It is not twenty years since this town was founded; and it has now several good streets, a small church, and a rather handsome Roman Catholic chapel. A new and direct road is being made from this place to Oughterard, so as to form a nearly straight communication with Galway. Clifden, which is the most westerly town in the county, is fifty-one English

miles from Galway, and 184 from Dublin. Neither it, Roundstone, Lenane, nor Ma'am, are noticed in any map of Ireland that I have seen: indeed, there is no map yet published which gives at all a correct delineation of this part of the country: I ought, perhaps, to except the great map of the county; but of that I am not certain.

We particularly noticed that *U*`lex nànus replaced *U.* europæ`us in this neighbourhood, the latter being much the more frequent species in all the other parts of Connamara and Joyce's Country which we visited.

The road from Clifden skirts the heads of several small inlets, and then, leaving the sea, enters upon by far the most barren and desolate country which we noticed during an extensive tour in Ireland. It consists of bog, resting upon a substratum of hornblende, the rock appearing in numerous masses at the surface, and often containing felspar; it is sometimes quartzose, but in many cases nearly pure. The whole country is full of small lakes, and has, at a distance, a very similar appearance to the district observed from the top of Shanafolia Mountain, near Ma'am. The vegetation consists solely of the following plants, the first two forming nearly the whole herbage:—*Schœ`nus nígricans* and *Molín*ia cærùlea are common; Erióphorum angustifòlium, *U*`lex nànus, and Rhynchóspora álba, being far from common. The other plants noticed were, Potentílla Tormentílla, *Myrìca Gàle*, Callùna vulgàris, and *Erìca Tétralix*, rare; *E.* cinèrea, Narthècium ossífragum, Drósera ánglica and rotundifòlia, very rare. In the lakes we observed Clàdium *Mariscus*, *Phragmìtes* commùnis (*Arúndo Phragmìtes*), *Scírpus* lacústris, and Utriculària mìnor, all of them far from common. In this district the bogs are often so sòft (especially where the Molín*ia* cærùlea predominates), that it is quite impossible to keep the ditches open by the sides of the road, and a strong undulation is caused in the water by any passing vehicle. The road is bounded on both sides by country of this character for more than five miles, and it appears to extend for a great distance both to the right and left; being terminated on one side by Urrisbeg, and the hills near the coast; and on the other, by the splendid mass of mountains called the Twelve Pins of Bunarola. In the eastern part of this district, and at about a mile from the turning to Roundstone, is a low but extensive mass of rocky ground, called Craigha Moira, which is quite covered by a heath new to the British flora (which I have called *E.* Mackai*àna*, in compliment to J. T. Mackay, Esq., the Irish botanist, conceiving it to be an undescribed species), having the flowers of *E. Tétralix*, and the leaves and calyx of

E. ciliàris, but differing in habit from both of them. It was pointed out to me, as probably different from any other in that part of the country, by Mr. William MacCalla, the son of the landlord of the inn at Roundstone. I have lately described this plant in a paper read before the Linnæan Society. This young man, although labouring under very great difficulties, has by his own unassisted exertions, and with an almost total want of books, obtained a very complete knowledge of the geology, mineralogy, conchology, and botany of the neighbourhood of Roundstone. He has now, I am happy to learn, obtained the situation of national schoolmaster at Ballinahinch.

Roundstone is situated on the shore of the bay of that name, which has deep water at all times of the tide. It is at present a very small place, but appears to be rapidly improving. The view of the Twelve Pins of Bunarola is peculiarly fine from this point, nearly their whole extent being visible. Several of these mountains rise to the height of 3000 ft.

Mr. W. MacCalla went with us to the station of Gypsocállis Mediterrànea (*Erica Hooker*), in Glan Iska, a boggy valley upon Urrisbeg Mountain. It is in the greatest plenty, occupying the valley for more than a mile, and growing in tufts of from 1 ft. to 2 ft. in height. He also pointed out a station for *Adiántum Capíllus-Véneris*, at the foot of a rock facing south west, on the bank of Lough Bulard. The specimens were small and few in number, but in beautiful fructification.

Birterbuy Bay, of which Roundstone Bay may be considered as a branch, is a fine harbour, extending many miles into the land, and having, as we were informed, deep water in almost every part. On a rocky island near to its head, called Cruig Neit, we found *Inula Helènium* in plenty, and more truly wild than I had ever noticed it in Britain.

Near Roundstone, asbestos is found in veins; porphyry is very abundant; rich copper ore and bog iron ore may also be obtained there. The low tract near to the coast, and the low islands in the bays, are formed of granite; the higher islands consist of hornblende and porphyry. Urrisbeg Mountain is mica slate and quartz, primary limestone lying in beds towards its base, where, also, green marble exists. On the opposite side of the bay, the granite rises into low hills of 200 ft. or 300 ft. in height; that being, as I have before observed, the highest elevation at which granite, *in situ*, has been found in these districts.

Our road to Ma'am led us again into the Clifden and Galway road, which passes by the celebrated salmon fisheries of Mr. Martin at Ballinahinch. This is said to be the best fishery

for salmon now existing in the kingdom; and, although the season for fishing with nets was over, yet we noticed many fine fish still making their way up the river.

The house of Ballinahinch is very extensive, but almost totally devoid of beauty: its situation, however, is good, being backed by a splendid mountain, forming one of the Twelve Pins. Near Steely's Inn, a few miles beyond Ballinahinch, there are extensive quarries of green marble, as also a copper mine, containing, I understand, very rich ore.

Between this place and Ma'am nothing was noticed worthy of being recorded here, except that, by attempting to take a short cut over the mountains, we were benighted in the bogs, and had the greatest difficulty in reaching our inn, where we did not arrive until several hours after it had become quite dark.

The following day we left Connamara, highly delighted by our visit to a district which I cannot but consider much more interesting to an admirer of romantic wild scenery, than even the celebrated lakes of Killarney; and the surprising number of rare plants which are here collected together, as well as the nearly total ignorance which exists of its productions in the other departments of natural science, cannot fail to make it peculiarly interesting to the scientific traveller.

St. John's College, Cambridge, Jan. 15. 1836.

A List of Species of Birds and Mammiferous and Amphibious Animals, observed in Connamara, in August 1835; *drawn up by R. M. Lingwood, Esq. Where no station is indicated the species was observed throughout the district.* c., *common*; v. c., *very common.*

Birds. — *A*quila *C*hrysàëtos, ringtailed eagle; *H*aliæ'ëtus, osprey, Oughterard. *F*álco *T*innúnculus, kestrel. *Accípiter fringillàrius*, sparrowhawk, Ma'am. *B*ùteo cyàneus, hen harrier. *C*inclus aquáticus, water ousel, c. *S*ylvia *R*ubécula, robin, only one seen, Ma'am; *T*róchilus, willow wren, on bank of Lough Corrib, near Ma'am. *M*otacílla álba, pied wagtail, v. c.; Boárula, grey wagtail, v. c. Saxícola *Œ*nánthe, wheatear, Ma'am; Rubícola, stonechat, Ma'am. Emberìza Citrinélla, yellow hammer, Ma'am. *F*ringílla doméstica, common sparrow, Steely's Inn, the only station observed; cannábina, grey linnet, v. c. *C*órvus *C*órax, raven, Ma'am; *C*oròne, crow, Ma'am; *C*órnix, hooded crow, called there scraw crow, v. c.; frugílegus, rook, a few observed at Tully; *M*onédula, jackdaw, Oughterard; *P*ìca, magpie, Oughterard. Troglódytes europæ'us, wren, Steely's Inn. *H*irúndo rústica, swallow, Oughterard. *C*ýpselus *A*'pus, swift, Tully, one only noticed. *T*étrao scóticus, red grouse. Hæmátopus ostrálegus, oyster catcher, Tully. *A*'rdea cinèrea, heron, there called crane, v. c. Numènius arquàta, curlew, v. c. *T*ótanus óchropus, green sandpiper, Tully. *S*colópax Gallinàgo, snipe, c. *A*nas *B*óschas, wild duck, c.; *C*récca, teal. *P*halacrócorax *C*árbo, cormorant, v. c., it frequents both the lakes and the sea coast. *L*àrus ridibúndus, black-headed gull, Tully; tridáctylus, kittiwake gull, Tully; cànus, common gull, Tully.

Mammiferous Animals. — *L*epus tímidus var. hibérnicus, Irish hare, c

This is probably a distinct species from the English hare. (See Jenyns's *Manual of Vertebrate Animals*, p. 35.)

Amphibious Animals. — *R*ùna temporària, common frog, v. c., said not to be indigenous, but introduced in 1669. (See Jenyns's *Manual of British Vertebrate Animals*, p. 300.)

A List of Species of Plants observed in Connamara, in August 1835; *including only those considered worthy of notice, either from their rarity, or other causes. Where no station is given, the species occurred throughout the district.* r, *rare.*

*R*anúnculus Língua, Ma'am. *N*ymphæ'a álba, Oughterard, confined to limestone. *V*iola palústris, in the bogs, very common. Drósera rotundifòlia, r.; longifòlia; ánglica, very common. Silène ánglica, Oughterard, in corn fields. *H*ypéricum *A*ndrosæ'mum, Lenane; humifùsum, Oughterard; elòdes, in the bogs; púlchrum, Lenane. *U*'lex europæ'us, common in all parts of the district, except near Clifden, where it is rarely found; nànus, Clifden and Roundstone, common. *C*ytísus scopàrius, Tully. *T*rifòlium filifórme, Lenane. *R*ùbus carpinifòlius, Ma'am; Kœ'leri var. fúsco-àter, Ma'am. Potentílla *C*ómarum, Oughterard. *C*ircæ'*a* lutetiàna, Lenane. *S*èdum Rhodìola, Shanafolia Mountain, r. *S*axífraga *G*èum, just below a small waterfall, on the second brook crossed on the road from Ma'am to Lenane; umbròsa, on all the mountains; stellàris, Shanafolia Mountain, r. Chrysosplènium oppositifòlium, Lenane, near a small waterfall above Mr. Joice's house. *F*èdia dentàta, Oughterard, in a corn field; auricula, Oughterard, in a corn field, a new plant to Ireland. *A*'ster *T*ripòlium, Lenane. *G*naphàlium sylváticum *β* réctum, Oughterard and Ma'am. Bìdens tripartìta, banks of Lough Corrib, near to Oughterard. *H*ieràcium umbellàtum ?, on the banks of Lough Corrib, near Ma'am (I cannot refer this plant to any other species; but it does not agree well with this); paludòsum, on the mountain behind the inn at Ma'am. Dortmánn*a* lacústris, in all the lakes. Gypsocállis mediterrànea, in Glan Iska, Urrisbeg. *E*rìca Mackai*àna*, Craigha Moira, near Roundstone; *T*étralix and cinèrea, common, and peculiarly fine. Callùna vulgàris, common, and very fine. Dabœ'*cia po*liifòlia, on all rocky spots at the lower levels, from near Galway to the Atlantic: it does not occur at the tops of the hills. *A*rctostáphylos U'va-úrsi, Tully. *G*enti*àna* campéstris, Oughterard and Ma'am. *M*yosòtis cæspitòsa, Ma'am. Digitàlis purpùrea, Oughterard. *V*erónica montàna, on the mountain behind the inn at Ma'am, r. Scutellària mìnor, Oughterard. Pinguícula grandiflòra; lusitánica, Urrisbeg, near Roundstone. Utriculària intermèdia, in the ditches in deep bogs, particularly near Oughterard, it does not flower; mìnor, near Oughterard, with the last. *L*ysimàchia vulgàris, on the banks of Lough Corrib, near Ma'am; némorum, on the mountain behind the inn at Ma'am. *G*laúx marítima, Lenane. Armèria marítima, Lenane. *P*lantàgo *C*orónopus, Lenane. *R*ùmex obtusifòlius, Ma'am; crí*s*pus, Ma'am. *S*àlix fúsca *β* rèpens, fúsca *ε* incubàcea, both at Ma'am; ambígua, Tully; aquática, oleifòlia, and aurita, all at Ma'am. *J*uníperus nàna, Shanafolia Mountain and Urrisbeg. Habenària chlorántha, Ma'am. *J*úncus obtusiflòrus, common in the bogs. Lùzula sylvática, Shanafolia Mountain and Lenane. Eriocaúlon septangulàre, in all the lakes. *S*pargànium nàtans, Oughterard. *S*chœ'nus nígricans. Rhynchóspora álba; fúsca, common in the bogs near to Oughterard. Clàdium *M*arí*s*cus, in very small patches on the borders of many of the lakes. Eleócharis palústris, in the bogs; pauciflòra, forming a large portion of the herbage on heathy ground. *S*círpus setàceus, Oughterard; Sàvii, Oughterard, Ma'am, and Lenane. *C*árex pulicàris, Ma'am; stellulàta, Ma'am; ovàlis, Ma'am; muricàta, Oughterard; binérvis, Oughterard and Ma'am; *p*anícea, Oughterard and Ma'am; recúrva, Oughterard; cæspitòsa,

Ma'am. No other *C*árices noticed. Molín*ia* cærùlea, forming the greater part of the herbage of the wettest bogs; cærùlea var. depauperàta, on the rocks in the channel of the river at Oughterard, just below the rapids. Danthòn*ia* decúmbens, Oughterard, r. *N*árdus strícta, on the mountain behind the inn at Ma'am. Lycopòdium *S*elàgo, Oughterard, r. Osmúnd*a* regàlis, Oughterard. *A*splènium *A*diántum-nìgrum, Urrisbeg: pointed out to me as *A.* lanceolàtum. *A*diántum *C*apíllus-Véneri*s*, Urrisbeg, on a rock facing s. w. on the shore of Lough Bulard. Aspídium cristàtum, Oughterard, only one plant seen. Hymenophýllum Wílson*i*, Shanafolia Mountain.

A List of Species of Shells found near to Roundstone, by Mr. W. MacCalla.

A'rca nùcleus, Nòæ; *B*úccinum reticulàtum, mácula; *C*árdium edùle, Cypræ'*a* pedículus, *D*ònax trúnculus; Hèlix ericetòrum, iánthina, bifasciàta; Limnèus pùtris; Máctra stultòrum, lutrària; *M*ùrex antìquus, *M*ỳa margaritífera, *M*ýtilus incurvàtus; *N*erìta Canrèna, littoràlis; *P*écten vàrius; Patélla læ'vis, fissùra, græ'ca; *S*òlen vespertìnus, Strómbus pès-*P*elecàni; *T*ellìna ténuis, donácina, depréssa, rádula, solídula; Tròchus Màgus, crássus, cinèreus, umbilicàtus, zizíphinus; Túrbo rùdis, clàthrus, térebra; Vènus verrucòsa, fasciàta, gallìna, decussàta, pullástra, aúrea, sinuòsa.

ART. III. *On the Quinary, or Natural, System of M'Leay, Swainson, Vigors, &c.* By PETER RYLANDS, Esq.

No. I.

"THERE can," says Baron Cuvier, "be but one perfect method, which is the *natural method*. We thus name an arrangement in which beings of the same genus are placed nearer to each other than those of the other genera; the genera of the same order nearer than those of other orders, and so on. This method is the ideal to which natural history should tend; for it is evident, that, if we can reach it, we shall have the exact and complete expression of all nature. In fact, each being is determined by its resemblance to others, and difference from them; and all these relations would be given in the arrangement in question. In a word, the natural method would be the whole science, and every step towards it tends to advance the science to perfection." No wonder, then, that most naturalists have spent a considerable portion of their time and talents, in attempts to discover this method, "the only one of nature;" and, consequently, that systems designated "*natural*" are extremely numerous. None, however, have been so particularly brought before the public, and emphatically styled *the* natural system, as the one under our consideration. If it is truly the long wished for natural system, then is the most important and beneficial advance which can be made in natural history attained; but if, on the contrary, though bearing the appellation of "*the natural*," it is found to be nothing more than an *artificial* method, every effort ought to be made, as early as possible, in order to over-

throw it, or at least in a great measure to prevent the extension of the deceptive influence necessarily connected with, and radiated by, it.

It appears to us, therefore, highly important to devote a considerable portion of our study to, and reflection on, this subject, in order to arrive at a just conclusion respecting its merits, and the claims it has upon our notice.

It must, however, be premised, that what we shall advance on this topic, is not intended to be what is generally termed an "impartial survey;" for, having duly considered it, we find that, so far from being *the natural*, it must rank amongst the lowest of *artificial* methods; we shall therefore rest content with pointing out to our readers the anomalies connected with, or contained in it, the discovery of which has been the result of our investigation. We perfectly agree with Professor Rennie, in considering it not a little singular that, while hypothetical theories such as this are, in a great measure, banished from other sciences, they should now reign as paramount in this department as alchemy and astrology did in the dark ages.

Mr. M'Leay has "the high and undoubted honour" of having discovered this system; but, as his work (*Horæ Entomologicæ*) is now so scarce, "that few can hope to consult its philosophic pages," Mr. Swainson, in three late volumes of Dr. Lardner's *Cabinet Cyclopædia*, has published, in a connected series, a detailed account of the first principles and fundamental rules of the "quinary" (for we think this a much more suitable appellation for it than "the natural") system: these will form the basis on which we shall construct our remarks.

At page 225. of his "Treatise on the Geography and Classification of Animals," forming vol. 66. of Lardner's *Cabinet Cyclopædia*, Mr. Swainson gives the elements of the quinary system in the form of the five propositions following:—

"1. That every natural series of beings, in its progress from a given point, either actually returns, or evinces a tendency to return, again to that point, thereby forming a circle.

"2. The primary circular divisions of every group are three actually, or five apparently.

"3. The contents of such a circular group are symbolically (or analogically) represented by the contents of all other circles in the animal kingdom.

"4. That these primary divisions of every group are characterised by definite peculiarities of form, structure, and economy, which, under deversified modifications, are uniform

throughout the animal kingdom, and are therefore to be regarded as the primary types of nature.

"5. That the different ranks, or degrees of circular groups exhibited in the animal kingdom, are nine in number, each being involved within the other."

If any person reflect but for a moment on these propositions, he will at once perceive, that, although they may stand theoretically, to use them practically, or, in other words, to bind nature with certain laws, and to force her to conform to them, is not only artificial, but impossible. Mr. Swainson is fully aware of this; for we find, in another work, that he gives vent to his feelings, and demonstrates to the world that he considers as impossible that very system he has spent, and is now spending, so much time and reflection in attempting to construct. We refer to page 200. of the volume on the classification of quadrupeds (vol. 72. of Lardner's *Cabinet Cyclopædia*); where, speaking of the Edentates, he says,—"A more convincing proof, indeed, cannot be adduced, to show the *utter impossibility of laying down rules, beforehand, for natural groups*, or for erecting a system upon any set of characters, when nature every where tells us, that her system is one of variation." Had the bitterest enemy, or the most zealous opponent, to the Quinary System sat down to pen a paragraph, or even chapter, against that system, we conceive it would almost be impossible for him to express an opinion more inverse to it than the author himself has in this brief though expressive sentence.

It might be thought sufficient by some, that, having shown, from the author's own words, the impossibility of his system succeeding, for us now to let the subject rest. It will, however, bring the Quinary System more under the consideration of our readers, if we review the *attempt* made for its formation, and the success which has attended it: we shall therefore proceed; and, in order to treat the subject as explicitly as possible, we shall consider the propositions in the order they stand, commencing with the two first: as they are so intimately connected, it will not be advisable to take them separately.

These propositions are, "that every natural series of beings, in its progress from a given point, either actually returns, or evinces a tendency to return, again to that point, thereby forming a circle;" and, secondly, that "the primary divisions of every group are three actually, or five apparently."

The meaning of the first proposition is so clear, that we need not dwell on it: that of the second, however, may not be comprehended by some; we shall therefore give the au-

thor's own words in explanation of it. "As it is manifest," says Mr. Swainson, "that every group, according to its magnitude, will exhibit more or less variety in its contents, the first question which suggests itself is, Are these varieties regulated by any definite number? and is that number so constant in all groups, as have been properly investigated, as to sanction the belief that it is universal? The answer is in the affirmative. Every group, whatever may be its rank, or value (that is, its size or denomination), contains, according to our theory, *three* other *primary* groups, whose affinities are also circular. One of these is called the *typical*, the other the *sub-typical*, and the third the *aberrant*, group. This latter is so much more diversified in its contents than the other two, that many naturalists reckon *five* groups in all; the number *five* being made out by dividing the aberrant group into *three*, instead of considering it as only *one*." (See *Geogr. and Classificat. of Animals*, par. 278. p. 226, 227.)

It will be evident to most of our readers, that this proposition is the most difficult (if there can be more difficulty in one than the rest, where there is an *impossibility* in all) to substantiate. Hence we find one naturalist, or rather *systematist* (the terms are far from being synonymous), publishing his belief that the "*natural*" number is three; a second, that it is four; a third, five; while a fourth feels certain that it is seven!

We have given Mr. Swainson's opinion above: it will now be proper to see in what manner he applies his theory, and the success he has met with in its application; that is, in attempting to perform, according to his own phraseology, an "*utter impossibility*."

He first, following Locke, divides every thing which the mind of man can conceive into *cogitative*, or *incogitative*, or, in other words, into *intelligent*, or *unintelligent*.

A deficiency of one division is here observable; that is, he has only two, while, according to his theory, he ought to have three (our readers must perfectly understand, that we consider it highly foolish attempting to arrange any thing metaphysical under any particular system). Mr. Swainson refers to this deficiency in a note on the same page, and actually, for this reason, doubts the correctness of the celebrated Locke's views. Just because those views do not conform to a fanciful system, *to rules laid down beforehand for natural groups*, they must be incorrect: he, however, is not able to discover a third division, and is therefore unwillingly obliged to conform to Locke.

Intelligent beings he divides into, first, God; second, spi-

ritual beings; third, man; and then very seriously gives as a proof that each of these forms a circle of itself, containing three smaller circles, *the Trinity of God ! ! !*

In reference to the minor circles contained in his *natural* group of spiritual beings, he quotes from *Coll.* i. 16., where St. Paul speaks of "principalities, powers, and rulers," which, he considers, is referable to the three minor circles in question ! !

Need the absurdity of this doctrine, I ask, be pointed out to the reading and intelligent community of Britain ?

Of unintelligent beings he can, in like manner conceive but of three sorts; namely, matter, time, space. Matter he can only divide into two kinds, ponderable, and imponderable. Time he considers as eternal, and divides it into *past*, *present*, and *future*. "The first and the last," says he, "are incalculable, for they are eternal; while the present is but as a connecting filament to each." Of space he remarks, "In like manner, may it be broken into infinite portions; but of its first great divisions we know nothing more than can be dimly gathered from certain passages in revelation."

The belief that space, or, in other words, *nothing*, is divisible into infinite portions, surprised us much: but that time is eternal; that the past and future, "*are incalculable, for they are eternal*," is an expression, which most certainly would have far better become the tongue of the infidel or the heathen, than have proceeded from the pen of a British author of the nineteenth century !

Bewsey House, Warrington, Nov. 7. 1835.

No. II.

In page 203. of his "*Treatise*," Mr. Swainson gives the circular disposition of the animal kingdom in a diagram, from Mr. M'Leay's *Horæ Entomologicæ*. We there find that his five circles consist of vertebrated (Vertebràta), molluscous (Mollúsca), acritous (A'crita), radiated (Radiàta), and annulose animals (Annulòsa), each forming a circle of themselves. But Mr. M'Leay found that these five circles would not "*blend into each other at their confines*," thereby forming a *natural progressive series*, without the intervention of five others, "much smaller, indeed, in their extent, but forming so many connecting, or osculant, circles;" thus making the number of circles ten. This Mr. Swainson is aware of; for on the same page he says, — "The number, therefore, as many erroneously suppose, is *not five, but ten*." Now, I would ask Mr. Swainson, or any of the supporters of this system, whether this is in

conformity to the rule given at p. 224., forming the second proposition; viz. that "the primary circular divisions of every group are *three* actually, or *five* apparently?" Or does it agree with any of the other groups which Mr. Swainson has with some difficulty defined? The answer must be in the negative; and we thus find that the very example to which Mr. Swainson, at p. 226. of his "*Treatise*," refers his readers, as proof of the validity of the first principles of his system, not only gives clear evidence against them, but at the same time manifests an entire absence of that *pervading uniform principle*, even in the primary arrangement of the animal kingdom, which Mr. Swainson, in most parts of his works, has so much enlarged upon.

The application of the first two propositions of the Quinary System, in the smaller divisions of the animal kingdom, now claims our consideration. Mr. Swainson divides the class Mammàlia into five orders; viz.: — Quadrùmana, Fèræ, *C*etàcea, Ungulàta, and *G*lìres. How these orders constitute a natural progressive series forming a circle, we are at a loss to determine. We are never informed through what medium *G*lìres and Quadrùmana "blend together at their confines." But, supposing this could be shown, the "*circle*" then would not be natural, in the *true* sense of the word.

The Linnæan method is universally acknowledged artificial. It was morally impossible, with the comparatively few materials which Linnæus possessed, for him to construct a natural system. Since his time a great advance has been made in natural history, and some thousands of species, entirely unknown to him, have been discovered. Hence new divisions, and new sub-divisions, have been required, and have therefore been formed: it is from this cause that many of his genera now constitute families, that many of his orders are now raised to the rank of classes, and so on. When Linnæus published his system, it was not advisable for him to make more divisions than was absolutely necessary. His system, for the age in which he lived, was sufficiently complicated: had it been more so, it would not have answered the purpose which he intended. No one, we are pretty sure, was more aware that the Linnæan arrangement was artificial than the learned author of it himself was. The end of Linnæus was answered; he put into the hands of the student a system which he could use; a system, actuated and led on by which, he might attain an eminent and useful knowledge of natural history. We can see no reason, however, for modern naturalists still pursuing and treading in the steps of Linnæus. His method was then an advantage; it would now be a disad-

vantage: it was then an impetus; it would now be a bane to the advance of natural history.

The principal fault, then, of the Linnæan classification, viewed in a modern light, consists in the paucity of divisions and subdivisions. Linnæus formed but six orders: he was therefore necessarily compelled to arrange under one order animals which have no true affinity to each other. Cuvier was aware of these anomalies: in his *Règne Animal*, therefore, he rectified them, as far as he was able, by constituting new orders, for the reception of such animals as were artificially joined with others in the Linnæan method, and for such as had been discovered since the time of Linnæus. Swainson, however, characterises all this great naturalist's endeavours as being preeminently unsuccessful; and, in order to improve *them*, we find in his own system only *five* orders, that being one less in number than Linnæus had. Mr. Swainson, therefore, instead of improving that author's method, has actually published a worse, and more artificial one, in which the laws of *natural affinity* (a subject on which he has written much, and should, therefore, understand) are broken in cases far too numerous to recount. In his first order (Quadrùmana), true quadrumanous animals are joined in close affinity with animals which are not only not quadrumanous, but are also what may be termed *flying animals*, being provided with wings: in the second (Fèræ), carnivorous, with animals subsisting entirely upon insects, and presenting reciprocal differences as great as those which separate rapacious from insessorial birds; and in the fourth (Ungulàta), semi-unguiculated animals, without incisor, and, in some cases, wholly destitute of any teeth, are united with animals possessing both teeth and true hoofs; provided, also, with the peculiar property of masticating their food a second time, by bringing it back into their mouths after it had passed the first deglutition! In one order we have the bulky elephant, and the graceful antelope; the awkwardly formed sloth, and the fleet reindeer; the massive, thick, heavy, short-legged *Hippopótamus*, and the tall, slender-made cameleopard; joined together with the bands of this *highly* "*natural*" arrangement!!

What is the cause of Mr. Swainson so transgressing the laws of natural affinity? Why has he not constructed more orders, and, by that means, produced a system more in accordance with nature? These are questions which might arise in the minds of some: as such, we will attempt to answer them.

We are all aware that no man can be perfect in this world. How numerous his talents; how extensive his learning; how

capacious his mind; he is but a man, and must bow to the imperfection of which all mankind are participants. Nay, we may often observe, that our wisest and most learned men are, as it were, blinded by their own learning, and "*common sense*" is too *common* to have a place in their minds; especially when advocating a theory which, whether right or otherwise, they have determined to establish; a theory which, perhaps, *common sense* might be fatal to. The Quinary System is the favourite theory of Mr. Swainson: he has, although, as we are led to suppose from his own words, contrary to the dictates of *his* common sense, *laid down rules beforehand for natural groups;* and, as those rules constitute the principal part of a theory which he appears determined to establish, he attempts to compel nature to bend to them; and, in so doing, he breaks her laws, and bids defiance to the requirements of natural affinity. It would indeed be an endless task to recount the numerous instances in which this is observable. To how many tribes, families, sub-families, and genera are the remarks we have made with respect to the orders applicable!

But this is not the only manner in which Mr. Swainson, by forcing the application of his two primary propositions, has broken the laws of natural affinity. Some groups do not admit of division; the animals which compose them are so united by affinity, that we at once perceive that they are intended by nature to constitute but one family, or genus. This, however, will not do for Mr. Swainson's theory: he must have five divisions to every group, or they will not conform to his rules, or (to use his own words) "*be natural.*" He therefore separates animals which are evidently approximate; he divides into *five* what, following nature, ought only to be *one*.

In some cases, however, circumstances will not admit of this; either on account of the paucity of the species which compose the group, or from the total absence of any grounds on which, with the slightest show of sense, he could construct any separation. From the same causes, also, Mr. Swainson is not able to define the circular series of all such groups. A person might be led to suppose that Mr. Swainson would either acknowledge these to be artificial according to his theory, or give up the system at once, as being one which cannot be substantiated. He would be strengthened in his supposition by the author's remarks, which are given at p. 340. of his *Treatise*: — "Natural groups," says he, "are thus to be detected by three different tests: 1. By their simple series of circular affinity; 2. By the theory of analogy; and, 3. By the theory of variation. No group which will not bear

these tests can be natural." This supposition, although drawn from these, the author's own words, and from his opinion expressed at other times, is denied by his practice, and, indeed, by the sentiments which, however inconsistent and conflicting, he has expressed in other parts of his volume, when applying his theory. If a group of animals does not, nor cannot be made to, consist of five other divisions, forming a circle, Mr. Swainson expresses his opinion, that either some animals belonging to the group have yet to be discovered, or, having existed, are at present extinct: and, because he fancies that the group *evinces a disposition* to form a complete circle, he *presumes* it to be "*natural*"!!

In the volume on the classification of quadrupeds, there are a few diagrams given of circular groups, the majority of which are imperfect, but, for the reasons adduced above, are *presumed* to be "natural."

In this manner proceeds our quinary author, and in this manner does he destroy both the validity of his first principles, and the uniformity of his plan; thus, being so accustomed to break the laws of nature, he has no uncomfortable feeling, when, not exactly *breaking* (that would be too openly inconsistent), but, what is almost as bad, *evading*, his own!

He would not do this, if it were possible for him to do otherwise; he would not, in their application, evade his own laws, if that application was not an "*utter impossibility*." What were Mr. Swainson's reasons for choosing five to be his all-predominant and universal number, we cannot conceive. His opinion could not well be drawn from the results of his investigation and labours; for, on examining his work on quadrupeds, we find that but one tenth of the groups which ought to consist, according to his theory, of five other circular divisions, exhibit this peculiarity; and of this one tenth one half are *compelled* to be such, and are, therefore, artificial, in the *true* sense of the word: it is very obvious, that the remainder may consist of five sub-groups, merely by chance, affording no proof whatever of that number being universal.

Bewsey House, near Warrington, Jan. 1836.

(*To be continued.*)

ART. IV. *Remarks on the Question of the Propriety of altering established Scientific Names in Natural History, should they be erroneous.* By C. T. WOOD, Esq.

NOTWITHSTANDING the advanced state of ornithology, there is yet considerable diversity of opinion, even among

ornithologists of high scientific repute, as to the question now under consideration. That any difference of opinion could ever have existed, is to me a matter of no small surprise; a surprise which is by no means diminished on considering the importance of the subject. The only rational ground on which a dislike of change can be founded is, the indiscretion which would be likely to be manifested by those who should take on themselves to alter established names: many of these alterations would, probably, be not for the better, and many for the worse. But it would not be very reasonable to eschew change altogether, because changes for the worse *might* be made. If this principle were carried throughout, we should have no improvements at all, because there is no human improvement but what brings some admixture of evil. These remarks have been suggested by a paper on nomenclature (VIII. 36—40.), in which Mr. Strickland gives the world the benefit of his thoughts on the subject. Let us examine this paper, and probe the assertions therein broached, to see "what stuff they are made of."

Mr. Strickland begins by pronouncing "the custom which seems to be daily gaining ground, of altering established generic and specific names of natural objects, without any sufficient reason for so doing," to be "highly detrimental to the progress of natural history." Now, I think this to be a proposition from which no well-wisher of natural history can dissent; and no one will agree to it more cordially than I do. But then the question arises, What is "a sufficient reason" for a change? According to Mr. Strickland, there is, apparently, *no* reason of sufficient importance to warrant an alteration, except when a bird is removed from one genus to another. It appears to me, that no one, who has impartially considered the question, can hold an opinion so inimical to the interests of science: all such persons will see that *some* change is necessary, though there may be difference of opinion as to the extent to which it is advisable to carry the reform. I shall, in another part, discuss the circumstances under which alteration is allowable, and shall now proceed in the examination of Mr. Strickland's arguments.

After many preliminaries about the "specific character," and the "description," which have nothing to do with the question in hand, Mr. Strickland comes to the point. "The object of the specific name," says he, "is precisely the same as that of all names whatever; which have been defined to be, 'arbitrary signs, adopted to represent real things or conceptions.'" This is an excellent definition of ordinary names and proper names, but utterly inapplicable in regard to scien-

tific nomenclature. No one contends, as Mr. Strickland seems to imagine is done, that the specific name should convey the whole specific character of the bird, but simply that it should be derived from some striking peculiarity connected with the bird. Thus, what a much more lively impression of the birds do the following specific names convey, than if they were the unmeaning terms for which Mr. Strickland argues: *whiteheaded* abern (Nèophron alpìnus), *forktailed* petrel (Thalassídroma furcàta), *rosecoloured* amzel (Pástor ròseus), *yellowbill* ouzel (*M*érula vulgàris), &c. Or, again, we may with equal advantage take the specific name from the *haunts* of the birds; as, house sparrow (*P*ásser domésticus), garden fauvet (*F*icédula horténsis), sedge reedling (Salicària phragmìtis), pine crossbill (Cruciróstra pinetòrum), alder goldwing (*C*arduèlis *S*pìnus), &c. An equally expressive and unobjectionable kind of specific name, is that derived from the *food*; as thistle goldwing (*C*arduèlis élegans), haw grosbeak (*C*occothraústes cratæ gus), furze whinling (Melizóphilus provinciàlis), honey pern (*P*érnis *a*pívorus), pippin crossbill (Cruciróstra màlum), &c. Or the specific name may be derived from the *voice*; as melodious warbler (Sílvia melòdia), garrulous fauvet (*F*icédula gárrula), sibilous brakehopper (Locustélla síbilans), ringing longtail (Afédula sònans).* I have been thus particular in giving instances, in order to illustrate the only four kinds of specific names which I think to be admissible in ornithology.

Nor am I alone in my opinion concerning specific names. Mr. Strickland is the first writer with whom I am acquainted who maintains it to be non-essential that specific names should have a meaning. Wilson's opinion entirely coincides with my own: he says, "Specific names, to be perfect, ought to express some peculiarity common to no other of the genus; and should, at least, be consistent with truth." This "prince of ornithologists," as he has well been called, likewise maintains, that specific names which do not answer to this description not only *may*, but *should*, be altered; I contend for no more. Another writer says, "It should be the aim of every nomenclator to bestow only such names upon animals as will express the peculiar forms, habits, &c., of the species to which they apply; but if, they fail in this particular, scientific names

* This is the longtailed tit of old authors (Pàrus caudàtus of Aldrovand). This bird, as well as the bearded tit (Pàrus biármicus of *Lin.*), should no longer be retained in the genus tit. The latter is very properly called the bearded pinnoc (Calamóphilus biármicus) by modern authors All the birds in the genus tit build in holes, which the longtail (Afédula) and the pinnoc (Calamóphilus) do not.

are but of little worth." This is the conclusion to which every impartial investigator of the subject must inevitably arrive.

Mr. Strickland continues: "Hence the use of names is, in fact, nothing more than a kind of *memoria technica* (artificial memory); by means of which, in writing or speaking, the idea of an object is suggested, without the inconvenience of a lengthened description." No one doubts this; and it is in order that specific names may answer this purpose the more completely that naturalists usually aim at giving appropriate appellations to natural objects. A correspondent of this Magazine well remarks, "Even the learned are often obliged to turn to their lexicons, and after all, perhaps, to remain in doubt, if not in ignorance, as to the signification in particular instances. The task of committing to memory a long list of hard names is much diminished, and becomes, indeed, a pleasurable occupation, when their meaning is known, and the propriety of their application apparent." (IV. 471.) Mr. Devaston, likewise, who declares himself decidedly averse to change, adopts for the pied flycatcher the name bestowed on it by Temminck, Muscícapa luctuòsa, instead of that of Linnæus, M. atricapílla; giving as his reason, that the former is more appropriate. (V. 83.) It argues but a small developement of causality to adopt a name because it has been given by a great naturalist, and without enquiring into the applicability: the phrenologist will refer this to misdirected veneration and imitation. However Mr. Strickland may argue for mere *sound*, he will never persuade reasoning beings to disregard the *sense*.

Mr. Strickland continues: "It is remarkable that Linnæus was the first to distinguish each species of natural object by a peculiar appellation. Before his time, naturalists were obliged to resort to the singularly inconvenient method of repeating the specific character every time that they wished to designate any species." Linnæus was the first to carry the binary system *throughout* nature; but it is not correct to say, that he was the first to adopt this method, or that naturalists were "obliged to repeat the specific character every time they wished to designate any species." Willughby (who, according to Swainson, "was the most accomplished zoologist of this or any other country") has frequently given a generic and specific name to birds, many of which have been falsely ascribed to Linnæus and other authors; as *A*quila marina (common ospray), Fálco lapidàrius (merlin, or stone falcon), *S*trix cinèrea (gray owl), *P*ica glandària (common jay), *M*érula aquática (common dipper), *P*érdix cinèrea (common partridge), *M*otacílla álba (pied wagtail), *A*nser *Bassànus* (solan gannet), &c. Several

of the names of Willughby are even superior to those of Linnæus; as *F*ringílla montàna for the mountain finch; which is far preferable to the awkward name *F*ringílla montifringílla, given by the Scandinavian naturalist. Returning from this short, but necessary, digression, I shall proceed in my examination of the paper under consideration.

The whole of the paragraph in page 38. is founded on the erroneous notion that, if specific names have any meaning, that meaning must convey the whole specific description. No one ever maintained this; and thus Mr. Strickland may refute it without much fear of contradiction. We shall therefore enter on the next paragraph. Mr. Strickland says, —"In addition to the arguments above stated, there are several other strong objections to the arbitrary and unlicensed alteration of established names." What, in the name of common sense, can be the use of devoting pen and ink to refuting opinions which were never held, much less defended? Mr. Strickland might as well fight his own shadow. It having been previously shown, both by argument and authority, that specific names should not only have a meaning, but also a meaning agreeable to truth, those specific names which do not answer to this description should not be suffered to stain the catalogues of the scientific; and, that my meaning may be the better understood, I shall give examples of objectionable specific names, as I have previously of desirable appellations: 1st, from the commonness of a species; as common crossbill (Cruciróstra vulgàris *Stev.*), common coalhood (*P*yrrhùla vulgàris *Tem.*): 2dly, from the size; as great snipe (*S*cólopax màjor), little grebe (P*ó*diceps mìnor), greatest toadeater (*B*ùbo máximus): 3dly, from the name of a place or country; as Dartford whinling (Melizóphilus dartfordiénsis), Bohemian waxwing (Bombycílla bohémica), European dipper (*C*ínclus europæ us): 4thly, from the names of persons; as Richard's lavroc (*C*orydálla Richárd*i* Vieil.), Tengmalm's nightling (*N*óctua Tengmálm*i* Selby.). The objection to the first is obvious: a bird which is common in one country, is very rare, or not to be found, in another; and this difference occurs not only in countries, but also in counties and districts. The objection to the second mode is, that it is very probable that species yet larger, or smaller, than those to which these epithets are applied may be discovered; in which case, it is no longer applicable: this frequently happens. Thirdly, the name of a country can never, with propriety, be affixed to a species, unless this is the only species found in that country, and unless it is confined exclusively to that country. It is thus evident that it can never be adopted. The red ptarmigan (*L*agòpus británnicus) is, I

believe, found only in Britain; but then other species in the same genus are found in that island; and thus the epithets "British," and "británnicus," to which it would otherwise be entitled, are not admissible. Fourthly, naming after persons is so very absurd and unscientific, that it cannot be too strongly condemned. Several naturalists have spoken of it as so pernicious a system deserves; and the only end which can be sought by this unscientific mode must be to gratify a paltry vanity, or to aim at that celebrity which could not be obtained by fair means.

If I am right in considering these specific names to be objectionable, as regarding the progress of the student, and, consequently, of science, it is plainly not only allowable, but desirable and necessary, that they should be altered whereever and whenever they occur. And on this ground it is that I have altered the name of the hedge coalhood (vulgarly, alp, bullfinch, tonihoop, &c.), from *P*yrrhùla vulgàris, to *P*yrrhùla modulàris. (See *The Analyst*, Nos. xi. and xiii.) The epithet vulgàris does not answer to Wilson's excellent definition of a specific name, which modulàris does. I am not aware of any other species, of coalhood to which this epithet would apply; and, even if there is, still it will remain equally applicable to the present species, which vulgàris will not. The *P*yrrhùla enucleàtor of Temminck obviously does not belong to the genus coalhood (*P*yrrhùla): the name proposed (VII. 594.) may therefore be adopted; namely, pine thickbill (Densiróstra enucleàtor). It is the *durbec des pins* of the French. I think it highly probable that, on close investigation, it will be found that there is but one known species of coalhood, though Linnæan authors have reckoned many.

Several writers (and among them I am sorry to find Mr. Westwood, who is worthy of a better cause) have condemned change altogether: but these worthy scribes, by grasping at too much, lose all. Naturalists who have considered the subject impartially, seeing the utter absurdity of such a position without investigating the question deeply, think they may disregard it altogether, and thus make unwarrantable alterations; whereas, had the anti-reformers been more reasonable in their demands, the probability is, that their wishes would have been gratified. Some change *will* take place; and, therefore, if, instead of exposing their ignorance and their folly by attempting to stop what no power on earth can stop, Mr. Strickland and Co. were to exert themselves to modify and direct this necessary change, they would be employing their time usefully, and would gain their point. Thus, if naturalists were to unite their voices with Wilson's in saying, "Specific names must in all

cases be consistent with truth," nomenclators would be more careful in bestowing names; and thus the need of change would at once be greatly diminished.

It should next be agreed, that not only must the name be consistent with truth, but that it must not be founded on a generic character: this necessary rule would exclude such names as Lóxia curviróstra, *C*inclus aquáticus, Nucífraga caryocatáctes, *A*quila *C*hrysäetos, &c. These two rules are, I think, amply sufficient; and, surely, they are simple enough. It is against those who should attempt to alter names which will stand the test of these two rules that merited indignation should be directed; not against those who would make beneficial changes. I will give a few examples of what I mean. The golden eagle was called by Willughly *A*quila aúrea; a name to which no one can reasonably object. But this bird might with equal propriety be called *A*quila fúlva: but he who should endeavour to make such a change should be branded as a retarder of science, equally with the non-reformers. In the same way, the black cormorant may with equal propriety be called Cormoránus Cárbo, and Cormoránus cristátus; but the former having the claim of priority, no one has a right to change it, there being no objection to the name. But now we will suppose another case: Linnæus called the pied wagtail *M*otacílla álba; Rennie has named it *M.* lòtor; and another, yet more recently, *M.* maculòsa. I should here decidedly say, that the first, although having the claim of authority and priority, ought to give way to the third; which, being consistent with truth, and not being founded on a generic character, *no one has a right to alter*. *M.* lòtor is consistent with truth; but then it is founded on a generic character; for it is applicable to all the species in the genus wagtail, as now restricted. I may here remark, that the yellow wagtail has been separated from the genus under the name of spring oatear (Bùdytes flàva *Cuv.*). So much for specific names.

Near Derby.

(*To be continued.*)

ART. V. *Illustrations in British Zoology.* By GEORGE JOHNSTON, M.D., Fellow of the Royal College of Surgeons of Edinburgh.

ASTE'RIAS RU'BENS. (*fig.* 20.)

Synonymes. — *A*stèrias rùbens *Lin.*, Syst., 1099; Mull. Zool. Dan. Prod., 234.; Fab. Faun. Grœnl., 367.; Turt. Gmel., iv. 130.; Lam. Anim. s. Vert., ii. 562.; Turt. Brit. Faun., 139.; Flem. Brit. Anim., 486.—

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A. hispida? *Pen.*, Brit. Zool., iv. 128. pl. 32. fig. 2. *A.* spinòsa? *Pen.*, Brit. Zool., iv. 129; Turt., Brit. Faun., 139; Flem., Brit. Anim., 487—? Borl., Cornw., 259. tab. 25. fig. 18.

Of the star-fishes found in Berwick Bay, this is the least attractive; but a preference has been given to it in these illustrations because of some obscurity which hangs over its nomenclature: for I can scarcely reconcile the descriptions of authors with the animal before me; and the figures of Pennant and Borlase tend rather to bewilder the enquirer than to guide him to a safe conclusion. They are very different from one another; and yet there is something which leads me to guess that they are intended to represent the same object, unless, indeed, the figure of the Cornish historian may not be referable to some variety of the Ophiùra Rósula!

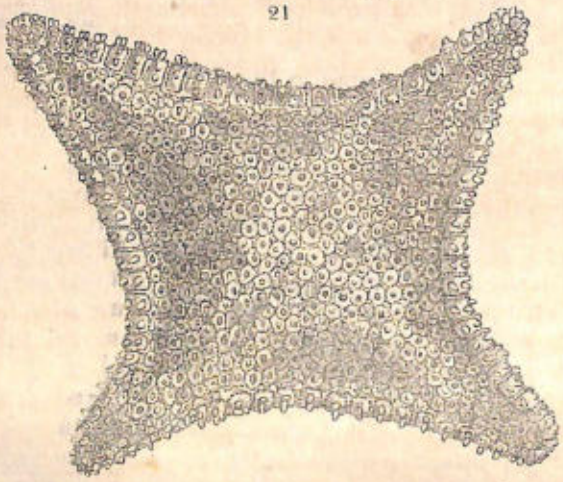
Astèrias rùbens, or the species here exhibited, is not very common on this coast, and is always an inhabitant of the deep sea, from which it is occasionally drawn by the lines of our fishermen. It reaches a size superior to any other species, the extreme diameter being sometimes more than 20 inches, and the rays, at their insertion, as thick as a child's wrist. It is so remarkably brittle, that it is rare to obtain a perfect specimen, and impossible to preserve it so; for, whether handled or not, killed quickly or allowed to die slowly, the arms break

asunder in one or more pieces, and separate from the body with a facility which is truly wonderful, and only rivalled by some of the allied Ophiùræ. The body is stellate, and of a brownish or reddish orange colour; the back flattened and rather smooth; but, when viewed with a magnifier, appears roughened with small tubercles, very closely set and irregularly arranged, except at the margins, where they are somewhat larger, and disposed in lines: these tubercles consist each of a short thick stalk, crowned with a circle of papillæ, which can be expanded or closed at the pleasure of the animal: rays 5 or 7, thrice the length of the diameter of the disk, flattened, linear-lanceolate, armed beneath with strong conical smooth spines placed on a transverse rib, and one half the breadth of the ray: under surface straw-coloured: tentacular avenues wide, the tentacula biserial only, and long. In a large specimen, the diameter of the disk was 2 in.; length of each ray 9 in., and its greatest breadth $1\frac{1}{2}$ in.

Our figure, which is considerably reduced, was drawn from an individual that had seven rays. One of the rays, it will be observed, has been broken short, and is in the act of reproducing the lost portion. Three spines of the natural size are shown at *a*.

ASTE'RIAS JO'HNSTONI. (*fig.* 21.)

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Description.—Body square; sinuated between the angles, of which two are somewhat more produced than the others; flat, rough with papillary warts and miliary granules, the latter encircling the dilated smooth base of the obtuse papillæ; these granules and warts cover the surface, but in the centre of a ring of granules there are frequent small apertures protected

by a pair of roundish scales, which open and shut at the will of the animal: operculum lateral, slightly convex, deeply grooved, the grooves branched: margin obtuse, thick, protected with a double series of large square plates studded with from two to four papillæ, and each of them surrounded with a series of granules: the ventral surface is divided into four triangular spaces by the tentacular avenues, which are fringed on each side with a double series of smooth, blunt, short, and slightly compressed processes, or spines: the triangular spaces are very rough, with enlarged granules and valvular openings, but there are no dilated bases for papillæ, and the valvular apertures are arranged in rows; in the centre of each of the compartments there is a large irregular opening. When fresh, the colour is a bright red or scarlet; but, on keeping, the colour fades to a faint and dirty brownish yellow. The figure represents it about one half the natural size.

I procured this beautiful and rare species from the coast of Caithness. Mr. J. E. Gray, who has examined the specimen figured, tells me that it is quite distinct from the true *Astèrias equéstris*; and he has, in consequence, assigned to it the specific name which is here adopted. I am, nevertheless, convinced that the species is identical with the *A. equéstris* of British authors; and, if this is a correct opinion, then the discovery of it, as a native animal, is due to the late Mr. Brodie of Brodie, who found it in the Murray Frith, and sent a spemen to Sowerby, in whose *British Miscellany* it is figured. My much esteemed friend Dr. Patrick Neill subsequently met with this star-fish in the Frith of Forth; as yet the most southern locality; though I doubt not, now that our naturalists are alive and active in their pursuits, it may, ere long, be added to the English fauna. — *Berwick upon Tweed, Jan.* 18.

ART. VI. *Abstract of a Paper on Irish A'lgæ, read before the Natural History Society of Belfast on January* 20. 1836.* By WM. THOMPSON, Esq., Vice-President.

THE following notes have originated from some attention bestowed on *A'lgæ* during a few weeks of last autumn which I

* Since this was written I have, on enquiry from Mr. J. T. Mackay (who possesses the very latest information on Irish botany, and whose *Flora Hibernica*, I am happy to say, is now in the press), learned, by a letter dated January 16. 1836, that several of the species here mentioned were previously found, though not yet published, by Mr. David Moore, on the coast of Londonderry, which county he was lately employed by government to botanise: a pleasing duty, that was performed by him with remarkable success. These species are marked thus *.

spent at Bangor, on the coast of Down. To Miss Ball, of Youghal, I am indebted for such species as she has added to our flora since the departure, about the end of last summer, of William Henry Harvey, Esq. for the Cape of Good Hope, to which time he had, as far as in his power, completed the history of Irish *A'*lgæ: in every instance these species were determined by Miss Ball previous to their being forwarded. Dr. J. L. Drummond's fine collection was likewise most kindly made available to me at all times; and it will be perceived that from it considerable information has been gleaned.

Species new to Ireland.

Asperocóccus ? pusíllus Hook. Brit. Fl., ii. 277. Collected by Miss Ball, at Ballycotton (co. of Cork), in August, 1835. In September, I found it growing in the rock-pools at Bangor. In both places it was parasitic only on Chórda filum, as originally described.

Dictyòta atomària Grev. Algæ Brit., p. 58. *U*lva atomària Eng. Bot., t. 419. Fine specimens, of the extreme size described by Dr. Greville, were gathered by Miss Ball, at Ballycotton, in August, 1835.

*Laurénc*ia *tenuíssima* Grev.; *F*ùcus tenuíssimus *Eng. Bot.*, t. 1882. A single specimen was obtained near Youghal (co. of Cork), in autumn, 1835, by Miss Ball.

Gigártina erécta Hook.; Gracilària erécta *Grev. Algæ Brit.*, p. 124. t. 14. By minutely examining the vegetation of the rock-pools about Bangor at low water, when the sun shone brightly upon them, I procured a few specimens in autumn, 1835.

Gigártina pistillàta Lamour.; *F*ùcus Gigártinus *Eng. Bot.*, t. 908. A single specimen, in fruit, occurred to me at Bangor in September, 1835: so characteristic is the figure in *English Botany*, that, from recollection of it alone, I was enabled to distinguish its species as it lay upon the beach. On looking back to some *A'*lgæ collected by Mr. Hyndman and myself at the same place in the previous month of March, I found another specimen, likewise in fruit.

* *Chóndrus Brodiæ*`*i Grev.*; *F*ùcus Brodiæ`*i* Eng. Bot., t. 1966. I gathered several specimens, in fructification, near Bangor, after a severe storm from the north-west, in October, 1835.

Sphacelària filícina Ag.; S. *h*ypnòides *Grev. Crypt. Fl.*, t. 348. Of this singularly beautiful species a specimen occurred to Mr. Hyndman and myself, in March 1835, near Bangor.

Polysiphònia violàcea Grev.; Hutchíns*ia* violàcea *Lyng?* Specimens gathered by Dr. Drummond, in June, 1834, at Bangor, have been named as above by Dr. Greville.

Callithámnion Bórreri Ag.?; Conférva Bórreri Eng. Bot., t. 1741.? A single specimen, apparently of this rare species, as figured and described in *English Botany*, but wanting the filaments there represented, I collected at Bangor in September, 1835.

Mesogloía purpùrea Harvey in Brit. Fl., ii. 386. Found growing on the rocks at the island of Ireland's Eye (north of Dublin Bay), by Robert Ball, Esq., during an excursion we had thither in April, 1835.

Species new to the North, or hitherto unnoticed as occurring North of the County of Clare, on the Western, and of the County of Dublin, on the Eastern, Side of Ireland.

Cystoseíra granulàta Grev. Algæ Brit., p. 5. t. 2. In the collection of Dr. Drummond, to whom the species has long been known, from his having on several occasions gathered it at Larne (co. of Antrim). According to Dr. Drummond, it attains a much greater size there than commonly described.

Desmaréstia ligulàta Lamour., *Grev. Algæ Brit.*, p. 37. t. 5. A few specimens have been collected by Dr. Drummond at Bangor, where it occurred to me not uncommonly in September and October, 1835: one specimen then obtained measured, though imperfect, 10½ ft. in length.

* *Sporóchnus pedunculàtus* Ag., *Grev. Algæ Brit.*, p. 41. t. 6. A single specimen occurred to me at Bangor in October, 1835. Owing, probably, to the lateness of the season, very few of the receptacles exhibited any appearance of the green tuft of filaments which commonly terminate them.

Sporóchnus rhizòdes Ag., *Grev. Algæ Brit.*, 43. t. 6., was, during a few days in October, 1835, washed ashore in considerable plenty at Bangor.

Rhodomènia renifórmis Hook.; *Fùcus* renifórmis *Eng. Bot.*, t. 2116. A single specimen has occurred to Dr. Drummond at Larne. In the summer of 1833, several specimens in my collection were obtained at Carnlough Bay, near Glenarm, by Miss Davison.

Rhodómela subfúsca Ag.; *Fùcus* subfúscus *Eng. Bot.*, t. 1164. Procured at Bangor in autumn, 1835.

Halymènia furcellàta Ag.; *Ulva* furcellàta *Eng. Bot.*, t. 1881. Two specimens in my possession were collected by Miss Davison, at Carnlough Bay, in the summer of 1833.

* *Enteremórpha ramulòsa* Hook.; *Ulva* ramulòsa *Eng. Bot.*, t. 2137.; I obtained in October, 1835, near Bangor, where it grows on the perpendicular sides of rocks, in company with var. β. of Ptilòta plumòsa.

* *Bryópsis plumòsa* Ag., *Grev. Algæ Brit.*, p. 187. t. 19. A

single specimen, growing on Corállina officinàlis, occurred at Bangor in September, 1835.

* *Polysiphònia fruticulòsa* Grev.; *Fùcus* fruticulòsus *Eng. Bot.*, t. 1686. Found growing in the rock-pools at Bangor in October, 1835.

Polysiphònia Brodiæi Grev.; *Conférva* Brodiæ*i* Eng. Bot., t. 2589. Bangor, May, 1831. Dr. Drummond.

Polysiphònia stricta Grev.; *Conférva* stricta *Dillw. Conf.*, t. 40. Belfast Bay, July, 1824. Dr. Drummond.

Polysiphònia parasítica Grev.; *Conférva* parasítica *Eng. Bot.*, t. 1429. In the same manner that Gigártina erécta was procured, I obtained specimens of P. parasítica growing upon various *Algæ* in the rock-pools at Bangor in October, 1835: in Strangford Lough, also, it has occurred to me.

Griffithsia multífida Ag.; *Conférva* multífida *Eng. Bot.*, t. 1816. A single specimen was found by me at Bangor, in October, 1835.

* *Callithámnion Plùmula* Lyng.; *Conférva* Túrner*i* Eng. Bot., t. 1637. Thrown ashore in great abundance on the low oozy part (and there only) of Belfast Bay, about Holywood, in September and October, 1835. Dr. Drummond and W. Thompson.

Callithámnion Túrneri Ag.; *Conférva* Túrner*i* Eng. Bot., t. 2339. Larne? Dr. Drummond. Bangor, W. T.

Callithámnion tetragònum Ag.; *Conférva* tetragòna *Eng. Bot.*, t. 1690.; on two occasions has been received by Dr. Drummond from Bangor; occurred to me there not uncommonly in October, 1835.

Callithámnion pedicellàtum Ag.; *Conférva* pedicellàta *Eng. Bot.*, t. 1817. A few specimens were gathered at Bangor in October, 1835.

Conférva intricàta Grev. Fl. Edin., p. 315. Observed by Dr. Drummond as commonly investing Sphacelària cirrhòsa in Belfast Bay in September, 1835. See Harvey in *Brit. Fl.* (p. 352.), on *C.* impléxa.

Conférva pellùcida Huds. Eng. Bot., t. 1716. Once found near Larne by Dr. Drummond. Grows sparingly in the rock-pools at Bangor, but was cast ashore plentifully during October, 1835.

Mesoglòia viréscens Carm. Brit. Fl., p. 387. A single specimen has been obtained at Larne by Dr. Drummond.

Species generally rare, or otherwise worthy of notice.

Cutlèria multífida Grev. Algæ Brit., p. 60. t. 10. Specimens varying exceedingly in form were collected by Miss Ball at Ballycotton in August, 1835.

Delesséria Hypoglóssum Ag., *Grev. Algæ Brit.*, p. 75. t. 12. Dr. Greville remarks of this species, "In Britain, its full length is about 3 in.; but a specimen in my possession, gathered by Miss Hutchins in Ireland, measures about 8 in." A specimen obtained by Dr. Drummond at Larne, in June, 1835, measures 19½ in. in length; and many more, collected at the same time, are in size very little inferior to it.

Rhodomènia sobolífera Grev.; *Fùcus* sobolíferus *Eng. Bot.*, t. 2133. Obtained in different parts of Strangford Lough, by Mr. Hyndman and myself, in 1834 and 1835: some of the specimens exceeded 7 in. in length.

Rhodómela lycopodiöides Ag.; *Fùcus* lycopodiöides *Eng. Bot.*, t. 1163. Not of uncommon occurrence on the stems of Laminària sacchárina at Bangor, in October, 1835.

Còdium tomentòsum Stackh., *Grev., Algæ Brit.*, p. 185. t. 19., has been found at Larne, occasionally, during winter, by Dr. Drummond, but not of late years.

Donegal Square, Belfast, Jan. 27. 1836.

ART. VII. *Evidence in Argument that Remains of Mástodon gigantèus and Mástodon látidens have been found in the Tertiary Beds of Norfolk.* By SAMUEL WOODWARD, Esq.

SOME doubts having been expressed by Mr. Bakewell, in 37—42., as to the existence of the remains of mastodon in the tertiary beds of Norfolk, I beg permission to lay before your readers a few brief remarks on the subject.

The distinctive characters of the grinders of the elephant and mastodon are so decided, that it is scarcely possible to mistake the one for the other. The enamel of the former is disposed in pairs transversely, to the number of about ten, surrounded and held together by what Parkinson terms the *crusta petrosa*. Now, the enamel of the grinder of the mastodon is all external; whilst the *crusta petrosa*, or a substance resembling it, is internal. * I saw a tooth of the elephant, the other day, in the collection of the Rev. William Foulger,

* Since the above was written, I have read Mr. Clift's remarks on the fossil remains from Ava, published in the *Geological Transactions*, 2d series, vol. ii. Speaking, in p. 373., of the tooth of M. elephantöides, and its near approximation to those of the elephant, he proceeds to say, "It is not impossible that there may yet be a link wanting, which might be supplied by an animal having a tooth composed of a greater number of denticules, increasing in depth, and having the rudiments of *crusta petrosa*, that necessary ingredient in the tooth of the elephant (for it is the animal mortar, as it were, by which the plates, or denticules, are cemented together), the entire absence of which distinguishes the tooth of the mastodon."

which I remember having had offered me by some fishermen at Bacton, on our coast, in 1824; and, but for their cupidity, I should have possessed it. This singular specimen, from the decomposition of the *crusta petrosa* of the posterior end, exhibits the upper part of two plates, terminating in points, which may be closely represented by placing the palms of the hands together, dropping one hand a little, and keeping the ends of the fingers a trifle apart. Specimens approximating this are not uncommon. Parkinson mentions one, in his possession, resembling the paw of a bear. I have one in which the protrusion of the points gives it a similar appearance; but, among all the specimens of the grinders of the elephant from our coast, I have not seen any thing like the mammillated processes of the tooth of the mastodon [*mastos*, a teat; *odous, odontos*, a tooth; *figs.* 22, and 23.] associated with the plates of that of the elephant: another criterion is, that these points are in rows, whilst the mammæ of the teeth of the mastodon (with the exception, I believe, of M. *elephantöides*) are irregular.



These remains appear to be of two species, Mástodon gigantèus and látidens.

M. gigantèus (Parkinson's Organic Remains, vol. iii. tab. i.). The large grinder figured by Smith, in his *Strata Identified*, was reported to have been found at Whitlingham, near Norwich; and, when at Scarborough, last summer, I put the question to him, and he assured me that it was so found. I believe that the fragment of a grinder which I found, some years since, at Bramerton, also belongs to the same species; as does that of the Rev. William Foulger, found at the same place. When I found my fragment, I think the whole tooth must have been there; as it was with a large mass of brown decomposing matter, the firmer parts of which I placed in my basket for further examination.

M. látidens (Geological Trans., second series, vol. ii. tab. 36. to 39.). The figures No. 22. *a.* and *b.* are of the fragment of a grinder: the figures are of one fourth of the diameter of the original, and represent a front view and a side one: found at Horstead, in this county (Norfolk), about six miles north-east of Norwich; which, on comparison with those of that species from Ava, in the collection of the Geological Society, will be found to agree pretty well. This interesting specimen

was first in the possession of the Rev. James Layton of Cutfield, and afterwards of Dawson Turner, Esq., of Yarmouth, who has for some time past missed it from his collection. The sketch which I have given was taken whilst it was in that gentleman's possession. Mr. Layton, in a communication to Mr. Fairholme, published in his *Geology of Scripture*, p. 281., says, "In 1820, an entire skeleton of the great mastodon was found at Horstead, near Norwich, lying on its side, stretched out between the chalk and the gravel. A grinder was brought to me (it is still in the possession of Dawson Turner, Esq., of Yarmouth); but so long after it was discovered, that scarcely any other part of the animal could be preserved. The whole had been carried away with the chalk, and burnt for lime, or spread in minute fragments over the fields." And in p. 370., "Your doubt, as to the great mastodon being found in Norfolk, came not at all unexpected: I should have doubted it myself under almost any other circumstances: as it is, I feel sure and certain of the fact. I lived at Catfield, in Norfolk, six miles from Hasborough, and about as far from Horstead. From this latter place marl is carried to all the villages in the neighbourhood, to be spread upon the land. A boatman, who was in the habit of bringing me fossils, brought a grinder of this mastodon as a curiosity, saying it had been found in the marl, and given to him by the head pitman. It was the posterior portion of the grinder of the great mastodon (I am certain of the fact), containing, as far as I recollect, eight points, none of which had been cut or brought into use. On the first opportunity I went to make enquiry about it at the chalk-pit. The pitman pointed out to me the place where it was found, and said that the whole animal was, as it were, lying on its side, stretched out on the surface of the marl. He described it as being very soft, and that a great part of it would at first spread like butter; the whole, however, had been thrown down along with the marl, and carried away. He said he had looked upon it as very curious indeed, but of no use; and he had kept that piece of the tooth merely by accident. He afterwards found another fragment or two of the bones in his garden, where he had thrown them, and he sent them to me. They are now in my possession; but I am not able to identify them with the mastodon, as distinguished from the mammoth or elephant. The grinder I sent to Dawson Turner, Esq., of Great Yarmouth, who, probably, has it now."

The fragment figured No. 23. *a.* and *b.*, which represent a side view, and a front one, reduced to one fourth of the diameter of the original, belongs, I conceive, to a young in-

dividual of the same species. It was found at Bramerton Cliff, associated with the cray shells, by Captain Alexander (now of Yarmouth), and presented by him, with numerous other organic remains, particularly crabs (*Cáncer Mæ`nas*, and *I'nachus Lamárckii*) and coprolites, to the Norfolk and Norwich Museum.

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Norwich, Jan. 20. 1836.

ART. VIII. *A Notice of Appearances of the Sky in Guernsey on the Nights of Nov.* 17. *and* 18. 1835, *in relation to the Instances of Aurora Borealis seen in these Nights in England; and of Appearances of a splendid Meteor seen in Guernsey and Jersey in the Morning of Jan.* 12. 1836. By F. C. LUKIS, Esq.

THE appearance of the sky, as seen from this island, on the nights of Nov. 17. and 18. 1835, was not attended by that brilliant display of rays or streams of light, as noticed in the various accounts already published in p. 23—36.

On the 17th, the whole northern part of the horizon was luminous to such a degree as to urge me to call several members of my family to observe it. The general aspect was that of splendid twilight, having a few dark dense clouds floating gently along its whole range; that is, from north-east to north-west.

On the 18th, the same appearances were repeated, with equal brilliancy.

On both nights the weather was calm; but these days had been preceded and were followed by partial showers.

[*Meteor.*]—I herewith send you two notices, from newspapers, of a splendid meteor seen on Tuesday, Jan. 12. 1836.

From the Guernsey Comet.—On Tuesday morning [Jan. 12. 1836.], about half-past 6 o'clock, a friend of ours, who was in St. Martin's parish, had his attention suddenly arrested by a phenomenon in the heavens of uncommon magnificence, which appeared in a southerly direction. It was visible for two or three minutes; and, during the period of its visibility, it was so light, that any person could have easily picked up a pin upon the ground. The phenomenon in question appeared as large as the sun, and darted forth its rays in every direction, exhibiting one of the grandest spectacles he had ever witnessed. After being stationary during the period already mentioned, it moved with great velocity towards the west, and

quickly disappeared, leaving behind it a radiance such as is witnessed when the sun sets on a fine summer's evening.

From the Jersey News.—A phenomenon in the heavens occurred on Tuesday morning last, between the hours of 6 and 7 o'clock, just before the break of day. A stupendous ball of fire was seen to descend towards the earth, which so illuminated the horizon, that a person could distinctly see to pick up any thing on the ground. Some country people, who were hastening to their work from St. Clement's to the Pier, were so alarmed at the sight, that they ran for shelter to the first house they came to. Its descent appeared to be very slow, until it came within the influence of the earth, when it was very rapid: it was travelling from north to south. The previous night was very stormy, with occasional vivid flashes of lightning, which continued at intervals until the morning.

The Brighton Guardian of Jan. 13. 1836, notices the appearance of a meteor on the same day and hour as the above; which correspondence inclines me to believe it to have been the same luminous body.

My man-servant, who was traversing a ploughed field at the time, informs me that it passed with immense velocity, at an angle apparently about 45° from the horizon, and that it became broad daylight in an instant, so that he could observe the smallest speck upon the ground on which he stood.

Guernsey, Feb. 2. 1836.

ART. IX. *Some Notice of the Effects of the Gas in the City of London on the Atmosphere.* By W. H. WHITE, Esq.

DURING the severe frost between Dec. 19. and 27. 1835, I observed the streets in the city to become very dirty after the evening closed in; so that I more than once was led to the conclusion that a rapid thaw was taking place; but when I came near to my house (3 miles south of London Bridge), I found the roads quite hard, and the trees still covered with their icy crystals: this led me to the consideration that the difference of temperature in the city was owing to the heat given out by the gas. It was, however, no great difficulty to make the experiment with the thermometer; in doing which, I found that the temperature during the day, in the city, was 3° Fahrenheit higher than at my house; and that, after the gas in the city had been lighted four or five hours, the temperature increased full 3°: thus making the difference of 6°, and sometimes as much as 7°, in the space of three miles.

This notice, though unimportant in itself, if you think it worthy of a place in your Magazine, may, probably, lead to further experiments, and to other useful applications of the gas than merely the light from its brilliant flames.

Old Kent Road, Jan. 1. 1836.

ART. X. *Queries and Answers.*

THE Bloodhound in Britain. — In a brief but interesting sketch by Mr. Swainson on the zoology of Great Britain, published in Hugh Murray's *Encyclopædia of Geography*, it is stated that the bloodhound, though formerly in high repute, and used to track out and bring marauders and other criminals within the grasp of the law, is now *extinct*. Is not this a mistake? I remember that, in the spring of 1830, whilst bird-nesting in the beautiful plantations round about Dunkeld, in the Highlands, the Duke of Athol's gamekeeper offered me for sale two noble-looking dogs, with bluntish muzzles and broad slouching ears, which he stated to be the offspring of a female staghound and a male bloodhound. He mentioned having had several of these dogs at different times in his possession. Perhaps some of your Perthshire readers will question him further on the subject; as I was not aware, at the time, that the bloodhound was so very rare, much less that it was extinct. I saw none of these dogs in the Pyrenees, nor in Spain, though the latter country contains a great variety of races of that useful and faithful quadruped.

The Irish Greyhound, where can it be seen alive in Ireland? — In the same work, it is stated that the breed of the great Irish greyhound is still kept up in a few parks in Ireland; but the names of the parks, or of the counties in which they occur, are not given. Some of your readers will, perhaps, be kind enough to supply the desired information. Ought not naturalists always to mention the exact localities where rare animals, plants, or minerals are to be met with? By so doing they would confer a great obligation on wanderers like myself. Most amateurs, I presume, would stroll many a mile out of their road to get a glimpse of such a powerful, stately, majestic-looking quadruped as the Irish greyhound has always been represented to be. — *Wm. Perceval Hunter. Sandgate, July* 10. 1835.

" *Incendiaries discovered by Bloodhounds.* — The old method of tracing perpetrators of any crime was, a short time since, revived with great success in Oxfordshire. The Duke of Marlborough has, in addition to the famous Blenheim

spaniel, retained unimpaired the breed of the old English bloodhound. The Duke's steward, who has the care of these noble animals, had recourse to this plan at that destructive fire (well-known in the neighbourhood) at Mr. G. Raingley's, of Woodstock, one of the Duke's tenants. The steward was one of the first on the spot, and observed some fresh footsteps: he therefore marked their direction, and summoned his conductor. The hound was no sooner put on the footstep than he opened his deep-toned note, and traced with wonderful exactness every winding attempt to delude his eager pursuit, until he reached a previously notorious cottage. The door was opened; but then appeared the failure, for no man was found: however, the insatiable pursuer was not to be thus deluded; for, rushing out in the direction of the fire, he became more anxious at every step, until he seized one of a group going to assist (and, as was afterwards proved, the one most lavish in abuse of the incendiary), to his no small astonishment. The man was thunderstruck at his unexpected discovery, and soon confessed that he was the actual perpetrator of the diabolical act." (*The Bury and Norwich Post and East Anglian, Feb.* 12. 1834.)

[Since the preceding was put in type, the treatise on kinds of bloodhounds in *The Penny Cyclopædia* has been seen; it is a very interesting one, and is illustrated by figures. It is included in Nos. 272, 273.]

ART. XI. *Retrospective Criticism.*

THE Superstition connected with the Horseshoe. (V. 212., VII. 546.) — The "Notices of certain Omens and Superstitions connected with Natural Objects," communicated by your intelligent correspondent, the Rev. W. T. Bree (VII. 545. *et. seq.*), afforded me much entertainment and information; and to such as have received pleasure from the perusal of them it may not be uninteresting to know that the horseshoe superstition extends to Asia. In India, as appears from Johnson's *Field Sports of the East*," the practice has been observed, and horseshoes are to be there seen nailed to the thresholds, and the idea of its preventing witches from entering prevails: whether founded on the superstition of the English in former days, is a matter of speculation, but deserves enquiry. On board small vessels, many years since, the practice was very general; but now a horseshoe is very seldom seen nailed to any part of a vessel. The combing of the companion hatch was more frequently the place to which

it was affixed than the mast. — *James G. Tatem. Wycombe, June* 4. 1835.

Dr. Turton's Orígines Zoológicæ, or Zoological Recollections. (VII. 315—328., 390—408.) — With the utmost respect for your entertaining and instructive correspondent Dr. Turton, I would beg to suggest that the saying, "Draw in his horns" (VII. 391.), applies to the snail rather than to the ox; the former always drawing in his horns when apprehending danger, and retiring within his shell for safety.

The fair mentioned in p. 394., note *, is held annually at Charlton, near Woolwich, Kent, on the 18th of October, and is said to have owed its origin to, and derived its name from, a compulsive grant made by some of our kings, when detected in an affair of gallantry, while residing at Eltham Palace. The procession from Deptford, through Greenwich, to Charlton, each person wearing some ornament of horn upon his head, has been long discontinued; and the fair has degenerated into one for pleasure, rather than for business. — *James G. Tatem. March* 16. 1835.

On the Robin and Dipper, and rumped, and rumpless, Birds. (VIII. 637. 638.) — "I do not deny," says the Rev. F. O. Morris, "(I never did) that the thrush and the robin have an oil gland. They may be seen, before a shower of rain, anointing their feathers with its contents." May they? This expression, "may be seen," is by no means satisfactory. Will he tell us that he, himself, has actually seen any bird in the creation express the contents from its gland and apply them to its feathers? "I doubt not," continues he, "but that if they" (the robins) "were, under these circumstances" (that is, after lubricating their feathers) "to fall into the water, they would receive as little damage, or nearly so, to their feathers, as the dipper." Had the reverend ornithologist examined, with common attention, the nature of a land bird's plumage, and then compared it with that of a water bird, he surely would not have made this declaration.

He continues: "Soak a thrush or a robin, but for a few minutes, in the water; soak a dipper for an hour or more; lay them both in the sun to dry: the one will be unscathed, unharmed; the other will present a miserable clogged appearance." But why in the sun, your reverence? That very act alone would insure the unsightly appearance in the land bird, which seems to have given you so much pain. This unlucky suggestion of yours proves to me that you are, as yet, quite a novice in the nature of plumage; whilst your allusion to a "chemical or other tedious process" (supposed to be adopted by me, in order to restore the feathers "of clogged and mi-

serable appearance" to their original beauty) leads me to suspect that you have been trying your hand at some bungling experiments, and that you have failed in your object. It neither requires the aid of chemistry, nor that of a tedious process, to put all to rights again, after a land bird has been immersed in the water.

It is somewhat arrogant in the Rev. F. O. Morris to insinuate that I am "blinded by prejudice," because I do not submit to what he, in his inexperience, considers "can almost be demonstrated." "Almost," forsooth! Why, this puts me in mind of the Frenchman, who had *almost* found out the art of living without food; but, somehow or other, he happened to die on the seventeenth day through pure *emptiness*. Will his reverence take the trouble to demonstrate fully (I'll have no almosts) that the dipper walks at the bottom of the water? and then I will strike to his superior weight of knowledge. In the meantime, I would put him in mind that he has not refuted any part of my theory already advanced, to show that birds cannot, by any means, walk on the ground under water.

The reverend ornithologist asks, if any birds are entirely devoid of the oil gland? This is evidently a question from one in rudiments. A very moderate attention to ornithology would have taught him, that there are birds with tails, and birds without tails. So that the robin of the Rev. F. O. Morris, having a tail, would have wherewith to anoint its plumage: but my barn-door fowl, having no tail, would not have wherewith to anoint its plumage; and, of course, it would be obliged to remain ungreased. Then the upshot would be, that my poor rumpless bird might catch a severe cold, or sore throat, when "exposed to a shower of rain," unless it applied in time to its more fortunate neighbour's toilette for a beak-full or two of his best Macassar. This act of nature, in furnishing some birds with an oil gland, for the purpose of *oiling their feathers*, according to the doctrine of the Rev. F. O. Morris, and in denying to others this inestimable advantage, would, in Corporal Trim's notions, "be putting one sadly over the head of another." I think so too. — *Charles Waterton. Walton Hall, November 5.* 1835.

[Since our refusing, in VIII. 516., a long treatise on this subject, by the Rev. Mr. Morris, which he had sent to us, we have received from him the following in substitution.]

Touching the Question whether Birds oil their Plumage, or not. [VIII. 375. note *, 514, 515. 637.; IX. 158.] — "The *bill*, the whole *bill*, and nothing but the *bill*." — As far as my knowledge goes, I am not aware of any one in the present day, except Mr. Charles Waterton, who upholds or

maintains the doctrine subversive of the generally received one on the above head. In answering his arguments, I shall, therefore, I presume, encounter all, or nearly all, that is to be urged in opposition to the belief that birds do use an oil, supplied by a gland which they possess, to render their feathers impervious to water.

In a note [VIII. 375. note *] to a short paper of mine (on the habits of the dipper), which appeared in VIII. 374—376., I expressed a doubt as to the correctness of Mr. Waterton's opinion as regarded the above question; and I have been led to the remarks I am about to make by having observed, in V. 412—415., a paper by Mr. Waterton "on birds using oil from glands;" and, to avoid any confusion, I will take his arguments *against* the heretofore *generally*, if not *universally*, received opinion in the order in which they present themselves.

First, then, from the circumstance of birds being annoyed by small insects or vermin, Mr. Waterton *takes it for granted* that, when birds are seen applying their bills to their feathers, &c., they are endeavouring to dislodge these insects. That birds are annoyed by insects "*is most true;*" but, were his hypothesis correct, it seems likely that the poor birds would, in time at least, eradicate the nuisance, which, in Mr. Waterton's words, "no part of their bodies are ever exempt from," "and which," he says, "they so much suffer from." But, after all their *supposed* endeavours, he himself allows that "no part of their bodies" has, as yet, been freed from the pest; and, this being the case, it does not appear to me that instinct would suggest to the birds a *useless* endeavour, or that they would waste their time, accordingly, which might be so much better employed. When, then, in this useless, fruitless, and ineffectual *supposed* course, the bird has chased the parasites down to the oil gland at the root of the tail, "some people," so says Mr. Waterton, "imagine that the bird is procuring an oil from the gland by means of its bill, in order to apply it to the feathers;" instead of, as his *theory* goes, being engaged in the pursuit of the insects. This, he argues, can, at the best, "be but conjecture, because the feathers hide from our view the operation that is going on." Now, I am very willing to admit that no one has ever so far ingratiated himself into the good graces of a bird as to get it to *voluntarily* turn back its feathers from the gland, that we may see it *voluntarily* engaged in carrying on the operation which *I suppose it to carry on* (in common, I believe, with *most*, if not *all*, naturalists *except Mr. Waterton*). But, with all due deference, I beg leave to differ on this subject "*toto cœlo*" from the author of the *Wanderings;* for how stands the case? The *à priori*

argument is certainly in our favour; and we are backed in our opinion by the *wisdom* of our ancestors, for which Mr. Waterton elsewhere contends that he has so great a veneration. I for one will vie with him in this veneration; and I, therefore, will not, for much stronger reasons than he has adduced, give up, among others, the point in question, on which they all agreed in days of yore. Mr. Waterton, however, *assumes* the point in question. "When," he says, "a man versed in the habits of birds sees the bird do this, *he knows* that it is trying to dislodge the vermin," &c.; "except, indeed," he parenthetically adds, "*except* after it has got wet." What, then, I would ask (allowing even, which I do not, his own argument as to the motive of birds in thus applying their bills to their feathers *at other times*), is its motive in thus applying its bill *when it* (the bird) *is wet*. The answer is obvious, as far as our present knowledge carries us; for even Mr. Waterton, though he endeavours to explode the received opinion, advances nothing, *positively nothing*, in proof of any other theory, but leaves the matter *precisely where he found it*.

But to proceed: "Will any naturalist," he asks, "say that he has actually *seen* a bird procure liquor or oil from the gland with its bill, and then apply that liquor or oil to its plumage?" (Yes; T. G. of Clitheroe: see VI. 159, 160.) I have before *allowed* that the feathers prevent our seeing what is going forward; but we are not therefore to conclude that the opinion which always has obtained as to the nature of the process is erroneous; for I very much doubt whether the objector himself has ever "actually seen" a bird catch one of these famous insects with his bill. As well might we argue, that no other globe but our own is inhabited because we cannot see the inhabitants thereof walking about; or, that our earth is stationary because we cannot perceive its motion.

But "I marvel how the oil can be obtained by the sharp bill of the bird." Why should we marvel at any such thing, when we consider that the bills of ducks, and many other sea and water birds, which chiefly use this oil, and to which it is especially useful, are more than ordinarily broad, and the better adapted for compressing any soft part of their bodies; and when we remember, moreover, that in these very birds, whose constant abiding on the water requires an increased supply of oil to render their feathers impervious to it, that in these very birds is this gland the most developed, and the best supplied with oil? Mr. Waterton proceeds, "When the nature of the gland, and the form of the bill, are duly considered, it is rational to conclude, that the application of the

hard bill to the soft gland would be very painful to the bird." If so, then thrice unfortunate are ye of the feline race: if this be so, how must your faces suffer, it is *equally rational* to conclude, when you wash them with your paws: 't is marvellous that your talons allow any part to remain unscratched of the contracting pupils of your eyes: dreadful must your sufferings be. Mr. Martin should introduce an especial clause in his *bill* to prevent the consequences of this wilful blindness of your natures.

Oh, but Mr. Waterton is willing to "suppose that the bird has succeeded in getting some of the liquor into its bill;" but asks, "how is the liquor to be applied to its feathers? It cannot be rubbed upon them, because it is within the bill" (certainly it must be received *into* the bill *before* it can be applied *by* the bill to the feathers); "and, if the bird should apply its bill to the feathers, they would merely come in contact with the edges of the bill, while the liquor would have sunk into the cavity of the lower mandible." As well may we fear, unlucky aldermen! that never again will ye be able to pour any more turtle soup into your mouths when once the liquid shall have passed into the *cavity* of your tablespoons, at the Lord Mayor's feast. It is quite as impossible for you to stoop your spoons as it is for a bird to stoop his *bill;* and, perhaps, the new corporation *bill* will save you the trouble of trying the experiment.

An argument follows the above which is really not deserving of notice. "I will now," says Mr. Waterton, "show that this oily liquor would injure the feathers. The feathers of birds, when in a perfectly dry state, have a beautiful and downy appearance, which is lost when wetted, but returns again when all the moisture is gone: if, however, any greasy substance or oily liquor has come in contact with them, I do not know what could be employed to restore the downy appearance to its pristine beauty. Let any body apply the oil from the gland in question to a feather, and he will produce a fixed stain." This all sounds very well; but I am sorry *again* to have to convict Mr. Waterton of *assuming* his premises, instead of *proving* them. 'T is likely, indeed, that what he says is the case, as regards the oil obtained from a *dead* bird, and applied to a feather of a *dead* bird; but that it is impossible for the oil to have the use generally assigned to it in a *living* bird, is just as absurd as to argue that the gastric juice cannot possibly exist *in* the stomach of a living animal, for the purpose of digesting its food, because, forsooth, when the animal is dead, it will often eat a hole *out* through the very stomach that before contained it so well. So, again, the

bile in the *living* and healthy subject has no power of staining what it touches: when the subject is *dead*, discolouration follows contact with it. Neither, supposing that his experiment *could* be tried *with* the oil, and *on* the feather of a *living* bird, would I attach much importance *even to its success;* so very much, in all probability, would depend on the birds *voluntary* obtaining the oil, and *voluntarily* applying it; nor know we, moreover, in what *quantity* the *bird* would apply it: and, besides, birds may possibly, and *probably* do, secrete from their mouths some liquid, which, *mixed with* the *oil*, may produce, *as a compound*, the effect we believe it to have. This we have obviously no means of disproving, and, if necessary, it may be the case.

Lastly, Mr. Waterton contends, that the gland cannot contain oil for the purpose of lubricating the plumage, because it could not be applied by *the bill* to the back of its head (which would therefore, I suppose, stand a chance of catching cold in a shower of rain). Why, who ever said that it could be applied *by the bill* to the back of the head? or who ever saw birds with their necks in the pillory, that they should not bend their heads at pleasure? What is easier, and what, moreover, I will say, is oftener seen done, than for a bird to stoop its head backwards or laterally, and rub *it* against the feathers of other parts of its body? in all probability for the very purpose which Mr. Waterton says "he *flatly denies*," without being able *to assign any other use* to the oil gland of birds, or to advance one single opinion, grounded upon any *fact*, against the received belief. This last argument is no better than if one were to say that cats could not wash the *back parts* of their heads because their paws, which they use for that purpose, extend only in a *forward* direction; or that it were impossible for them to wash their faces at all, because they use only their saliva for that purpose, which how are they to get applied to the back part of their heads? The story of the eagle "varnished over," which next follows, I will not comment upon any more than just to say that, "*me judice*," Mr. Waterton has accounted for its appearing so by an argument which militates against *his own;* for if the difficulty *be* great for a bird to oil every part of his body with oil obtained from the gland, on account of the *impossibility* (which does not exist, as I have shown) of his getting at the back of his head, I would ask, is not the difficulty increased tenfold by supposing him to cover every part of his body with slime *by rolling on a fish?* How is he (it might just as well be asked) to besmear his head? is he to stand *upon it*, *on* the fish, or how? I leave Mr. Waterton to an-

swer this question; and will, at the same time, take my leave of his paper in V. 412—415., only adding, that the gland about which so much has been said has been dissected by eminent anatomists, has been found to be supplied with oil, and to be furnished with an excretory duct; certainly very strong *presumptive evidence* as to its use in the economy of birds, especially when coupled with the fact that Mr. Waterton, in VI. 275., states his total ignorance of any other use it can be of. In VI. 277, &c., Mr. Waterton has a few more remarks on the same subject; but, in my opinion, the *facts* mentioned in V. 159, 160., by *eyewitnesses* of the operation, in reply to Mr. Waterton's former *theory* on the subject, are more than sufficient to set the matter at rest.

Beechfield House, Doncaster.

PS. — T. G. of Clitheroe, in his account of the Muscovy duck, as quoted above, VI. 159, 160., has mentioned that he saw it erect the feathers from the gland when wanting to extract the oil. What says Mr. Waterton to this? And I have, since writing the above, seen tame ducks do the same; then apply the bill to the gland, and then to the feathers. "*Auto boa*" (Aristoph.). The thing speaks for itself.

ART. XII. *Obituary.*

DIED, on Jan. 1. 1836, the Rev. *George Reading Leathes*, A.M., at Shropham, Norfolk, aged 58, after a paralytic affection, which occurred to him on the Christmas-day preceding, while officiating in the duties of public worship at Shropham Church, and from which he did not recover. He was distinguished for the interest which he took in objects of natural history, especially plants and fossils, for the extent of his knowledge of them, and for the cordiality with which he excited and promoted a kindred interest and knowledge in others. His own collection of living plants, his museum, and his library, were indexes of the extensive measure of his affection for subjects of natural history; while Smith's and Sowerby's *English Botany*, Sowerby's *Mineral Conchology*, the Norfolk and Norwich Museum, the Bury St. Edmund's Botanic Garden, the Norfolk and Norwich Horticultural Society, the Bury St. Edmund's Horticultural Society, and the collections, both of plants and fossils, of his scientific friends, the Rev. T. Rogers, Lackford; the Rev. T. Image, Whepstead; and others; and for fossils, doubtless, the collections of his scientific friends, Mr. S. V. Wood, Woodbridge, and Mr. S. Wood-

ward, Norwich; may be referred to in proof of the liberal spirit with which he imparted and reciprocated his discoveries and acquisitions. A species of fossil shell has been named after Mr. Leathes, by Sowerby, O'vula Leathèsii: perhaps other objects.

REVIEWS.

ART. I. *Notices on Works in Natural History.*

DAVIS, J. B., Surgeon: A Popular Manual of the Art of Preserving Health; embracing the subjects of Diet, Air, Exercise, Gymnastics, General and Physical Education, Occupations, Bathing, Clothing, Ventilation, &c. Designed for the use of all ranks and professions in society. 8vo, 504 pages. London, 1836. 10*s.*

A work that every naturalist who is not of the medical profession may study with much pleasure and advantage, and, one would presume, with some pleasure and advantage if he be. A philosophising habit pervades the work. The following extract should obtain for the work the patronage of naturalists, especially of those who are naturalists rather generally than technically:—"There are far *more practical advantages*, more real utility, *in the study of natural objects, than in that of abstract science or dead languages*, especially in the earlier periods of education. The one is far more consonant with what forms the experience of life, and affords advantages of which the other is almost wholly devoid, for the promotion and preservation of the health of the student. There is no necessity to injure the health of the body, whilst we are seeking to enlighten the mind. Should the study of nature ever come to be pursued, as it admits of being, as a means of education, it will afford exercise to all the elements of which man is made up. It will exercise and improve the senses, the lungs, and limbs, and the understanding also. It will be a developement of the natural method of education; for when a child comes into the world, how is it first taught to form ideas, to obtain a control over its faculties, and to lay down the rudiments of human affection? Clearly through the medium of the senses when exercised upon real objects, their forms, their colours, their motions, constructions, and uses. And the delight of the infantile mind, at its own progress in this course of study, knows no mixture and no deduction. Joy and enjoyment pervade the heart, and the powers are strengthened at every step. And were this native bent of the mind fostered and en-

couraged, it would give a tinge of character to the whole future life, which would tend more to the equalisation of the exercise of all the faculties, to that harmony of excitation and of action we have seen to be so desirable, than anything else." (p. 361, 362.)

Swainson, W., F.R.S., &c: The Natural History of Quadrupeds, vol. 72. of Lardner's Cabinet Cyclopædia. 6*s.*

This is vol. iii. of the *System of Nature* in the *Cabinet Cyclopædia:* and it may, perhaps, be said to equal the two previous admirable volumes in the masterly manner in which the subject is handled. In his characteristics of the genera, at the end of the volume, it is to be regretted that he has not always given English names; and those which are given are not always correct. The volume, however, notwithstanding these and a few other defects, is the most accurate, masterly, and complete compendium which has yet appeared on the subject. — *S. D. W. Nov.* 3. 1835.

Hope, Rev. *F. W.*: An Address on the Second Anniversary of the Entomological Society, Monday, Jan. 25. 1836.

The Society flourishes: want of space does not allow quoting.

Various Contributors: The Entomological Magazine, No. 14., Jan. 1836.

Besides interesting information on insects in this number, there is a communication on metamorphoses of Crustàcea, by Mr. J. V. Thompson. It is illustrated by wood-engravings: and one on the origin of Entozòa in the bodies of animals, by Henry Metford, M.R.C.S.

Watson, H. C.: Remarks on the Geographical Distribution of British Plants; chiefly in connexion with Latitude, Elevation, and Climate. Small 8vo, about 300 pages. London. Longman and Co. 1835.

Of great value to botanists, both students and proficients; and there is so much in it on the physical geography and climate of Britain as to render it likely to much avail those who pursue these subjects.

Berkeley, Rev. *M. J.*, M.A. F.L.S., &c.: The English Flora of Sir J. E. Smith. Class XXIV., Cryptogàmia, by W. J. Hooker, LL.D., &c. Vol. V., or Vol. II. of Dr. Hooker's *British Flora*: Part II., comprising the *Fúngi*,

by the Rev. M. J. Berkeley, M.A. F.L.S., &c. 8vo, above 400 pages. Longman and Co. London, 1836.

From a glance at this, it seems carefully and skilfully elaborated: a more considerate notice of it may be inserted hereafter. It is a work that has long been wanted, and must henceforth become the guide and the standard of all who engage in the investigation of the British *Fúngi*. (See under *Literary Notices.*)

Hooker, W. J., LL.D., Regius Professor of Botany in the University of Glasgow: The British Flora; comprising the Phænogamous, or Flowering Plants, and the Ferns. The third edition, with additions and corrections. 8vo, 500 pages. 1835. 12*s.*

In curtailing my review of Dr. Hooker's *British Flora*, 3d edition [VIII. 472.], you have altered the connexion, and, therefore, the meaning, of some of my remarks. I did not use the word *fault* at all, nor say that it contained new words, nor that it was more deficient in conciseness than the former edition; on the contrary, I gave Dr. Hooker much credit that he had coined *no new words*, and lamented them, not as new in themselves, but merely that the system of Linnæus, formerly so simple, should lately have required the aid of such words at all: and, certainly, I did not intend to accuse him of their introduction, much less of coining them. Of his work, in fact, I spoke in the warmest praise, both for its arrangement, accuracy, and clearness. The insertion of this, as it will show the true meaning of my words, will only be doing justice to the Dr. and to myself, and remove any unfavourable impression which your readers may have received of his work, and, therefore, I am sure will meet with your attention.—G. Francis. [*Received on Jan.* 27. 1836.]

Francis, G.: A Catalogue of the Species of British Flowering Plants and Ferns, that are described in the third edition of Dr. Hooker's *British Flora*; published to facilitate Botanical Correspondence, as an Index to Herbariums, &c. In one sheet, price 6*d.*; 5*s.* a dozen.

A second edition has been published, in which the names of varieties are inserted, additionally to the names of the species, as included in the first edition.

Art. II. *Literary Notices.*

A History of British Birds, in two volumes; *A History of British Reptiles*, in one volume; *A History of British Crustácea*

in one volume; and, *A History of British Zoophytes*, in one volume; are announced for future publication by J. V. Voorst, as a portion of a uniform and complete illustration of the zoology of Great Britain, of which other portions are Yarrell's *History of British Fishes*, already noticed in VIII. 244, 245. 584.; and Bell's *History of British Quadrupeds*, announced in VIII. 584. The size of Yarrell's *History of British Fishes* is 8vo: 13 parts of it have now been published, and it is announced that it will be completed in May next. Part I. of Bell's *History of British Quadrupeds* is to be published in June.

Audubon's *Ornithological Biography*, Vol. III., price 25*s.*, has been announced.

Dr. Craigie's *Elements of Anatomy, general, special, and comparative*, forming the article so entitled in the *Encyclopædia Britannica*, 7th edition, is published separately by Messrs. Black, Edinburgh, 4to, with 13 engravings.

Wilson's *General and Systematic Treatise on Insects*, in the *Encyclopædia Britannica*, 7th edition, is published separately, by Messrs. Black, Edinburgh, 4to, with 540 figures, engraved on steel.

Ehrenberg's *Researches and Discoveries on the Infusòria.* An account of an extension of these is given in the last number of the *Edinburgh New Philosophical Journal*, illustrated by a plate. The contribution is one of great interest to naturalists.

Berkeley's *Dried Specimens of the Species of British Fúngi.* On March 1. is to be published, No. 1., price 10*s.*, of fasciculuses of dried specimens of the Species of British *F*úngi, that are described by the Rev. M. J. Berkeley, M.A., in Vol. V. Part II. of the *English Flora*, and of such species as may be hereafter discovered to be indigenous to Britain. The numbers are to be published half-yearly.

Of Bohler's *Lichenes Britannici, or Dried Specimens of the British Species of Lichen*, noticed in VIII., 416. 525., eight fasciculuses have been published.

Daniel Cooper's *Flora Metropolitana, or Botanical Rambles within Thirty Miles of London*, is to be published on March 1., price 4*s.* 6*d.*, 12mo.

THE MAGAZINE

OF

NATURAL HISTORY.

APRIL, 1836.

ORIGINAL COMMUNICATIONS.

ART. I. *Notes of a Natural History Tour in Norway.* By EDWARD FORBES, Esq.

(*Continued from* VIII. 307., *and concluded.*)

FROM Tiroe we sailed to Bondhuus, a small village at the upper end of the Marenger-fiord, a branch of the Hardanger-fiord, about a Norwegian mile in length, presenting scenery of the wildest and most romantic kind. It is very narrow, winding amongst mountains of great elevation, whose summits are white with perpetual snows, and whose sides rise almost perpendicularly from the water. At one place, a large and unbroken waterfall plunged from a great height at once into the sea. The village of Bondhuus is situated at the entrance of a valley, the other end of which is adorned by the beautiful glacier of that name. The glacier is about ten miles distant from the houses; but so near did it seem to be, that, although we had arrived at a late hour, we proposed to our peasant landlord a walk to the glacier whilst our supper was preparing. The deceptive appearance of such masses of ice is well known to such as have travelled in Switzerland.

We visited the glacier next morning. It is situated at the end of a small lake, formed by the melting of the snows, and presenting the beautiful milky blue colour which characterises waters from such a source. The Bondhuus glacier is a branch of the great Folgefund, but is diminishing yearly, and extended several hundred yards from its present limits twelve years ago. Around its base grew *Cerástium alpinum* and *aquáticum*, *Silène rupéstris*; *Saxífraga Cotylèdon*, *stellàris*, and *cæspitòsa*; *Phlèum alpinum*, and many other alpine plants. On our return to Bondhuus, we proceeded by boat to Viger, our next station. As usual, we were overtaken by

rain, and were benefited by a thorough ducking, which threw a damp upon the pleasure of our sail. The scenery was as grand as that we had passed through during the preceding day. Indeed, I have never seen anything in Switzerland or in Scotland which could compete with the stupendous magnificence of the Hardanger-fiord.

Viger is a pretty village, in the middle of a natural park, walled in by mountains. There being no "guest-giver" there, we proceeded to the parsonage, and were received with a kindness and hospitality never to be forgotten. From Viger we journeyed to Eid-fiord, situated at the head of the fiord upon a gravelly delta, formed from the debris of the neighbouring mountains by the river Voring, which is expanded into a lake about two miles broad, and the same in length, just above this delta. At the upper end of the lake we found a series of terraces of debris, on which grew *Astrágalus* alpìnus (*Phàca astragálina Dec.*), *Erígeron* àcris, *Càrex* recúrva, and *Arabis* petræ`a. Our object in visiting Eid-fiord was to see the great fall of the Vorings-foss, one of the finest waterfalls in Europe, first made known to the traveller by Professor Hanstein a few years before, and which appears to be the waterfall mentioned by Inglis, as of a somewhat apocryphal existence. It is formed by the fall of a large river down a deep and narrow ravine, presenting an unbroken cascade of 800 ft. or more. According to our guide, comparatively few of its visitors had descended the ravine, which is easily accounted for, when the difficulty, and often danger, of such a descent is considered. We ventured, and were well repaid for our pains by one of the finest sights, probably, in Europe.

The Vorings-foss is about fourteen miles distant from the fiord; and the elevation of the ground in the neighbourhood of the fall must be very considerable. On it we found Phyllódoce *taxifòlia* (Menzièsia cærùlea) abundant and in fine condition; *Aconìtum* lycóctonum, *Arabis* alpìna, *Verónica* saxátilis and alpìna, and Bárts*ia* alpìna. In the lower part of the valley, leading to the fall, grew *Asperùgo* procúmbens. We returned from Eidfiord down the Hardanger to Graven, where (it being Sunday) we rested for a day, and had the pleasure, for the first time, of tasting the flesh of the reindeer; a delicacy peculiarly agreeable to our palates, as for the last week our food had consisted solely of cold fish and haver-brod, a sort, but a very poor sort, of oat bread, which, combined with the misery of wearing wet clothes, made anything in the shape of meat and a warm shirt the summit of human felicity. The water of the Hardanger-fiord around Graven tastes quite fresh: the sides of the rocks at the water's edge are thickly covered with stunted specimens of the *Mytilus* edùlis.

At Graven I found specimens of a small Clausília, which I consider the C. obtùsa of Pseiffer. It differs from the Clausília mínima *Zeigler*, in the very obtuse termination of the upper whorls, a character of rare occurrence in this intricate genus.

From Graven we walked to Vossevangen through much beautiful scenery. The pine forests were very extensive in this district, with their usual inhabitant the Linnæ`*a*. On the way we observed *V*erbáscum nìgrum and *S*èdum álbum for the first time. Vossevangen is a considerable village, and is the capital of the district of the same name.

From Voss we directed our course towards the Sogne-fiord. The country around Voss is formed of a mica slate, in which no garnets were observed. It is probably a bed in the gneiss. Between it and the gneiss at Tvinde is found a singular rock, a sort of granular quartz, substratified. At the same place, on the road side, lay a detached mass of hypersthene; but I did not see it *in situ*. One side of the valley of Stalheim is bounded by hills of snow-white quartz, which are almost bare, and present mural precipices, having a very singular appearance at a distance, from their shining white colour.

The valley of Stalheim is a great ravine of the most picturesque character, in the middle of which rises the almost isolated and inaccessible mountain of Jordan-nook. On each side of the stair-like descent into the valley is a cataract of the first magnitude. Stalheim is famous in Norway for the number of the wolves found there; and across the road, in several places, we observed a rope suspended from a pole on each side, which we were told was placed in that manner to ward off the wolves, as their dislike is well known to any thing suspended over their heads.

At Gudsvanger we again took to water, and sailed down the Heimdals-fiord, a branch of the Sogne-fiord. The scenery resembled that of the Hardanger-fiord. During the morning a large eagle flew over our heads. Instead of turning off with the road to Christiania we sailed the whole length of the upper Sogne-fiord to Lystre, where we commenced ascending the mountains of Haranger to cross into Gulbrandsdalen. The peaks of the Haranger-feld are the highest in Norway; their elevation reaching above 8000 ft. As these mountains rise immediately from the level of the sea, and are very precipitous, they lose nothing of their height to the eye.

After passing the night at Berger, a group of huts at an elevation of about 2000 ft., we engaged a guide and ponies to bring us to Lomb, in Gulbrandsdalen, a distance of near 40 miles, twenty of which were occupied in crossing an

alpine plain, covered in many places with snow, and exceedingly rich in botanical treasures. At its highest elevation we found *R*anúnculus glaciàlis and pygmæ`us, *S*axífraga rivulàris, *L*ýchnis alpìna and dioíca, *S*àlix herbàcea var. polàris, and *P*ediculàris lappónica. Somewhat lower, on the verge of the snow, grew Erióphorum capitàtum, *E*rígeron ?, Woodsia hyperbòrea: and lower down, *S*axífraga cérnua, petræ`a, *m*uscòides; *R*anúnculus hyperbòreus, and Hieróchloe boreàlis. In the alpine valley of Bererdal, *G*entiàna nivàlis was very abundant, as also P*y*rola rotundifòlia and chlorántha, *A*strágalus alpìnus, several species of Potentílla, and *A*ndrósace septentrionàlis.

The vegetation gradually changed character as we descended on the beautiful lake of Lome; and we were surprised to find *L*ýchnis alpìna growing on the margin of cultivated places, at an inconsiderable height above that lake, along with a variety of Prímula farinòsa, approaching P. stricta. We now directed our walk towards Guldbrandsdale; and our gradual departure from the mountains was marked by the successive appearance of *T*halictrum símplex, Dracocéphalum Ruyschiàna, and *P*olemònium cærùleum. The snow-capped mountains of Lom-field were gradually concealed by the lower but nearer pine-covered hills that border the rich and beautiful valley of Guldbrandsdalen, into which we entered by that of Hedal, having taken a two days' walk across the country by the compass; a mode of travelling, without a guide as we were, by no means free from difficulties. We entered the great road from Drontheim to Christiania, near Froen, and proceeded southwards until we reached Zellehummer, at the head of the Miosen-see. On our way from Froen to Zellehummer, we saw the grave of the Scottish captain, Sinclair: near it grew the *T*amarix germánica.

Zellehummer is a small but flourishing village, deriving its prosperity from its position at the head of the largest lake in Norway, thus forming a convenient market for the interior districts. It is situated in a trap country; the rock in its immediate vicinity is a primitive greenstone; about 10 miles from it, on the east side of the lake, this is succeeded by a wackaceous conglomerate, the composite masses of which are of very large size.

From the trap country we passed into that great tract of limestone (transition) which forms the fertile province of Hedemarcken. This limestone is of a dark bluish grey colour; brittle, not crystalline; where in contact with the trap, much indurated; and every where scant in fossil remains. A few belemnites were all I could obtain. Campánula *p*ersi-

cæfòlia and rapunculòìdes abound in Hedemarcken. Viola mirábilis also occurs in this district.

The gneiss reappears near Eidsvold, and continues to within a few miles of Christiania. The singularly interesting geology of that neighbourhood is fully described by Von Buch in his *Travels*.

The capital of Norway is a peculiarly favourable station for the naturalist. The flora of its neighbourhood can vie with that of any university town in Europe: the entomologist may there exert with success all his beetle and butterfly catching propensities, and the student of ichthyology, of the Mollúsca, and the Crustàcea, will find ample occupation amongst the inhabitants of that fiord from which Müller drew so many of his discoveries. In its university he will meet with Esmarck, Hanstein, Rathke, and Blyth, all men imbued with the true spirit of the naturalist, and glad to render him every assistance in their power.

Edinburgh. [*Received, Feb.* 23. 1836.]

ART. II. *A cursory Notice of Objects, natural and otherwise, observed in the Course of a Journey in the Interior of Peru.* By Mr. ANDREW MATHEWS, A.L.S., Travelling Collector of Natural Objects.

As it is not an every-day occurrence to receive a letter from this part of the world, I write to you by an opportunity which has just offered to forward some letters by the Maranon to Para.

During my journey down the river Huallaga, and a short stay in Tarapota, I have added much to my collections in animals, birds, insects, snakes, and land tortoises. On leaving Cuchero, the journey for the first three days is on foot, over immense hills, and along the border of the river, but through an almost impenetrable forest, to where the river of Monson joins the Huallaga (above this, to the river Cayumba, the river is rapid and dangerous). At the junction of the river Monson we took a canoe manned with six Indians, and in three days reached the pueblo (small village) of Uchiza. To this place the river is broad and deep, with two or three mal-pasos (bad passes or rapids), but, with a little dexterity, not dangerous. At Uchiza we took another canoe (but with fewer hands, as the river is wider and more level) to Tocache, which is only one day. At Tocache we had to take a larger canoe, with seven Indians, as the river is more confined and rapid between hills. The distance to Sion from the last-

named pueblo is one day, but has many mal-pasos, three of which are dangerous, and require not a little skill and exertion to avoid being carried from one side of the river to the other, and swamped in the eddies of the rapid, or dashed to pieces against the rocks. At Sion we took a fresh canoe, with seven hands, as at a short distance below is a bad pass, called Savalayacu, where it is necessary to unload the canoe, and drag it for some distance to near the edge of the rapid. The Indians then enter the canoe, and with all force descend; paddle for the centre of the rapid, and in an instant are below it with the force of the stream; and reload below the rocks. From Sion to Lupuna is but one day: but, as the delay of passing Savalayacu was considerable, we slept at a small settlement called Balsayacquilla: thence the river widens, and is less rapid. Lupuna is situated at the junction of the river Huayabamba, which is also navigable for canoes for some distance towards the Cordillera. From Lupuna to Juan Guerra, on the river Myobamba, is two days: this distance the river is magnificent, in some parts 9 or 10 miles wide, and full of large islands: in some parts the hills approach close to the river, but are not so high as those to the southward. The voyage may be performed in the time stated from each pueblo; but, as my object was not speed, I stopped at various places to collect as much as I could manage to preserve.

The forests along the river abound in monkeys and birds: of the latter, two species of turkey, one of pheasant, and some partridges, not only in beauty but in flavour, are superior to any thing we have in Europe. The ears of the Indians are continually on the alert to catch the least sound of the voice of a monkey or huangana (the peccary); which, when once heard, they are all on shore in an instant with their serrabatan (a hollow tube through which they blow a small reed tipped with poison); and so sure and fatal is their aim, that we were well supplied with roast and stewed monkey during the journey. The villages south of Lupuna were formerly called the Missiones altos del Huallaga, and had curates, or missionaries; but at present they are left entirely to themselves, and daily decreasing, and becoming worse than before they were converted. From Lupuna northward to this place the people are far superior, more industrious, and rapidly increasing in number. At Tarapota, and here, they are under the care of two very excellent men. At Tarapota, one of the old missionaries, the Fray Don Eusabio Arias, a most worthy and exemplary character, has been 28 years in these parts, and has composed a grammar and vocabulary of two of the

languages most in use, both of which he has given to me, and which will be a great addition to the knowledge of the languages spoken on the Ucayali. The author being an excellent Spanish and Latin scholar, they may be depended on as exact. I do not expect to reach Lima before December next; where I hope to hear that the Reform Bill has been of some benefit to England. Did the British government but possess this part of America, her superabundant population, by means of the Maranon, might find food and employment, quicker and with less risk than at Swan River.

It is impossible to say what are the riches and products of this province, seeing that only the banks of the rivers are as yet known. Though not a perfect plain, as has been represented, the hills are moderate, and covered with timber. The hill on which this town stands (Lamas) contains quicksilver ore, and four kinds of earth which they use here for painting, of excellent quality, and colour so fine, that they require but little grinding for use. The temperature is particularly fine: the thermometer ranges from 70° to 85°, which is its highest in the shade, and the place is free from those diseases common to the humid parts of the tropics.

Ciudad de Lamas, Minas, Interior of Peru, June 14. 1834.

[*Received on Nov.* 10. 1835.]

[The present account is continuous to one by Mr. Mathews, sent by us to the *Analyst*, see vol. iii. of that work, p. 36—42., No. xiii. Oct., 1835. Other notices by Mr. Mathews, since he left England, are in our VI. 314—319., and VII. 633, 634. See, in relation to the last, VIII. 470.]

Art. III. *On the Quinary, or Natural, System of M'Leay, Swainson, Vigors, &c.* By Peter Rylands, Esq.

(*Continued from* p. 138., *and concluded.*)

The third and fourth propositions of the Quinary System now remain only to be discussed. The fifth, being merely a matter of choice, and professing not to have any particular influence on the system being natural, we shall leave unnoticed. They are as follows: — 3d, "The contents of such a circular group are symbolically, or analogically, represented by the contents of all other circles in the animal kingdom. 4th, That these primary divisions of every group are characterised by definite peculiarities of form, structure, and economy, which, under diversified modifications, are uniform

throughout the animal kingdom, and are, therefore, to be regarded as the *primary types of nature*."

We admit that all this is very striking and prepossessing to a mere general reader, who would bend his eyes, for a few seconds, on these, as being two of the principles of the system, close the book, and extend his researches no further; yet think himself qualified to form a correct opinion of the subject.* This, however, will not do for the naturalist: he has some interest in the subject; and, in order to arrive at a correct knowledge of it, must investigate its application, and read attentively the explanatory remarks the author introduces: to use the words of Mr. M'Leay, "He requires its application to nature, and its illustration by facts." (*Linn. Trans.*, vol. xiv. p. 57.) An investigation such as this would fully convince him, that, although at first these propositions may appear striking and gratifying, they, in reality (i. e. in their application), mean literally nothing.

One group, characterised by the definite peculiarity of form, long legs, is, under a "diversified modification," represented by a group with those organs quite the reverse. A second, characterised by a short tail, is beautifully represented with that appendage remarkably long. The lengthened bills of the Grallatòres are analogically represented by the abrupt muzzle of the *Mùres*. The species of a fourth group, remarkable for the dulness and uniformity of their colour, are *strikingly* represented, under a "diversified modification," by the *Trochílidæ*, the tints of whose plumage vie in resplendent magnificence with the rainbow or Oriental gems. These are a few instances of Mr. Swainson's theory of representation, or analogy, or what would be better termed contrariety: more specimens will be introduced in the detail.

Mr. Swainson's five "primary types of nature" are, the quadrumaniform (or insessorial), typical; the carnivorous (or raptorial), sub-typical; and the suctorial (gliriform or grallatorial), the rasorial (or ungulated), and the aquatic (cetacious or natatorial), aberrant forms. We shall trace each of these, in their diversified modifications, through some of the groups which Mr. Swainson and his colleagues have defined.

We can make but few remarks on the quadrumaniform, insessorial, or typical groups. According to Mr. Swainson, these groups are the best organised; and their chief distinc-

* On some such grounds as these, we must account for the language the *Literary Gazette* uses, when reviewing Mr. Swainson's *Treatise*:— "One of its most striking and gratifying features is, the strong analogies which it presents between the several natural kingdoms."

tion consists in qualities implied by the name they bear: they are typical. This we cannot deny; but we may remind our author, that, considered in this light, this part of his theory is nothing new: naturalists have always admitted, that in every group there are species, which, from their superior organisation, &c., may be considered as typical of such groups: in this, however, we must say we cannot perceive any trace of the analogy of form, structure, or economy, mentioned in the fourth proposition, as typical groups vary considerably in all these respects.

The definite peculiarities of form, structure, and economy, we learn, from perusing Mr. Swainson's work *On the Classification of Quadrupeds* *, of rapacious or sub-typical groups, consist in their various organs being aptly adapted for living upon and destroying animals both of their own and other species; their carnivorous habits and bloodthirsty dispositions; and a tendency in their colour to assume a spotted or striped appearance. We find this type typically represented in its own "circle" by the *Félidæ* in Mammàlia, and the Falcónidæ in A`ves. This is all fair and just: we must examine, however, under what diversified modifications we find it in other groups. It is represented in Quadrùmana by Cercopithècus, because the species this genus contains are "mischievous and malicious" (*On the Class. of Quadrupeds*, vol. 72. *Lardner's Cab. Cyc.*, p. 72.); so that into this simple trait of character has a modification reduced the terrible claws, the enormous canines, the bloody dispositions, and the carnivorous habits of the rapacious type of nature.

The rapacious type of the Silviadæ (warblers), according to our author, is the genus Sylvícola (*Treatise on the Geography and Classification of Animals*, vol. 66. *Lardner's Cab. Cyc.*, p. 246.), in which we find the evil propensities, and the formidable weapons, of the primary type, by a curious modification, reduced to an almost imperceptible notch, or tooth, which may be discovered on the upper mandible of the bill of these birds!

In the class Insécta, we are told, the rapacious type is represented in the *Sphíngidæ* (which is a sub-typical, or rapacious group of Swainson), by the "singular threatening aspect which the caterpillars of the sphinx moths assume on being disturbed;" which is a reason sufficient to lead Mr. Swainson to consider it as "a remarkable modification of the terrific or evil nature which is impressed under one form or other upon all sub-typical groups." (*Ibid.*, p. 247.) But the most

* P. 101. 121, &c.; comp. *On the Classification of Animals*, p. 245, 246.

striking analogy which our quinary author has noticed, is that of the sub-typical or rapacious type, as represented amongst the *P*apiliònes (*P*apilionàceæ *R.* [this term is in use in botany]). The sub-typical form of this tribe, we are informed, is *N*ymphálidæ, some of which, when in the larva state, produce an uncomfortable sensation if held in the hand: hence they are termed "stinging" caterpillars. But this is not the only reason which led our propounder of types to consider this as the "type of evil:" the chrysalises of these "stingers" are suspended downwards; on which circumstance Mr. Swainson expresses his opinion, that they are "thus pointing to the world, as the only habitation, where their innumerable types of evil are permitted to reside; or to that dark and bottomless region, where punishment awaits the wicked at *their* last great change"!! (*Ibid.*, p. 248.) This is, it must be owned, very poetical and striking; yet, as it is obvious that the inexperienced novice in natural history is competent to judge of the merit of such logic as this in proving natural analogies, we shall let it pass without further comment, and proceed to investigate the application in nature of the next of Mr. Swainson's wonderful "types."

"As to structure," remarks Mr. Swainson, "aquatic types" (which now claim our consideration) "are chiefly remarkable for their enormous bulk, the disproportionate size of their head, and the absence, or very slight developement, of the feet. . . . . This structure implies the peculiar power of seizing their food by the mouth alone, without the assistance of the feet or claws; and, as this power would only be necessary to such animals as lived upon others, we accordingly find that all natatorial types are carnivorous: the medusæ, the cuttle-fish, the whales; but none more perfectly than the order Natatores amongst birds, the owls among the Raptores, and the Fissirostres in the circle of the perchers (Insessores). Sub-typical forms," continues our author, "as we have already seen, are preeminently carnivorous; but they differ from the natatorial in this, that the food is captured by the aid of the claws, while, in the type we are speaking of, the mouth alone is the instrument of capture." (*Ibid.*, p. 249, 250, 251.) We see, above, that Mr. Swainson brings forward amongst his other instances, in order to prove the truth of his statement, owls, and gives the reader to understand, in fact he tells him distinctly, that owls seize their food by their mouth alone. By owls, we conceive Mr. Swainson only refers to the species which live on fish; but these most certainly make use of their claws as instruments of capture, and not (as Mr. Swainson asserts, and would lead his reader to believe the same) their

mouths. In support of this, we shall bring to our aid the acute observer and indefatigable naturalist, Wilson, who, in his *North-American Ornithology*, speaking on the *Nóctua* (*Glaúx Rylands's MSS.* *) *Nýctea*, snow owl, makes the following decisive observations. "Unlike most of this tribe, he hunts by day as well as by twilight, and is particularly fond of frequenting the shores and banks of shallow rivers, over the surface of which he sails, or sits on a rock a little above the water, watching for fish. These he seizes with a sudden and instantaneous stroke of the foot, seldom missing his aim." (Wilson's *North-American Ornithology.*)

We find the natatorial, or cetaceous, type represented in the *Simiidæ* by *Pàpio*, because the species in this genus have a large head, and little or no tail! (*On the Natural History and Classification of Quadrupeds*, vol. 72. *Lardner's Cab. Cyc.*, p. 72.) In *Ursinæ*, the fact that an animal *probably* preys on dead fish and blubber is a sufficient reason for Mr. Swainson regarding it as aquatic (*Ibid.*, p. 146.); while a species of ox (*Bós Thersites*) is considered as this type, merely because the "fore part of the shoulders is elevated"!! (*Ibid.*, p. 285.) In this last instance, the natatorial type is analogically represented by an animal frequenting neither the sea nor its vicinity; being furnished neither with a short tail nor short legs; and not in the least carnivorous; although all these properties are to be found in, and constitute, the primary type.

The suctorial (also termed the gliriform and grallatorial) is distinguished, according to our author, from the other types, by these animals deriving their food by suction; being always the smallest in size, the most feeble and defenceless in structure, and the most defective in the organs of mastication; their clothing being of a uniform dull colour. There is also a great length, or attenuation, of the body; the head is always very small, generally prolonged into a pointed snout; and the mouth, as adapted to sucking, uncommonly small. (*On the Natural History and Classification of Quadrupeds*, p. 305.; comp. *On the Geography and Classification of Animals*, p. 254.)

* Our reason for proposing *Glaúx*, as the sub-generic name of the snow owl (*Nýctea*) and its affinities, arises not from any wish to substitute our own for other naturalists' nomenclature, but merely to prevent the disadvantage necessarily accruing from there being two genera in the animal kingdom with the same appellation. Thus, an extensive group of insects are arranged under the genus *Nóctua*, and *Nóctua* is likewise used to designate the owl in question, and its affinities. *Glaúx* is taken from the Greek, and has the same signification as the Latin *Nóctua*, simply an owl. — *R.* [*Glaúx* is the name of a genus of plants characterised and denominated by Linnæus.]

"In such," remarks Mr. Swainson, "as belong to the vertebrated circle, the feet are always fully developed; for these animals are peculiarly active (*Treatise on the Geography and Classification of Animals*, vol. 66. *Lardner's Cab. Cyc.*, p. 254.), and enjoy in a remarkable degree the power of running and leaping."

The Edentàta are one of the primary types of the vertebrated "circle," the true character of which is quite the reverse of that here described; and, therefore, at once proves the fallacy of this portion of our author's doctrine.

Amongst the analogies (or, rather, as we remarked above, contrarieties) of this type, we find short legs represented by long legs; long bills, by obtuse muzzles; gregarious, by animals living only in pairs; and a uniform dull clothing, by the most brilliant plumage! But this is not all, the type is termed suctorial; and we are told that the species which it contains are most deficient in the organs of mastication, chiefly living by suction.

The Glires *L.* (Animàlia rodéntia *Cuv.*), according to our author, constitute the preeminent type. Tell this to one of those practical naturalists who are denominated farmers; tell him, at the same time, that rats and mice are good examples; tell *him*, that these are suctorial, that these procure their food chiefly by suction, that these are deficient in the organs of mastication. Would he not point to the holes in his barn floor, and ask you what made those? Would he not enquire, by what means, then, were some of his best loads of wheat, or of corn, reduced to dust? Or he might ask what substance less hard, or less durable, than iron would present an insurmountable barrier to these, his greatest plagues and destroyers. And do these animals thus pierce the hardest wood, thus destroy the firmest texture, or thus grind such quantities of grain, by means of suction? To answer this in the affirmative would appear highly preposterous and ridiculous; but such are the doctrines contained in, and propagated by, a system termed natural, and published and supported by some of our most eminent naturalists.

Mr. Swainson states that the characteristics of rasorial types (which now only remain to be considered) consist in the species which constitute them being, in general, remarkable for their size, being inferior only in this respect to the natatorial; for the strength and perfection of their feet, the toes of which are never united, so as to be used for swimming; for the great developement of the tail, and of those appendages for ornament or defence which decorate the head. (*Treatise on the Geog. and Class. of Animals*, p. 257, 258.)

With regard to their economy, he remarks that they possess a superior degree of intelligence, and evince a disposition to submit to the dominion of man, far exceeding all other animals. (*Ibid.*, p. 260.) Mr. Swainson, also, further states that "the economy of this type is in direct opposition to the natatorial; for it is strictly terrestrial: we know not, in fact, a single instance where the individuals belonging to it frequent water, or its vicinity" (*Ibid.*, p. 259.); yet, on the next page but one, he gives us an example of this type, the common duck!! (*Ibid.*, p. 261.) The strictly terrestrial economy of this type is, also, represented by the beavers (*C*astóridæ), the Crácidæ, the *A*nserìnæ (geese, &c.), the *P*achydérmata, and the Manàtus! (*Ibid.*, p. 264.) This, therefore, like the other types, means nothing, when we inspect its illustration by facts: in theory, we are told that every individual belonging to this type is strictly terrestrial, neither frequenting the water, nor its vicinity; in the analysis we find quite the reverse.

We admit, with Mr. Swainson, that, if an animal is rapacious, we generally, in fact, always, find it possessed of suitable means for catching its prey; that, if it is aquatic, it has an organisation adapted to its living in water; and so on: and, further, that rapacious, aquatic, and the other forms, are generally found provided with an organisation, &c., which, as suited to their peculiar mode of life, may be distinguished in all such animals throughout the animal kingdom, although in varied modifications; but that every group, or, to express it in Mr. Swainson's phraseology, that every "circle," contains within itself a representative of such type, we deem as purely a fanciful conjecture as the existence of the circles themselves. It is in his attempts to support and prove this conjecture that Mr. Swainson has been necessarily obliged so to break through and surpass all true analogy, as to make what he terms analogy, not striking and gratifying, but preposterous and absurd.

We have now laid before our readers some of the objections (for to state all would far exceed our limits) which, after much study, reflection, and investigation, we are inclined to think will militate strongly against the Quinary System, as it now exists. But, before concluding, we beg to assure our readers, that the remarks we have made do not proceed from any wish to find fault or criticise; to call in question the opinions of an eminent author; or from a love of controversy. The sole end of them is, in order, if possible, to place the subject in a clear light, and to lead others to investigate and examine it for themselves: and, whether such investigations cleanse it from all imputations, answer all ob-

jections urged against it, and bring it out of the furnace like gold seven times purified; or, on the other hand (and we think this the most probable supposition), manifest to the world, that, although bearing the deceptive title of "natural," it is the most fanciful and theoretical, our end will be alike answered.

Bewsey House, Warrington, Feb. 19. 1836.

ART. IV. *Notes on the Habits of a domesticated White Rat, and a Terrier Dog (Flora), that lived in Harmony together.* By SAMUEL MOSS, Esq., Cheltenham.

EARLY in the year 1822, a white rat was caught in the kennel, or the stables, belonging to Colonel Berkeley, the present Lord Segrave, situate adjoining to where Pittville Parade now stands. It was considered a great curiosity, and was exhibited as such. Having expressed a good deal of interest about it, and another being caught soon afterwards, it was brought to me. It was full grown, but, I apprehend, had been hurt by the trap, as it died in about three weeks, and proved to be with young. I think it had five or six.

About the autumn of the same year, another white rat was caught, and brought to me. It was about three parts grown, and exceedingly savage; and, when allowed to go at large in my sitting-room, flew at me with great ferocity. I put it into a squirrel cage, with a turnabout wheel, and for two or three days kept it on short allowance, and gave it no food but what it took out of my hands. At first it snapped at the food, and endeavoured to bite my fingers through the wires, but very soon came out of its box on my approach, and evidently knew my voice.

By this time it began to feel the security of the box, and would not come out unless forced to do so. When I put my hand into the box to take it out, it bit me severely, and did so two or three times afterwards; but, finding I took no notice of its attacks, and that it was always treated with kindness by me, it soon ceased to exhibit signs of anger, and lay perfectly passive when I opened the lid of the box to look at it.

As I had no family, and sat the greater part of my time alone, occupied in reading or writing, I often turned it out of the box, and it soon became familiar, on finding that I did not interfere with it (for I carefully avoided letting it know that it was watched), and would come to and cross over my feet with impunity to pick up crumbs, &c., which I purposely

allowed to drop for it; so that in about a fortnight it would approach me when called, and take sugar or bread from my hand.

At this time I had a small white terrier dog, called Flora, an excellent rat-killer, and of great courage, who was always with me, and lay on the hearth-rug at my feet. When the rat was first brought into the room in the cage, Flora was very anxious to get at him; but the first time I took the rat in my hand, I called Flora, and introduced her to my new acquaintance. With that sagacity for which the dog is celebrated, she immediately comprehended my meaning, and never afterwards showed the slightest wish to assail the rat; on the contrary, they soon became very much attached; and, when any stranger came in, the rat put himself under her protection, by going into a corner of the room, while Flora stood sentry, growling and showing her teeth most furiously, until satisfied that no injury was meditated against her favourite.

A high wall surrounded my garden at the back of the house. I frequently turned the rat and dog out to amuse themselves, which they did by playing at hide and seek amongst the flowers; but, when my whistle was heard, they each endeavoured to outstrip the other in the race to be first to pay their respects to me.

Scugg, the rat, as soon as I took my place at table, would run up my leg, get on the table, and, if not vigilantly watched, would carry off the sugar, pastry, or cheese, of which it would nibble a little, and leave the rest to Flora; but if, which was sometimes the case, Flora was hungry, and anxious to have the first bite, Scugg kept her in order by striking her on the nose with his fore paw, which Flora never resented, but would sit quietly looking on, until permitted to take her share. They lapped milk out of the same saucer, and Scugg slept between Flora's legs before the fire. The rat did not, from the first, that I recollect, show any fear of the dog; which I account for by supposing that the novelty of his situation made him desperate and insensible to fear.

The presence of a stranger at the table did not prevent him from foraging; but he would not eat from any hand except mine. He was very much attached to me, and would lie for hours within my waistcoat, or, if I went out, in my pocket.

Many persons supposed that its colour protected it, and that its being white was the cause of the dog not destroying it; but, in November, 1824, another white rat was caught and brought to me one evening, whilst Scugg was at liberty and

amusing himself with Flora in the room. I opened the trap, and shook out the stranger to them: both the rats ran rapidly about, pursued by the dog, and one of them was almost immediately caught, and as soon destroyed, to my great consternation, for the two rats were so much alike that I could not distinguish one from the other; great, therefore, was my joy and surprise to see Scugg run into the corner, and Flora at her post to protect him, where she remained so long as the man and the dead rat were in the room.

My white rat, in colour, was very like a white ferret; that is, slightly tinged with yellow, not so much so as the ferret; the eyes red; countenance mild and placid; the animal free from smell, and particularly clean in its habits, and highly offended if the fur was wet or ruffled the wrong way. The only thing unpleasant connected with it was its tail, against which I never could overcome my repugnance; and, when suddenly drawn across my face in his frolicsome passages from one shoulder to the other, it always made me shudder.

When the farm, with the stables, kennel, &c. &c., were removed, to make way for the Pittville pleasure-grounds, the colony of white rats were dispersed, and took up their quarters in various parts of the town, and, I suspect, were finally extirpated by the brown rats. Some of them, however, were more kindly received, and formed alliances with their brown neighbours; for, about the latter end of 1825, two or three party-coloured rats were caught; since which they have disappeared altogether. When the first white rat was caught, it was a matter of discussion whether it was a *lusus naturæ* or a distinct race: the question was set at rest by a man, who had formerly served as a marine, exclaiming, on seeing the tame rat, "That's a Guinea!" He said they were common on the coast of Guinea. I have since been told, but I do not recollect on what authority, that they are met with in various parts of the globe. Some years since, they were to be found in considerable numbers in Nelson Street, Bristol, brought there, probably, in some of the trading vessels; and from thence it is likely they found their way to Cheltenham.

In Feb. 1825, on my marriage, I parted with my little friend; but he did not survive the separation above three or four weeks. Whether he grieved at parting, or whether he was not kept sufficiently clean, or was not allowed sufficient liberty, I cannot tell. I sent for him occasionally, to show him to some of the numerous enquirers after him; and, on the last occasion, had great difficulty to take him from my

bosom and put him into his cage. He drew himself up in a corner of his box, quite sulkily, and was found dead in the same position next morning.

Cheltenham, Feb. 1. 1836.

ART. V. *Notice of the Arrival of Twenty-six Species of the Summer Birds of Passage in the Neighbourhood of Carlisle, Cumberland, during the Spring of* 1835; *to which are added a few Observations on some of the scarcer Species of Birds that have been obtained in the same Vicinity from Nov.* 10. 1834, *to Nov.* 10. 1835; *and a few Meteorological Remarks on the Spring, Summer, and Autumn of* 1835, *at Carlisle.* By a CORRESPONDENT.

*** The figures contained in the column on the right, in the table below, as well as those affixed to the species not included in it, refer to the numbers in Fleming's *History of British Animals*, which we have inserted, in order that any reader who may wish to see the various synonymes of any of the birds alluded to in this paper may find the species at once, should he possess, or have an opportunity of consulting, that very useful publication.

No.	English Specific Names.	Latin Generic and Specific Names.	When first observed.	No.
1.	Quail	*Cotúrnix vulgàris*	May 2.	6.
2.	Swallow	*Hirúndo rústica*	April 3.	35.
3.	House martin	*úrbica*	13.	36.
4.	Sand martin	*ripària*	4.	36.
5.	Swift	*Cýpselus A'pus*	May 2.	37.
6.	Goatsucker	*Caprimúlgus europæ'us*	4.	38.
7.	Pied flycatcher	*Muscícapa atricapílla*	April 29.	41.
8.	Spotted flycatcher	*Grísola*	May 14.	42.
9.	Ring ouzel	*Túrdus torquàtus*	April 11.	49.
10.	Wheatear	*Saxícola Œnánthe*	4.	53.
11.	Whinchat	*Rubètra*	May 5.	54.
12.	Redstart	*Sýlvia Phœnicúrus*	April 22.	57.
13.	Grasshopper warbler	*Currùca Locustélla*	13.	58.
14.	Sedge warbler	*salicària*	May 7.	59.
15.	Greater pettychaps	*horténsis*	10.	62.
16.	Wood wren	*sibilàtrix*	6.	63.
17.	Blackcap	*atricapílla*	April 13.	64.
18.	Whitethroat	*Sýlvia*	May 6.	66.
19.	Yellow wren	*Régulus Tróchilus*	April 11.	70.
20.	Yellow wagtail	*Motacílla flàva*	17.	75.
21.	Field lark, or titling	*Anthus triviàlis*	22.	78.
22.	Cuckoo	*Cùculus canòrus*	23.	121.
23.	Wryneck	*Yúnx Torquílla*	19.	125.
24.	Cornerake, or land rail	*Ortygomètra Créx*	19.	129.
25.	Dottrel	*Charàdrius Morinéllus*	May 6.	164.
26.	Common tern	*Stérna Hirúndo*	20.	235.

Red-backed Shrike (*Lànius Collùrio*), n. 40. — On Sept. 5., a specimen, in nestling plumage, was shot on the banks of the river Eden, near the village of Cargo. The red-backed

shrike is very rare in the vicinity of Carlisle: indeed, this is the only specimen we have ever yet seen that has been killed in this district: we have, however, been informed that a few breed occasionally in the neighbourhood of Keswick.

Brown, or Grey, Snipe (*Scólopax grísea*), n. 106. — A specimen was shot on Rockcliff Salt Marsh, on Sept. 25., during a very high tide, which covered the whole of the marsh, with the exception of a few small elevated patches scattered here and there, on one of which the bird was observed busily feeding, and picking up insects, &c., with amazing rapidity. It proved to be a young female of the year, and was in good condition; the stomach was filled with the elytra of several small coleopterous insects: no other individual was seen. This species is most unquestionably one of the rarest of the British birds; and we can only find two other instances of its having been met with in this country. The first is stated by Montagu, in his *Ornithological Dictionary*, to have been killed on the Devonshire coast, in the month of October; the other is said to have been obtained in the vicinity of Yarmouth, by Gould, in his magnificent work on the birds of Europe; and it is rather a singular circumstance, that these specimens were all in different states of plumage; the first, a male, being in its winter livery, the second in its nuptial dress, and the third in that of adolescence.

Double-fork-tailed Sandpiper (*Trínga minùta*), n. 153. — One of this scarce little sandpiper was captured alive on the cattle-market, contiguous to this town, on Sept. 23.; and we believe it to be the only specimen that has been obtained in the neighbourhood of Carlisle during the present year.

Common Gannet (Sùla Bassàna), n. 172. — On June 24., a very fine adult male was shot near the village of Bowness. It was, however, extremely lean, and apparently labouring under some disease; and it is, perhaps, owing to this circumstance that it had wandered so far from one of the breeding stations of this bird on the Scotch coast. The capture of a gannet in this county is of very rare occurrence.

Red-breasted Goosander (*Mérgus serrátor*), n. 201.—Three specimens were captured, in this vicinity, during the month of November: two of them on the coast in the neighbourhood of Drumbrugh, on the sixth; the other on the river Eden, not far from the village of Richardby. They were all young birds of the year, and are the only specimens we have either seen or heard of for several years. The adults are exceedingly rare in this district.

Crested Grebe (*Pódiceps cristàtus*), n. 206. — An old female, in moult, was shot, not far from Carlisle, on Oct. 24. The

crested grebe, in the adult state, is very rare in this part of the county; and the above is only the second specimen that has come under our observation.

Iceland Gull (*Làrus islándicus*), n. 224. — On Feb. 8., an immature specimen was killed on the coast near Brow-houses.

Black Tern (*Stérna nìgra*), n. 236. — Two or three young birds were occasionally seen, during the autumn, flying about the river Eden, in different localities, one of which was killed, on Sept. 12., a little below Eden Bridge. This bird and the Iceland gull are both, we believe, additions to the ornithological fauna of this county.

A few Meteorological Remarks on the Spring, Summer, and Autumn of 1835, *at Carlisle.*

Although the spring of 1835 was remarkably dry in this district, it was nevertheless extremely late and backward, perhaps quite as much so as either that of 1829 or 1832. During the evening and night of March 9., there was a considerable fall of snow, which covered the surrounding country from 6 in. to 8 in. deep, and which materially impeded the passage of the public roads, in various parts, for a short time: indeed, in this vicinity, we have not had so much snow at one time for many years. The weather from March 18. to 22., and again from April 1. to 9., was fine and mild for the season; after this period, however, to May 15., it was exceedingly cold and chilly. The summer, upon the whole, was fine, and occasionally extremely hot and sultry. The autumn, generally speaking, was wet, so much so, that from Sept. 8. to Nov. 7. there was scarcely a day without more or less of rain.

Carlisle, Nov. 10. 1835.

[In VIII. 345, 346., are statements relative to the climate of Kendal, Westmoreland: the mention of them, here, is made in the thought that they, along with the above, may avail any reader engaged in acquiring information on the climate of the north of England.]

Art. VI. *Notes on the Habits of the Jay.* By Charles Waterton, Esq.

Our peas and ripe cherries have attractions which this well-known bird cannot resist. To these it unfortunately resorts, and loses its life by the gun of the watchful gardener,

who never fails to magnify a petty act of plunder into a downright commission of felony. Forgetful of the caution which is its peculiar characteristic at other seasons of the year, the jay becomes remarkably daring and adventurous in pea and cherry time. To this unlucky yearning for the good things of the garden I attribute the general scarcity of this truly British bird. Even here the jay is never abundant, though a safe retreat is always open to it; so that, whilst the magpie is very numerous, it is comparatively a scarce bird. Two or three nests, at most, are all I can annually produce. These, by the way, I find are much more compact, and better put together, than those which naturalists have hitherto described.

The nest of the jay is never seen near the tops of trees, like those of the magpie and the crow. He who feels inclined to study the nidification of this bird must search the lower branches of the oak, or inspect the woodbine mantling round the hazel. In such situations he will find the nest, which mostly contains six eggs; and, if he advances with "cautious step and slow," he may approach within a yard of it before the sitting bird will take its flight.

There seems to be an erroneous opinion current concerning some birds, which are supposed to forsake their eggs if they are handled, be it ever in so slight a manner. This requires some explanation. If you rush up abruptly to a nest, so as to terrify the old bird, you will find, with very few exceptions, that it will forsake the place. If, on the contrary, you approach the nest of any bird in gentleness and silence, and allow the owner to slip off without being fluttered, you may take the eggs out of the nest, and blow upon them, and put them in your mouth if you choose, or change their original position when you replace them in the nest, notwithstanding which the bird will come back to them (even though it be a ringdove), and continue to sit on them as attentively as before.

The jay being one of those birds which have their brilliant colours prior to their first moulting, you will find the male and female so much alike, that it will be no easy matter to distinguish the one from the other.

The young of this bird are born blind: of course, the parent bird never covers the eggs with any part of the materials which form the nest, when she has occasion to be absent.

Here let me remark the immense difference that exists betwixt a newly hatched bird with its eyes open, and one newly hatched with its eyes closed. The first can walk and find its food in a very short time; the second is helpless in

the extreme for many days, and cannot support its own weight. A scientific friend in the United States of North America has asked my opinion of our English account concerning a young cuckoo, which, on the very day that it was hatched, was actually seen retrograding up the side of a hedge sparrow's nest with a young hedge sparrow on its back. After reaching the top, it rested for a moment, and then, with a jerk, threw off its load quite clear of the nest. No bird in the creation could perform such an astounding feat under such embarrassing circumstances. The young cuckoo cannot, by any means, support its own weight during the first day of its existence. Of course, then, it is utterly incapable of clambering, rump foremost, up the steep side of a hedge sparrow's nest with the additional weight of a young hedge sparrow on its back. Add to this, that an old bird the young of which are born blind always remains on the nest during the whole of the day on which the chick is excluded from the shell, in order to protect it. Now, the old hedge sparrow, in the case just mentioned, must have been forced from her nest by the accidental presence of an intruder. Her absence, then, at this important crisis, was quite contrary to her usual economy, for she ought to have been upon the nest. It follows, then, that instinct could not have directed the newly hatched and blind cuckoo to oust the hedge sparrow, even though it had strength to do so, because the old bird would have been sitting close on the nest, but for the circumstance which forced her from it, namely, the accidental presence of an intruder. The account carries its own condemnation, no matter by whom related or by whom received. I had much rather believe the story of baby Hercules throttling two snakes in his cradle.

> " Parvus erat, manibusque suis Tirynthius angues
> Pressit, et in cunis jam Jove dignus erat."

When naturalists affixed the epithet glandàrius to the name of the jay, they ought also to have accorded it to the jackdaw, the rook, the carrion crow, and the magpie, not forgetting the pheasant and the ringdove. All these birds feed voraciously on the acorn; and, with the exception of the two last mentioned, they bury it in the ground, not in hoarded heaps, but separately, here and there, as fancy may direct them.

When the snows of winter have fairly set in, and thus prevented the jay from finding a supply of acorns amongst the fallen leaves in the woods, it is then seen flitting from hedge to hedge in the vicinity of pea and bean stacks, where it may

be observed clinging to the sides of these in quest of uncovered pods; and thus it acquires part of its scanty provender, "till vernal suns and showers" have dissolved the accumulated snow, and cleared its former haunts. To these it returns once more, and consumes myriads of insects in comparative safety. But when the fatal season of peas and ripe cherries arrives, scarcely any thing short of death can deter this unfortunate bird from participating in the proffered feast. The gardener, in discharging his gun at it, is sure to make bad worse by his officious interference; for, in his eagerness to kill the poor bird, he never once reflects that the contents of his piece do ten times more harm to the fruit and to the tender shoots of the cherry tree, than the dreaded presence of half a dozen jays, all with empty stomachs.

Towards the end of April, when nature smiles around, and the woods begin to expand their opening bloom, he who loves to wander through them, in quest of ornithological adventures, will sometimes hear a profusion of imitative tones not far from the place where he is straying, now hoarse and sonorous, now lowered and subdued, and composed of modulations almost approaching to those of song: they are produced by ten or a dozen sprightly jays, assembled in merry mimicry and glee, ere they depart in pairs to select a place for approaching incubation. This is the only period of the year in which the jay shows a disposition to be social; for, at other times, it is a wandering solitary bird, and does not allow its young to associate with it, after they have arrived at a state to be able to provide for themselves. Here, where the jay is encouraged and protected, this part of its economy may be easily verified.

This bird would probably not be noticed as having anything remarkable either in shape or in plumage, were it not for the loveliness of its bastard wing and greater covert feathers. The blue, the black, and the white in them are so exquisitely blended, that the eye is never tired with gazing on the colours. Nothing can possibly be conceived more charming. No other known bird in the creation possesses such a rich exhibition of colouring in the bastard wing and greater coverts. It belongs exclusively to this one species of bird: it is the indubitable and never-failing mark of the jay of Europe; a bird which will ever have a friend in me, notwithstanding its acknowledged depredations in gardens and in orchards. Its pilferings are of short duration: they are too trivial to cause uneasiness, and of far too light a nature to demand the forfeiture of life.

Walton Hall, Yorkshire, Feb. 21. 1836.

ART. VII. *Records of the Results of Dredging.* No. 3., *Including Notices of Species of Natícidæ.* By EDWARD FORBES, Esq.

Two species of Nática occur on the Manx coast; namely, N. monilífera *Lam.* (the Nática glaúcina of British authors) and N. rùfa *Mont.* The former is very frequent, the latter rare: they are found on gravelly bottoms, at a depth of from 12 to 20 fathoms of water. I have examined the animals of both, and do not recollect having met with any description of them in print: as the results are interesting, and perhaps important, I shall state them here.

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Nática monilífera *Lam.*: *a*, a side view of the extracted animal; *b*, a front view, the tentacular hood and mantle reflected; *c*, a front view of the head; *d*, a view of the head from beneath, showing the foot-like process; *e*, one of the cartilaginous jaws; *f*, the operculum. The figures are all larger than the parts that they represent.

The head of the N. monilífera resembles a produced tubercle, is of a pink colour, and presents, in front, a pear-shaped opening, placed vertically, which is the mouth. From the centre of the mouth slightly protrudes the anterior part of the jaws, with the apex of the tongue between them. These jaws are cartilaginous, of a square form and considerable size, toothed in front like a saw. The tongue resembles that of a Littorìna [VIII. 75.], but is shorter and broader in proportion. Beneath the head, and attached to it only, is a process resembling a little foot. The mantle is pinkish white, and presents nothing remarkable in its form: beneath it is a sort of hood, produced at one side into a broad triangular tentaculum, which is pinkish white at the base, and brown towards the apex, but presenting no appearance of an eye. I have examined six animals, and never found more than one tentaculum. The foot is dilated; of a pinkish white colour, with the sides variegated with brown. The operculum is thin, corneous, and of a pale brownish yellow colour.

The animal of N. rùfa is white, with the exception of a fine thread-like line of dark brown, which borders the much dilated foot. It has no eyes, and is furnished with two lan-

ceolate white tentacula, which, when the animal is at rest, are reflexed on the shell, along with the edge of the hood. The shell varies in wanting one of the white bands, which are described as encircling it spirally.

It will be seen from these descriptions that our British Náticæ differ materially, in regard to the inhabitants of the shells, from the generic characters of Lamarck and Rang, who describe the animal as furnished with two tentacula, very long and sharp, bearing on their outer sides sessile eyes.

In the seventeenth volume of the *Linnæan Transactions* is an important paper by that most observant naturalist, Lansdown Guilding, on the family "Natícidæ *Guild.*," in which he divides the Lamarckian genus Nática into two; namely, Nática and Naticina, characterising the latter from the N. mammílla, and some other West Indian species, the animals of which he found eyeless, and differing from the animal of Lamarck in many other particulars, corresponding nearly with the descriptions I have given above, which were drawn up before I had seen his paper. He, however, describes the mouth as "subtus cartilagineum, proboscidiforme, intra caput retractilium." [Cartilaginous beneath, proboscis-shaped, retractile into the head.] May he not have mistaken the small foot-like process beneath the head for a proboscis, to which it has, indeed, a great resemblance?

It would be very desirable to ascertain whether all the Natícidæ with corneous opercula are blind, and whether all those with testaceous opercula accord with the descriptions of Lamarck and Rang.

Should my observation on the tentacula in this genus prove correct, it might induce us to ask the physiological question, Does the absence of eyes degrade the number of tentacula from a generic to a specific character?

I have my doubts as to the identity with N. monilífera of what are placed as large British specimens of that species: they appear to me more nearly allied to N. rùfa. An examination of the animal would settle that point. I have never obtained these shells when dredging: they are said to occur buried in the sand, at very low tides, in the Frith of Forth.

The N. nítida of Donovan is generally described as being white: my specimens have all brownish bands on a white ground. It appears to inhabit shallower water than either N. monilífera or rùfa, and my friend Dr. Knapp informs me it is not uncommon at St. Andrews. I have not as yet seen the animal.

The N. pallídula and lacùna of Fleming form the genus Lacùna of Turton; which may constitute a very excellent

subgenus of Littorìna, as the animals are generically allied. The animal of L. pallídula is white, with two long white tentacula; the eyes at the external base.

All the true British Náticæ may be referred to the genus Naticìna of Guilding, unless the N. tuberosíssima of Laskey be an exception. The N. canrèna is but doubtfully native. They may be arranged thus:—Genus, Naticìna *Guilding:* Species 1. monilífera *Lam.*, synonyme, glaúcina *Mont.*, not of *Lin.*; 2. rùfa *Mont.*; 3. nítida *Donov.*; 4. glabríssima *Brown*, synon. sulcàta *Turt.*; 5. helicoìdes *Johnston*, in *Trans. of Berwickshire Nat. Club*, 1835; ?6., tuberosíssima *Mont.* Appendix, the fry of the larger species: N. pellùcida and álba of Adams.

In describing the animal of the N. monilífera, I have incidentally referred to its tongue. This is an organ on which I am inclined to bestow more importance, in relation to generic character, than has hitherto been ascribed to it. Its form, length, texture, the shape of the expansions at its extremity, and the direction and form of the hooks with which it is provided, are all characters deserving of attention, and constant in resemblance amongst the several species of each genus, especially amongst the holostomatous tribes of Pulmonibránchia, as well as the Scutibránchia and Cyclobránchia. By the way, I should feel rather inclined to question the statement that the tongue in the Mollúsca is worn away at its apex by use. (See an interesting essay on the digestive organs of Mollúsca in this Magazine, the Number for February, 1835.) [VIII. 71—80.] Independent of the somewhat unscientific nature of the supposition, the structure of the end of the tongue would seem to forbid such an idea, especially the constant and precise form of the membranous expansions at the extremity.

6. *Howe Street, Edinburgh, Jan.* 1836.

[*Desultory Notes by the late Rev. Lansdown Guilding, relative to Notices in Vols. I. and II. of this Magazine, on certain Molluscous and Aquatic Kinds of Animals.*]

I. 102. *The Species of Animals which discharge a coloured or acrid Fluid are much more numerous than most Persons suppose.* — The whole of the Laplýsiæ and the Iánthina slowly pour forth a fluid of the most splendid purple, which serves to darken the surrounding water, and confuse their pursuers. In the *P*úrpuræ the fluid is, at first, of milky whiteness, and only by degrees acquires its lovely tints. Other marine beings eject a colourless and pungent secretion, which drives their enemies to a distance. I have seen the Portuguese man

of war (Physàlia pelágica), so common in the calms of the Atlantic Ocean, repel several large fish, which, with a violent splashing and eager motion, were endeavouring to seize and devour it, but were constantly overcome by the stinging particles which nature has given for the protection of this soft, defenceless, and splendid animal. The Cephalópoda have the power of ejecting their coloured secretion to some distance. I was lately in search of shells, wading, with a friend, on a reef, who was much terrified at being suddenly covered from head to foot with the inky discharge of a captured Sèpia.

II. 24. *Many of our floating Marine Animals are highly poisonous to the Skin.* — I have known a soldier in the neighbouring garrison suffer dreadfully while bathing with the troops. I saw the man's arm, in the hospital, much swollen and inflamed. The torture he endured was very great, and did not cease for several days.

The Cuttle Fish, or, as they are here called, sea cats, do not in our seas attain to any formidable size. They are sometimes eaten. They are very quick in their motions: indeed, it is a difficult task to secure them without a spear, so quickly do they hobble away under the rocks.

The Motion of most free Bivalves is moderately slow, and interrupted, and the protruded foot is principally used. I have to describe a new genus, closely allied to Lìma *Sowerby*, which is locomotive, and swims (by opening and closing the valves, and the action of the numerous large tentacula with which the margins of the cloak are fringed) with as much ease as a fish. The collector, indeed, in deep water, without a drag net, would have no little trouble to secure it.

I. 198. *This gelatinous and offensive Substance* was, doubtless, of animal origin, though it might be difficult to ascertain what produced it. The sea is sometimes covered to a vast extent with a subgelatinous, brownish, floating scum, which may prove to be the ova of marine creatures. The larger Gorgòni*æ*, on the death of their aggregate *P*ólypi, are sometimes covered with a gelatinous coat, exceedingly difficult to remove. The air scarcely dries it; and, if moistened by rain, it is quickly restored: boiling alone seems to remove it altogether. The jelly seems to be highly acrid. On a late dredging expedition, my hands were so completely poisoned from fishing up Gorgòni*æ*, from the spicula of marine bodies, and the brittle spines of a kind of Ophiùra, that for many days I could not dress myself. The cuticle of my fingers fell off, and their natural sensation was not for a long time restored.

I. 487. *The slimy Secretion of the* Pólypi *of Corals and Gorgòniæ* is certainly acrid, and often painfully irritating to the skin. They form, too, a slippery and treacherous footing. When walking among dangerous rocks, covered for many yards with these aggregate creatures, and other Radiàta, I have sometimes narrowly escaped serious falls.

I. 355. *The Mollúsca, though destitute of a Skeleton, fashion their Shells with more Correctness* than the writer imagines. Monsters and varieties will occasionally occur, and shells, in their infancy, will present the aspect of genera to which their inhabitants are not even remotely allied: but their thinness and unfinished whorls easily point out their imperfect condition, without leading conchologists into the [case supposed in I. 355.].

I. 495. *Búlla lignària.*— See Humphrey, *Linnæan Transactions*, ii. p. 15. tab. 2. Other shells [shelled molluscous animals] have the gizzard-like organ, as your correspondent will see in the paper pointed out to him, which was written by one of the most active collectors of his day.

II. 69. *The Spinning Slug* is a distinct species, well described in the *Linnæan Transactions*, and beautifully figured in the princely work of my friend the Baron de Férussac. In the Virgin Islands there is a common species of Cyclóstoma, which, having given out a mucous thread, closes the operculum, and swings by the thread when hardened by the air. The creature is thus safe from ants and other enemies.

II. 102. The account alluded to of the structure and habits of the *Naútilus* and Tròchus is fabulous and absurd.

II. 73. This *Astèrias* seems to have been engraved from a rude sketch. It bears a great resemblance to a species common in the Caribean seas. Dele "& *b*, a section of a small bivalve shell."

II. 154. I doubt the fact of star fish destroying oysters.

I. 62. *Erratum.*— For "Polybrachìone," read "Polybrachiònia."—[*Lansdown Guilding. St. Vincent, May* 1. 1830.]

ART. VIII. *Views on the Uses of the Nectary and Corolla in Plants.* By Mr. WILLIAM GARDINER, Jun.

IT is with much diffidence that I submit to your readers the following remarks on the uses of the corolla and nectary in the vegetable economy, these remarks being derived solely from observation; while I believe that correct experiments,

and minute anatomical investigations, are absolutely necessary before any such theory as this that I propose can be clearly and satisfactorily established. But my aim is to attract the attention of some of our eminent botanists to the subject, with the hope that they will furnish us with abundance of good and substantial information on a point so interesting to every lover of flowers.

The nectary secretes a sweet honey-like juice, called nectar, a portion of which supplies with food the little embryo seeds in the ovary, while the remainder is partly consumed by insects, and partly exposed to the influence of external agency by the petals of the corolla, where it undergoes such a change as fits it for nourishment to the anthers. This nourishing of the sexual organs appears to be the primary use of the corolla and nectary, though on this point "doctors differ." Some have even maintained that the nectary is not essential to fructification (Milne's *Bot. Dict.*, art. *Nectary*), and that it is merely a superfluous appendage to the flower (when distinct from the corolla), furnishing food to insects. Nature, however, makes nothing superfluous; and, although thousands of insects live upon nothing but nectar, this furnishing of food for insects I conceive to be a secondary office of the nectary; and they, in return for the food thus derived, efficiently benefit the plant, by assisting it to perform the important function of reproduction: for, entering the flower in search of nectar, they disperse the pollen, and scatter it on the stigma; or, if the male and female organs are in distinct flowers, convey the pollen which adheres to their feet and wings from the former to the latter. Bees, flies, and beetles, of various kinds, banquet on this luscious fare; and butterflies and moths have spiral tongues formed for nothing else than sipping its delicious sweets. Dr. Darwin relates his having counted, on a plant of *Cacàlia suavèolens*, which produces a great quantity of nectar, besides bees of various sorts without number, above two hundred painted butterflies, which gave it the beautiful appearance of being covered with additional flowers.

The corolla has generally been considered as merely a curtain to the floral bed, affording to the sexual organs protection from external injuries. But this, I am disposed to believe, is also a secondary office of the organ; the primary use being, as before stated, to expose to the action of air, light, and heat the nectar, and thus transform it into the proper nutriment of the anthers, in like manner as the sap is exposed and elaborated in the leaves, before it returns to form the new wood.

That the offices here assigned to the nectary and corolla

are the primary ones, appears highly probable from two important considerations.

The first is, that the corolla and nectary are, in most cases, intimately connected with each other; and the connexion of both with the sexual organs is peculiarly striking. This is beautifully exemplified in tubulous flowers, such as the stramonium, primrose, honeysucke, &c., in which the tube of the corolla is the nectary, having the stamens inserted into it near its summit, and surrounding the ovary with its base. The same circumstance is displayed by the ringent, labiated, violaceous, and orchideous flowers. In the genus Campánula, the nectary consists of five valves covering the receptacle, and each surmounted by a stamen, the base of the nectary being so intimately connected with that of the corolla at the point of insertion, that the one can scarcely be separated without injuring the other. Similar instances might be adduced to any extent; but these will suffice for my present purpose.

The other consideration to which I have alluded is the concurrence of number. The stamens always bear a certain proportion to the number of petals, or divisions of the limb of the corolla. Thus flowers with 2 stamens have either 2 or 4 petals, or divisions of the limb; if there be 3 stamens, there will be 3 or 6 petals, or divisions; if 4 stamens, 4 or 8 petals, or divisions; if 5 stamens, 5 or 10 petals, or divisions; if 6 stamens, 3 or 6 petals, or divisions; if 25 stamens, 5 petals, or divisions; and so on.

The secondary uses of the corolla are, to enfold the sexual organs during their infancy, and afford them a sheltering covert in their mature state: opening and shutting as the nature of the various species requires to be supplied with, or defended from, a certain amount of heat, light, and moisture.

In all these provisions, nature has one great end in view; namely, the reproduction of the species. The flower-bud expands, the nectar is secreted, the germ is fostered, and the food of the anthers is elaborated by the corolla. The anther bursts, the pollen is shed on the stigma, the style conveys it to the ovary, and the embryo seeds are fecundated. The seeds come to maturity, they fall to the ground, they germinate; their plumule ascends, forming a stem, protruding the branches, leaves, and flowers; and their radicle descends, and becomes a root. The root absorbs juices from the soil, these juices ascend through the stem to the leaves, the leaves elaborate them by exposure to certain stimulants, and from thence they are conveyed as nourishment to all parts of the plant. The flower-buds appear, they expand, the nectar is secreted, and the same circle of operations continues to be

performed from season to season; the one set of organs, namely, the conservative organs, or the root, stem, and leaves, preserving the individual plant during the natural period of its existence; and the other, or reproductive organs, consisting of the calyx, corolla, nectary, stamens, pistils, and seed, perpetuating the species.

The unity and harmony of design here presented to our contemplation naturally leads us "from nature up to nature's God:" for who but a being of infinite wisdom and power could have given the first stimulus to these wonderful operations? and to whom should the spontaneous gratitude of our hearts be given, but to Him who hath so beneficently embellished our earth with all its gay garniture of fragrant blossoms to cheer and delight us in the onward path of life? and well may we exclaim, in the inspired language of Mrs. Hemans,—

——— "O Father, Lord!
The All Beneficent! I bless thy name,
That thou hast mantled the green earth with flowers,
Linking our hearts to nature! By the love
Of their wild blossoms, our young footsteps first
Into her deep recesses are beguiled,
Her minster cells, dark glen, and forest bower;
Where, thrilling with its earliest sense of Thee,
Amidst the low religious whisperings
And shivery leaf-sounds of the solitude,
The spirit wakes to worship, and is made
Thy living temple. By the breath of flowers
Thou callest us, from city throngs and cares,
Back to the woods, the birds, the mountain streams,
That sing of Thee! back to free childhood's heart,
Fresh with the dews of tenderness! Thou bidd'st
The lilies of the field with placid smile
Reprove man's feverish strivings, and infuse
Through his worn soul a more unworldly life,
With their soft holy breath. Thou hast not left
His purer nature, with its fine desires,
Uncared for in this universe of Thine!"

Dundee, Forfarshire, May 19. 1835.

ART. IX. *Facts on the Climate at and about Kenmure Castle, by New Galloway, Kirkcudbrightshire.* By Mr. ROBERT LORIMER, Gardener at Kenmure Castle.

DEPTH of Rain fallen in Kenmure Garden in different Seasons, stated in Inches and Sixteenths of an Inch.—In 1832: in Jan. and Feb., unknown; in March, 7·8 in.; in April, 2 in.; in May, 1·12 in.; in June, 3·14 in.; in July, 2·8 in.; in August, 2 in.; in September, 2·8 in.; in October, 8 in.; in November,

7·8 in.; in December, 6·14 in. In 1833: in Jan., 2·8 in.; in Feb., 5·6 in.; in March, 2·10 in.; in April, 2·2 in.; in May, 4 in.; in June, 5·12 in.; in July, 2 in.; in August, 2·8 in.; in Sept., 4·2 in.; in October, 6 in.; in November, 8.2 in.; in December, 14 in.: the sum for 1833, 59·2 in. In 1834: in January, 10·12 in.; in Feb., 3·14 in.; in March, 5·14 in.; in April, 0·10 in.; in May, 2·6 in.; in June, 4·4 in.; in July, 3·2 in.; in August, 5·10 in.; in Sept., 3·10 in.; in October, 4·8 in.; in November, 5·6 in.; in December, 4·12 in.: the sum for 1834, 54·12 in. In 1835: in January, 4·2 in.; in February, 9·2 in.; in March, 5·6 in.; in April, 1 in.; in May, 5·9 in.; in June, 1·4 in.; in July, 4·4 in.; in August, 2·2 in.; in September, up to the 24th, 6·14 in.

I have not seen any account of any other place to equal this. Trees do not make much progress in a season, although they are quite healthy. The temperature is much lower here, in general, than at about 20 miles distant, south or east; which I attribute to there being so much uncultivated ground in the neighbourhood: for 18 miles to the south and west, and for a great distance to the north-west, there is nothing but heath-clad hills, composed chiefly of granite.

Sept. 24. 1835.— Harvest work has been suspended for two weeks past by continued rain: there is much grain to cut down around this place yet, and much of it has been destroyed by high winds that have prevailed for a few days past.

Art. X. *Short Communications.*

Mammiferous Animals. —*Affection shown by the domestic Cat to the Young of other Species of Animals.* —Notwithstanding the ferocious character of domestic cats in a comparative state of nature, and the cruelty which they generally manifest torturing their captured prey (especially when about half grown), and revelling with delight in the quivering flesh of the yet gasping victim before they devour it (which, I believe, is the character, generally speaking, of the feline tribe), yet they have, in many instances, been known to manifest great affection for the young of different species of animals, and especially of those tribes which are the peculiar objects of their ferocious appetites.

Female cats, I have frequently observed, not only possess a very strong desire for the preservation of their own young, but are particularly gratified in the exercise of maternal duties, either to their own offspring, or to the young of other species of animals.

A case in proof of this strong maternal feeling occurred in the stable of D. Stokes, Esq., Bankside, a short time ago. A the groom was clearing away some rubbish from a corner of the hay-loft, he found a nest containing four young rats, about three or four weeks old. He immediately took them down into the stable, to a favourite cat, of known prowess, not only in killing rats, but also of putting many of her ill-fated victims to a lingering death. The groom put down the "young vermin" before the cat, telling her "to make a hearty breakfast of them," and immediately returned to the hay-loft. On his return to the stable, in about half an hour, "neither puss nor the vermin were to be seen;" he therefore thought she had obeyed his orders, and despatched her early meal. Some hours afterwards, he was attracted to a corner of the stable by the soothing purr of his favourite cat; and found her performing the duties of a mother to her foster-brood, in a neatly formed nest, which she had constructed for them, and to which she had conveyed them in his absence, and for which she evidenced the strongest attachment. It is, however, but justice to say, that the cat had had her litter of kittens drowned about three weeks before this occurrence took place. Puss was not permitted to exercise her maternal duties longer than to gratify the curiosity of the neighbours. This fact was related to me by an eyewitness of the greatest veracity. — *W. H. White. Old Kent Road, June* 10. 1835.

An Instance of the Attachment of a Female Cat to two Leverets. — During the summer of 1804, as my father's servant was mowing some long grass in a copse adjoining the orchard, he mortally wounded a hare, while she was performing her maternal duties to her offspring. The man brought home the wounded mother, and her two leverets, about five or six weeks old. While my father was examining the injuries the mother had received, the man put down the leverets in the kitchen; and, after the examination was concuded, the leverets were missing. It was, however, soon discovered that the cat, which had had three of her four kittens destroyed a few days before, had conveyed the leverets, unobservedly, to her kitten; and she performed the duties of a mother to them so long as it was necessary for her to do so. I have often been amused with the lively gambols of the kitten and the two leverets. As the young hares became capable of providing for themselves, they used to feed in the orchard and adjoining fields. I have frequently observed their foster-mother go in quest of them in the evening, and give her well-known call of affection and endearment; when her adopted charge would immediately obey the well understood summons; and, although

grown almost as large as herself, would partake of her maternal bounty: when satiated, they would return to their frequented pasture. — *Id.*

Mammiferous Animals and Birds. — *A kind of domesticated Pigeon has been observed to be apparently fostering the Young of a kind of Cat that is wild in St. Vincent.* — Whilst stationed in the Island of St. Vincent, in the West Indies, last year (1834), as a military officer, I kept some pigeons in a box of holes of the usual shape, nailed up against the gable end of my stable, but within reach of cats from the roof. Near the spot there are many wild cats, which breed in inaccessible rocks. One morning, a soldier, who took care of the pigeons, told me that he had found a pigeon sitting on several kittens, and, apparently, nursing them with care; whilst the kittens seemed making every effort to suck the pigeon. He said that he removed them, as the cat would, no doubt, return at night, and might kill the pigeon; but that they were placed very near, in order that their mother might hear them, and be led to them by their cries. I was so much interested by this curious fact, that I desired the soldier to replace them in the same box; and I returned in a few hours afterwards, and found the unhappy pigeon sitting on the kittens, but tormented by their unceasing efforts to procure milk; whilst she was making constant efforts to arrange them, as if to keep them quiet, that she might be suffered to sit still. They remained in her nest during the rest of the day, and were again removed at night, from fear of the cat: but I brought the officer commanding the troops there, and another officer, to witness it; and they agreed that a scene so, to us, out of the usual course of nature, as a bird to be nursing quadrupeds, of a species, too, her avowed enemy, required witnesses to attest it. — *W. R. Hampstead, March* 14. 1835. [Who sent his name, and that of his place of residence, more particularly than above.]

Birds. — I have no pretensions as an ornithologist; but, having been a resident in the country for the last two years, I find no pursuit so delightful as attention to birds. I have not been fortunate enough to discover any rare ones, except

The Bohemian Waxwing, which I met with last winter on Hardwick Heath and at Rougham, both places near this town. Two birds of this species were afterwards shot in the neighbourhood; and, I believe, they were found in many other parts of the kingdom. To-day, however (Nov. 11. 1835.), I have seen one species, which, as far as I can learn, is quite as uncommon here: it is

The Crossbill (*Lóxia curviróstra*). — Walking by a plantation of Mr. Brookes's, at Horringer, I heard a peculiar twittering from several birds, but could not get a sight of them; but, on returning from my walk, on the same spot, I observed a bird quite new to me busily engaged on a fir cone. I had my telescope with me (which, indeed, I always take out on my rambles), and had the opportunity of examining it for some time very minutely; so that I am quite certain of its identity. As I have said, this is the first I have seen living; but its colours are brighter than those of any stuffed specimen I have met with. I never carry a gun, or I could easily have obtained it, as it was very near me. — *J. S. Brown. Bury St. Edmunds, Nov.* 11. 1835.

The Pratincole (*Glarèola Pratíncola*). — An individual was shot on May 21. 1835, in the parish of Quy, Cambridgeshire, and is preserved in the collection of James Thomas Martin, Esq., of Quy Hall. Only four specimens of this species are recorded as having been killed in this country. As Mr. Jenyns, who lives within three or four miles of that place, has not noticed this fifth in his *Manual of British Vertebrate Animals*, he, of course, could not have been aware of it. — *E. Ventris, Clk. M.A. Cambridge, Jan.* 18. 1836.

The Roller (*Coràcias gárrula*), a beautiful individual of, was lately shot at Oakington, Cambridgeshire, and is now in the possession of the Cambridge Philosophical Society. (*Cambridge Chronicle*, Oct. 30. 1835. — The notice sent to this Magazine by *H. Turner, Bury St. Edmunds.*)

Feathers in the Gizzard of the Larger Species of Grebe, and why? (VI. 519.) — On Jan. 5., 1836, a male grebe was sent to me; I think a young bird of the species Pódiceps cristàtus *Lath.*, but it had been much injured about the head. The first stomach contained three perch, one 5 in. long and quite perfect, and the colours almost as bright as if just taken; the gizzard, which was very muscular, contained a great mass of feathers, and among them two or three perch partly digested, one of them $3\frac{3}{4}$ in. long, another $1\frac{1}{2}$ in. I washed the feathers, and, on comparison, found that they corresponded with those on the sides of the bird under the wing, or with those on the thigh. They were chiefly in a half-digested state, and, as there were no traces of them in the lower intestines, it appears extremely probable that they may finally be assimilated with the food: or, is it necessary, in the economy of the larger species of grebe, that the gizzard should be always full? Has any one known it to contain food without feathers? — *T. K. Toomavara, Ireland, Feb.* 12. 1836.

The Osprey. — A very large bird was recently observed

hovering over the fish-pond at the Bray du Val, Guernsey. A man fired at it, but the shot did not strike it. It continued poised on its outstretched wings for some minutes; and then, descending with the velocity of an arrow, disappeared beneath the water; from which it presently emerged, bearing a fine mullet in its talons, and flew with its prey to a wall. A dog ran to seize it; but the bird, throwing itself on its back, seized the dog's jaw in its talons with such tenacity as required considerable force to disengage him from its gripe. It was then strangled, and proved to be a fine specimen of the osprey, or sea eagle. (*Morning Chronicle*, Dec. 1. 1835. — The notice sent to this Magazine by *G. E. Dennes*.)

Sea Eagle (*A'quila albicilla*). — A fine male individual was shot on Dec. 14. 1835, upon the estate of Mrs. Styleman, Hunstanton Hall, by the keeper. The crop and stomach contained nearly fifteen herrings. The distance from tip to tip of its extended wings was 7 ft. 3 in. It is now preserved, kill [illegible]r. Thomas Knight's, preserver of birds and animals, [illegible]ondon Street, Norwich. (*Bury and Suffolk Herald*, Dec. 16. 1835. — The notice sent to this Magazine by *H. Turner*.)

Fishes. — *The ocellated Blenny* (*Blénnius ocellàris* Brunnich), *a Locality of; and the Indenture in the Dorsal Fin of, is not an invariable Character.* — Mr. Forbes, Edinburgh, has sent a copy of a drawing that was taken from an individual when newly caught, dredged on a scallop bank in 20 fathoms water, at Ballough, Isle of Man, June, 1834, to the end that this copy might be submitted to Mr. Yarrell, with the question, for his deciding, whether the individual, which differs remarkably in the form of the dorsal fin, both from Mr. Yarrell's figure (*A History of British Fishes*, i. p. 223.), and that of Bloch, be or be not a variety. Upon the paper bearing the drawing is the following additional information: — Drawing of the natural size of the fish: d., 25; p., 12; v., 2; a., 16; c., 10. Body greyish; brownish white on the back, with ochraceous brown marking. First ray of the dorsal fin [illegible]gest. Two crests fimbriated behind. Dorsal fin rather [illegible]rower in the middle; rays spotted, and a large black spot between sixth and eighth rays. Eyes almost on a level with the crown; irides yellowish.

The drawing and account have been submitted to Mr. Yarrell, who considers the individual, not as a variety, but as a larger one than he has seen; and is disposed to refer the almost total absence of indentation in the dorsal fin to increased age.

Insects. — *The Locust, an Individual of, has been recently*

taken alive in Ireland.—At the meeting of the Belfast Natural History Society, on Dec. 23. 1835, Mr. W. Thompson, V.P., exhibited, through the kindness of Mr. R. Ball of Dublin, Cor. Mem., a fine specimen of the locust (*Locústa migratòria*), measuring 5 in. across the wings. It was captured near Ardmore, in the county of Waterford, in September, 1835, and brought alive to Miss M. Ball of Youghal, a lady who has, for some time past, given considerable attention to native entomology, and whose collection, already extensive, is now enriched by this first specimen of the locust obtained in Ireland.— *T.*

PLANTS.—[*Plantàgo màjor, with a Panicle of Bracteas having the Place of the Inflorescence.*]—This specimen of a very curious and rare variety of the greater plantain (*Plantàgo màjor*) was gathered, by my eldest daughter (Ruth), in a lane about half a mile from Oxford, going from Longmeadow to the village of Iffley, on Sunday last, July 26. 1835. It appears to be the *Plantàgo màjor* var. γ of Sir J. E. Smith; *P. màjor* var. β paniculàta of Gray's *Nat. Arr. of Brit. Plants;* and *Plantàgo màjor* panícula spársa of Ray's *Synopsis*, p. 314. The spike is abortive, and branches into a panicle, with small leaf-like bracteas. Ray calls it the "Besome Plantain, or, Plantain with spoky tufts." It was first observed in the Isle of Thanet, by Dr. Johnson, in the year 1632; and it has been found, more recently, near Ripton, in Huntingdonshire, by Mr. Woodward; and at Bedingham, near Bungay, Suffolk, by Mr. Stone. It is figured in Johnson's edition of Gerard's *Herbal*, p. 420.; and in Parkinson's *Theatrum Botanicum*, p. 494.— *W. Baxter. Botanic Garden, Oxford, July* 29. 1835.

P.S. Since writing the above, I have been looking over your *Magazine of Natural History*, and find that there is, in III. 482., a figure (apparently copied from Gerard) of the same variety, and a notice of a specimen of it which had been found near Durham.— *W. B.*

The specimen sent by Mr. Baxter differs from the figure in III. 482., in the panicle exceeding 2 in. in length; in ers, having a pretty symmetrically conical outline, with the lo those and lower compound spikes having a peduncle about a quarter of an inch long, and those more and more upward, less and less long. The spikes in the terminal part of the panicle (whether simple or compound, it is not easy to see) are sessile, and so closely situate as to, in the specimen which has been pressed, imbricate each other. The peduncled compound spikes arise each from the axil of a bractea, and, I think, each of the spikes and spikelets too.

Plantàgo lanceolàta, Instances of kinds of Monstrosity in.—

"We have a specimen in which the stalk bears several spikes, some sessile, others pendent on partial stalks, and the whole intermixed with leaves disposed in a rose-like manner; and my friend Dr. Thompson found in Haiden Dean the rarer monstrosity of several perfect heads on the summit of one stalk." (*George Johnston, M. D.*, in his *Flora of Berwick upon Tweed*, i. 38.)

Smith has noted, in his *English Flora*, i. 215., of *P.* lanceolàta, that "The spikes are liable to the very same transformations as in *P.* màjor."

Plantàgo mèdia with its Scape bearing, not a Spike of Flowers, but numerous enlarged Bracteas disposed into a Tuft, resembling, more or less, a many-petaled Rose Flower. — This form is cultivated in some gardens, and, so far as I have experienced, is constant, or very nearly so, to this character, both in all the scapes it produces in any one year, and in all successive years. I have often suspected that this is the form implied under *P.* màjor *δ* in *Eng. Flor.*, i. 213., and as "The rose-shaped variety . . . often kept in gardens, for the sake of curiosity," noted in p. 214.; because I have never seen a form of this character belonging to the species *P.* màjor. I have never referred to the works cited in *Eng. Flor.*, in identification. The two species are distinguishable easily. — *J. D.*

Íris tuberòsa grows wild in Cornwall (V. 200, 201.); *some Localities of it.* — It grows in this neighbourhood, in Truciffe Lane, on the top of a hedge, on the left-hand side as you turn up from Love Lane, about fifty yards from the turn. At Barfle, a small tenement belonging to Lady Davy, the orchard is overrun with plants of it: they are, in fact, a perfect nuisance. I have been informed of two other places where they grow; but, as I have not examined these places, I shall not mention them.—*John Harvey, Druggist. Penzance, Oct.* 29. 1835.

[I have noted in V. 201. certain differences that the figure of *Í*ris tuberòsa (given in IV. 29.) shows from the *Í*ris tuberòsa I had known. That figure is copied from that in Sibthorp's and Smith's *Flora Græca*. Since the time of my noting this, information of three species of *Í*ris with tuberous rootstalks, and 4-edged leaves, has been published in Sweet's *British Flower-Garden*, second series, t. 146., and the three grouped into a genus, which R. A. Salisbury, Esq., had indicated long before, in the *Hort. Trans.*, and applied to it a term of Tournefort's; namely, Hermodáctylus. (This is interpreted, in Sweet's *British Flower-Garden*, *Hermes*, Mercury; *daktylos*, finger; the semblance of the tubers to the human fingers.) The one figured in Sweet's *British Flower-Garden* is there

named longifòlius, where that figured in *Flora Græca* is named rèpens; and that figured in Curtis's *Botanical Magazine*, bispathàceus. It may be well to obtain tubers from both the Cork habitat (IV. 28, 29. 437, 438.; V. 197.) and from the Cornwall one (IX. 205.), or Cornwall ones (V. 200, 201.; IX. 205.), and cultivate and compare the plants, to ascertain if they be of one species, or of more.]

Anagállis cærùlea, the Question of the Distinctness, as Species, of it and A. arvénsis. (VIII. 633.) — I introduced the cærùlea into my garden ten years since: plenty of plants have been produced from seeds that have fallen into the ground. By carefully rooting out the arvénsis, I have almost succeeded in extirpating it: this year I had but three plants of it; but those of cærùlea were numerous. — *John Harvey, Druggist. Penzance, Cornwall, Oct.* 29. 1835.

Art. XI. *Queries and Answers.*

Why do Birds sing? (VII. 484—486.) — Mr. Conway's second question, "Why do birds sing?" is next to be considered. Although many theories have been framed to answer this question, I had never been wholly satisfied with any one of them, and thought the subject would require a great deal more investigation, till I met with the following passage in Mudie's *Feathered Tribes*, which, I think, goes far towards solving this baffling problem: —"The purpose which the song of birds answers in the economy of nature, is one of those mysteries, which, like the difference of tint in their plumage, human ingenuity has not yet been able to explain. It is not, however, a mere pairing cry, because it is continued till the birds break the shell, and, in some instances, till they are able to fly. We may be sure, however, that it has its use; and, as we can observe that the females of all birds which have that cry, whether it be what we call song or not, are excited when it is uttered by the male, it *may* be that it produces in the female that heat which is necessary for hatching the eggs. In ourselves, there are many sounds which make the heart beat, the blood dance, and the whole body glow, we know not why; and thus we have, at least, no ground for denying without proof that the other animals may be affected in a similar manner. Perhaps the more philosophical way of considering it is, to suppose that it produces general excitement, and a power of more energetic performance in all the labour which the birds can undertake." (I. 245.) This extract (from

the most delightful work with which I am acquainted, on the birds of Britain) explains why birds are gifted with the faculty of song: to find out how they are enabled to sing, recourse must be had to the most useful of sciences, phrenology, which teaches us, as is correctly stated in VII. 568., that birds have an innate organ of tune, which enables them to sing, in the same way that the organ of language enables man to speak. However, this interesting subject requires much further elucidation, and, among your contributors, perhaps no one would be more competent to the task than Mr. Waterton, who so well deserves the epithets bestowed on him by Mudie (*Feathered Tribes*, vol. i. p. 148.), of "amiable, eloquent, and enterprising." — *S. D. W. Near Derby, Nov.* 22. 1834.

Does the Bramble Finch breed in this Country? (VIII. 512.)— There is, I believe, no authentic instance of the mountain finch, or bramble finch, having brought up young ones in this country. A notice of a pair of this species having begun a nest is given in the *Field Naturalist's Magazine*. The writer says, "I have little doubt in my own mind that two mountain finches, which, I believe, are not known to breed in this country, are now building in a large patch of furze in Hurst Wood. I watched them so long, and observed them so accurately, that I can hardly think I could have been mistaken. I saw the nest also; but they had not begun to lay, and I was obliged to leave the neighbourhood." In furze is a strange place for a bird to build in, that usually makes its nest in lofty pines and firs. Accounts of this nature should be received with great caution, as common observers are so apt to be deceived. Three or four winters ago, a mountain finch was shot in a field of stubble near Derby. It is now in my possession. — *S. D. W. Near Derby, Sept.* 6. 1835.

Is the Redstart known to feed upon the Hive-bee? — *H. T. August*, 1835.

Could any one inform me how to preserve Bees, and other Insects covered with Down, from the Attacks of Acari? — In using Mr. Waterton's receipt, I found it stuck the down so completely together, that no means I have used have been able to make them smooth enough to appear in a cabinet. — *C. T. Nov.* 24. 1834. [This question has been submitted to Mr. Waterton, who has sent four specimens of humble bees, and has stated that they "have been *soaked* in a very strong solution of corrosive sublimate, *much* stronger than what is required to preserve them for ever from the depredations of *Acari*. Their intestines have been extracted." Mr. Waterton has sent the specimens, to prove that not any injury has

been produced to their hirsuties, except that he has remarked that the solution was so strong, that he "should not be surprised if the white powder appears upon their hirsuties." (V. 684.) The degree in which this is the case renders the powder not obvious, though, on close looking, perceptible. The copious hirsuties of the specimens is unclotted and unruffled. The specimens are at the service of C. T.]

Large Botanical Engravings. — Are there published any engravings of a sufficiently large size to be suitable for illustrating some lectures upon the elements of botany, to be delivered before a small and private audience? If you are not aware of any, perhaps some of your readers may.—*W. D. P. Islington, Feb.* 24. 1836.

ART. XII. *Retrospective Criticism.*

THE Sibilous Brakehopper (*vulgarly, Grasshopper Lark*) *Locustélla sibilans.* (p. 106.) — Your correspondent has evidently mistaken one of the pipits (*Anthus*) for the sibilous brakehopper. The latter species, undoubtedly, has a short, strong, and crooked claw, as described in *Montagu's Ornith. Dict.* I have seen many specimens of the former curious and interesting species, and none of them had the hind claw at all produced. It is quite a mistake to suppose that it has any affinity to the larks (*Alauda*), amongst which it was, on account of its colour, classed by the older ornithologists; and some went so far as to add the long hind claw in their plates, to render its similarity to the larks more obvious! Now, however, it has found its true affinities, in the family Sylviadæ, subfam. *Philomelinæ*, and genus Locustélla, of which group there is only a single British species. The description given by Selby of its habits and plumage is, I believe, perfectly correct. — *Neville Wood. Foston Hall, Derbyshire, Feb.* 12. 1836.

Epeira diadema (VIII. 575.), the figure of, which you have given with my remarks, although an excellent representation of the species, and, perhaps, of the size of which it usually occurs in the south of England, is much larger than any individuals that I have seen in this neighbourhood; perhaps nearly twice as large as the one of which the anecdote is told: therefore, calculated to convey an erroneous idea of the creature's strength. — *Wm. Gardiner, jun. Dundee, Forfarshire, Nov.* 13. 1835. [No. 129. of the *Penny Magazine* contains interesting information on spiders, illustrated by engravings. Epeira diadema is the theme of some of the information.]

The Cause of the Colours of the Swiss Rivers. (VII. 438—443.) — If Mr. Clarke and J. R. have fertile talents for speculation, and a great deal of spare time which they wish to employ in a subject not soon to be set at rest, they cannot fix upon a better than the cause of the colours of the Swiss rivers. (VII. 438—443.) On my arrival in this country, it was one of the first things which forced itself upon my attention; and during fourteen summers, and nearly as many winters, it has been to me an inexplicable problem (no proof, my friends will say, of its being a difficult one). I have taxed the chemical, optical, and every other sort of knowledge, of my various acquaintances, some of them of no ordinary attainments; but all their speculations have ended about as satisfactorily as Corporal Trim's story of the King of Bohemia and his seven Castles; that is, they left off pretty nearly where they began. Nothing is easier than to study any one river that may be chosen, and to form a most plausible theory, which shall leave nothing relating to its colour, &c. &c., unexplained; but a day's march will be nearly sure to bring you to the banks of another by which every word of your system will be overturned: for example, let theories founded on the Rhone, or the Rhine, be tested by the Orbe. On considering attentively the whole of the article in VII. 438—443., different as the opinions there expressed may be, I should have little hesitation in saying that they are all partly right and partly wrong. — *P. J. Brown. Thun, Canton of Berne, Switzerland, June* 22. 1835.

The Species of Fossil Shell described in p. 103—105., *and illustrated with a Figure, and deemed a Species of Cònia, is not a Species of Cònia.* — In reference to my communication in p. 103—105., I feel it but justice to Mr. Lyell to state that I was prevented showing him the article in question before I sent it to you; and, since it has been published, I have received a letter from him stating, that, although at the first sight of the fossil, he conceived it to be a Cònia, as stated in his note alluded to, he soon afterwards, by accurately inspecting it, came to a similar conclusion with Dr. Mantell, that it is either a hippurite, or, in all probability, of the family of the "Rudistes" of Lamarck. —*Robert Hudson. Feb.* 6. 1836.

A Communication from Dr. Mantell on the same Subject. — Mr. Mantell begs to make a few remarks on the communication from Mr. Hudson, inserted in the February number of this Magazine (p. 103—105.), relating to a fossil shell from the chalk at Lewes.

When the specimen was first submitted to Mr. Mantell's inspection, he informed Mr. Hudson, that, in his *Geology of*

the South-east of England, he had named it Hippurìtes, in conformity with the opinion of the eminent geologists who had examined specimens discovered by Mr. Mantell many years since, at the Meeting of the British Association at Oxford. At the same time, Mr. Mantell expressed his doubts as to the correctness of the appropriation, and particularly pointed out to Mr. Hudson the absence of the two internal longitudinal ridges which are peculiar to the Hippurìtes. It must be an oversight for Mr. Hudson to describe his specimen as unique, when Mr. Mantell had shown him, not only portions of single specimens, but also a group of four large ones. Mr. Hudson's example is interesting, as exhibiting the form of the cone very perfectly. Two still finer specimens have been found lately in a chalk-pit, near Worthing, by Mr. Dixon. Mr. Mantell would also mention that the reticulated structure of these fossils more closely resembles that of the Hippurìtes than it does that of the Còvia, or others of the *Bálanus* family. — *Brighton, Feb.* 27. 1836.

Tetragonólepis angùlifer is the name which Professor Agassiz has given to the species of fossil fish that is figured in this Magazine, V. 549., where a notice of it is given from Mr. Greaves, in whose stone quarry it had been found at Wilmert's, near Stratford upon Avon. Mr. Weaver, of the Natural History Museum, Birmingham, now possesses the specimen, by the liberality of Mr. Greaves. Professor Agassiz does not know of any other specimen of this species, and has had it drawn on stone. Tetragonólepis: the scales four angled. This information is derived from the *Analyst*, No. xiii., Oct. 1835, in which a lithograph and a notice of the specimen and species are given.

Flinty Substances found in the Ashes of burnt Hay-ricks. (VIII. 631.) — I am induced to offer a few remarks on your observation on this subject (VIII. 631.), from having been an eyewitness of the fire that occurred in the Old Kent Road, I believe on Sunday, August 2. 1835. Seven hay-ricks, containing upwards of 200 tons of hay, several sheds, farming implements, &c., were almost entirely consumed. The fire originated in generated heat, and continued burning for eight days. I visited the fire daily; and, from enquiries I made of the men belonging to the farm, I learned that a ton weight of common salt had been sprinkled among the hay, during the time it was being placed together in the ricks. This circumstance, I think, may, in some measure, account for the immense masses of flinty matter that were found on removing the ashes. It appeared to me that the salt, in a vitrified state (if it be capable of assuming that state; and here my slight

knowledge of chemistry, will not help me out), formed a great portion of many of the masses produced, some of which possessed much more flinty appearances than others; and those portions which appeared to be formed of hay alone had a great resemblance to fine network, *en masse*, and were easily pulverised, probably from their not having been exposed to such intense heat as the harder substances. Some wood, also, both in the dry and the green state, was consumed, which might also contribute to the formation of these flinty substances. I have no doubt but there must have been some cause for such flinty formations, besides the hay; for I witnessed a similar fire (five hay-ricks), a few years ago, in Nottinghamshire, in the ashes of which I am not aware that any flinty substances at all were found: indeed, if there were any, they were so inconsiderable, both as to size and number, as to escape notice; whereas in the late fire in the Kent Road I saw some masses that measured from 18 in. to 2 ft. in length, and 12 in. or 14 in. broad, many of which were sold from a shilling to half-a-crown each. The taste of these substances was very salt.

I have a still further reason for thinking that salt formed a portion of these masses. I remember, some years ago, that one of my father's favourite horses went blind, from a film which rapidly spread over both eyes. A skilful veterinary surgeon was consulted as to the means of cure; and he used the following recipe: he ordered a branch of a *green ash tree* to be cut, about 1 ft. long, and 6 in. in diameter; in one end of which he bored a hole with an auger, about 1 in. in diameter, and 7 in. or 8 in. deep; this cavity he filled with common salt; then plugged up the hole with a well-fitted plug of the same wood (green ash), and cast it into the fire, where it continued till the wood was entirely consumed. There then remained in the fire a flinty cylindrical substance, *not unlike the substances* found in the fire above alluded to. This substance was pulverised, and, a small portion being put into a quill, was blown into the eyes of the horse. The remedy was a painful one; but so effectual, that the horse, in a few days, had the full use of his vision.

I am therefore of opinion, that the hay alone did not produce the masses found in the ashes; but, however, to bring the matter to a certainty, I shall be most happy to supply any gentleman with specimens of the substances produced in the fire above alluded to, in as great a variety as I can select, if they will take the trouble to analyse them. It would, also, be worth while for any gentleman to make the experiment with the *green ash and common salt*, as mentioned above, in order to compare the two substances together. N.B.—All commu-

nications on this subject must be free of postage, and directed to be left at No. 8., Bow Churchyard. — *W. H. White. Old Kent Road, Dec. 2.* 1835.

ART. XIII. *Hints of Improvements.*

PROPOSALS for the Publication of a Work on the Nests of British Birds. — It appears to me astonishing, considering the great interest which is now taken in ornithology, and the number of books which have been written on the subject, that so little attention should have been paid to the nests of birds. There is no complete ornithological work of any British author, with which I am acquainted, that includes representations of the nests of each of the species. In a work by James Bolton, called *Harmonia Ruralis; or, an Essay towards a Natural History of British Song Birds*, figures of the nests of each species are given; but most of them are in a very inferior style, as might be expected from a work published in 1794. For instance, plate 14., containing the nest of the green grosbeak (*Coccothraústes Chlòris*), is so totally destitute of resemblance to the nest of any small bird I know, that it would be impossible to recognise it. It looks more like the front of the nest of the ivy wren (Anorthùra Troglódytes) than anything else. The nest and eggs of the corn bunting (Emberìza *Miliària*) are in better taste; and the nests of the yellow bunting, the reed bunting, and the redpoll linnet (plates 18. 20. 22.) are beautifully figured. But this work comprises only forty species, while there are about 300 British birds. Such plates as those of Selby might very advantageously have contained a figure of the nest and egg of each species; and if this had been done, instead of cramming birds of different species, genera, and even families, into one plate, as is done in that work, the value would have been greatly enhanced, instead of, as at present, impaired. Audubon has happily avoided the unfortunate practice of representing birds of different species in the same plate; but he has very seldom given the nests of the birds. That he could have accomplished this, is evident from the very superior style in which those which he has figured are executed: for instance, that of the marsh wren.

Till lately, a work on eggs was much wanted; but now that Mr. Hewitson is so ably supplying that deficiency, in his work on *British Oology* *, I am anxious that some good orni-

* It is to be wished that Mr. Hewitson had brought out his work arranged according to Selby or Temminck, instead of the irregular and ill-concocted plan he has at present adopted. I am aware that it will be

thologist should undertake a work which should be devoted to those fairy cradles, birds' nests; or, still better, a complete work should be forthwith commenced, containing a figure of every species of British bird, together with its nest and egg, as far as possible the size of nature. The work might be about the size of that of Gould's *Birds of Europe;* and a page or more, as required, of letterpress might be given. There is no work, with which I am acquainted, that does not contain figures, either of bad form, or incorrectly coloured: even the works of Gould and Audubon are no exceptions. It should be the care of the author of the work which I am proposing not to admit any figures which would be liable to this censure; and, in short, he should endeavour to make it worthy of the present advanced state of science, and to rescue ornithology from the blame, which I have heard attached to it, of being half a century behind most other sciences. In Mudie's *Feathered Tribes* two nests are given, but apparently more for ornament than as representations of the real objects. That of the dipper is, as Mr. Salmon remarks [VIII. 358.], most erroneously open at top. I am rather surprised that such an ornithologist as Mudie should have allowed this. The figures of the birds are also far from what could have been wished: I advised a friend of mine to have the plates left out when he sent his copy to be bound; and a great improvement it has proved. This work, I am glad to find, has been appreciated by the public; for it is near a third edition. I shall conclude by hoping that my hints for the production of a work on the nidification of British birds will be productive of the desired effects, and that other correspondents will second my wishes. — *C. T. Wood. July* 10. 1835.

Remarks on the extravagant Price of Works on Natural History.—It ought to be the aim of every one to remove, as far as lies in his power, the obstacles which may happen to impede the acquisition of his favourite pursuit; and, with this view, I wish to draw the attention of your readers to the very unfair practice, which has prevailed to an extent of which few are, perhaps, aware, of charging for works, especially works on natural

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replied, that the eggs could not be procured with certainty; but if, before he had commenced the work, he had made known what eggs he wanted, surely individuals who have collections would have been liberal enough to have supplied him with those he needed. The work should also have been brought out monthly, and not at the present long intervals. (See a review of *British Oology* in No. xi. of the *Analyst.*) There ought likewise to be two volumes, one containing the eggs of land birds, and the other those of the water birds. However, as this is the first work which has been dedicated to eggs, these numerous failings must be overlooked, and improvement must be looked for in a future work.

history, many times their worth. It is stated in the prospectus to the *Family Library*, that the notoriously high price of works on natural history has deterred many from looking into natural history. Now, although I do not think that any one naturally fond of that study would be prevented from continuing it by pecuniary obstacles, yet, I do think that the grievance would be a serious hindrance in the prosecution of the subject, and, as such, should be removed. For those readers who are not aware of the unwarrantable charges put on books, I will give a few examples.

Shaw's *Zoology* is advertised as follows:—"Shaw's *Zoology*, vols. ix. to xix., 6 vols., published at 3*l.* 15*s.* per vol., for 2*l.* 10*s.* the 6 vols. (large paper copy) quite new." Only think, of charging 3*l.* 15*s.* for a work which may any day be obtained for 7*s.* 6*d.* per vol., neatly done up in cloth, or 10*s.*, handsomely half bound! Another striking instance occurs in the *Ornithologia*, a little work by Mr. Jennings, published at 15*s.*, but which may now be obtained for 2*s.*: and it is worth no more. *The Field Book* (published in 1833) was published at 25*s.*, and may now be had for 16*s.* Rennie's edition of the *Ornithological Dictionary* was published at 21*s.*: I procured it, quite new, for 15*s.*, thus deducting 6*s.*; for which might be obtained one of Swainson's admirable volumes on zoology, in Lardner's *Cyclopædia*, replete with profound views and philosophic induction; or six numbers of the *British Cyclopædia of Natural History*; or three numbers of your own interesting and useful *Magazine of Natural History*.

Your quondam reviewer, A. R. Y., says (Vol. IV., p. 39.), "The high price of books is a subject on which, whatever might have been the case formerly, there is no reasonable ground for complaint in the present day." While writing this passage, your able correspondent had an eye to the *Library of Entertaining Knowledge*; and, certainly, the works of which that consists cannot be charged with being over dear, whatever else may be said of them: see the *Analyst*, vol. ii. p. 347. But I am sure that A. R. Y., and every other equally candid person, will confess, on considering the previous statements, that the poor naturalist does not get near his money's worth from the bookvender.

There is hardly a work that could be named that is not charged far above its worth. Jesse's *Gleanings* is an interesting work, full of pleasant anecdotes; but it is exorbitant at 10*s.* 6*d.* per vol. *The British Naturalist* is far more reasonable, being 6*s.* per vol. We are happy in perceiving that this excellent little work has, as predicted by A. R. Y., arrived at a 2d edition. The last edition of *Bewick*, published in 1832,

is rather dear at 1*l.* 16*s.* Mudie's *Feathered Tribes* is reasonable at 1*l.* 8*s.*; but we hope that in the next edition the odious plates will be omitted; and we are sure that an author of such eloquence and depth of mind can stand in need of no such catchpennies. His *Natural History of Birds* was, perhaps, at the time when it was published (Dec. 1834), the cheapest work that ever issued from the press; but it has since been eclipsed. Mr. Combe's *Constitution of Man* was published, in April, for 2*s.* 6*d.*! and, within a month's time, a large edition, consisting of 2000 copies, was bought up. It has since been published, enlarged, price 4*s.*; and no one who has that sum at command should be without that invaluable work. The original edition of Wilson's *American Ornithology* (9 vols. quarto) is dear at 25*l.* Audubon's large *Plates* are sold at a more reasonable rate; but I must say that I was disappointed, very much disappointed, on first beholding them. The plants and flowers are far better executed than the birds; and, altogether, Audubon's forte, in my opinion, is in his descriptions: throughout his two unrivalled volumes of *Ornithological Biography*, hardly a single page can be pointed out which does not display the rich luxuriance of the author's mind, and the peculiar eloquence for which his descriptions are distinguished. The chapter on the wood turkey (vol. i. p. 1—17) is a masterpiece of ornithological biography; and the description of the white-headed eagle has only been rivalled in eloquence by Wilson or Mudie.

However, to return to the subject before us. The beautiful plates of Gould (particularly his *Birds of the Himalaya Mountains* and *Birds of Europe*) may be confidently recommended to the ornithologist, both on account of their splendid execution and reasonable price; and we cordially agree with the praise bestowed in No. iv. of the *Analyst*: "The Birds of Europe by J. Gould. Nine parts of this splendid work have already appeared. The author, evidently a *Falco* [an *Aquila*] of the golden eagle kind, has taken wing nobly; soars far above all his European competitors; and leaves even the American Audubon himself at a goodly distance below." (Vol. i. p. 260.) The price of this work, when complete, will be 60*l.*; that of Audubon, 160*l.*; nearly all the copies of Gould's work (300) are subscribed for. The next work which occurs is the *Wanderings in America*, by Waterton. The first edition of this work (published in 1825) was a ridiculous price, 1*l.* 11*s.* 6*d.*; the price of the 2d edition, published in 1828, was brought within a more reasonable compass, 10*s.* I entirely agree with an eloquent writer in the *Mirror* (vol. xxv. p. 371.), when he says, "With the exception, perhaps,

of Wilson and Audubon, Charles Waterton may be said to stand first among field naturalists." His extraordinary perseverance, his enthusiastic love of nature, his singular power and beauty of description, all entitle him to this praise. And higher praise cannot be bestowed, than in affirming that this little volume is fully worthy of a place beside those of the most illustrious ornithologists of the age, Wilson, Selby, Mudie, and Audubon. Next comes the *Natural History of Selborne*, by the placid Gilbert White. Of all the numerous editions of this work with which I am acquainted, that edited by Rennie (published 1833) is the best. I have procured it for less than the advertising price, through the proper bookseller, which shows that 16*s.* is an unfair charge.

Indeed, there is scarce a work that can be named, from the *Ornithologia* of Jennings to the *Ornithological Biography* of Audubon, that can be pronounced to bear a price proportionate to its value; and none but the public can be blamed for the continuance of the grievance. As long as individuals will continue to purchase at any price the booksellers choose to ask, so long will they be obliged to be cheated of half their money's value; but if they will apply through the proper sources, they will be enabled to double or triple their literary meal with the same money. These remarks, which may also serve as a sort of guide to books, will, I hope, be attended with the proper results. There are booksellers who make fair charges, and others who make unfair charges; and as long as preference is shown to the latter, the price of books will continue at the present ruinous height. This being the case, it is sincerely to be hoped, that the wealthier class of naturalists, if not for their own sakes, will, at least, for the sake of their poorer brethren, contribute their aid to lower the greedy and rapacious charges made by the bookvenders; for there are many, like your correspondent H. (II. 465.), "obliged to economise, not having the means to purchase the required works on science." — *C. T. Wood. Burton on Trent, July* 19. 1835.

ART. XIV. *Instances of Man's Progress in the Extension of his Knowledge of Natural History.*

THE Museum at Saffron Walden, Essex, has closed for the season, for the purposes of rearrangement, after a weekly exhibition of its contents to the public for six months.

It possesses specimens of the greater part of the British kinds of birds; a few only of the more rare being wanted to

complete its collection. There is also a good collection of African hawks: some foreign birds, among them the lyre bird (Menùra superba) and argus pheasant (A'rgus gigantèus) stand conspicuous; and others of less attraction.

In the department of comparative anatomy, the skeletons of an African elephant, a two-horned rhinoceros (*Rhinóceros bicornis Burchell*), and a hippopotamus, form interesting objects. A few smaller skeletons of British animals and birds make up the list.

The entire collection, which has been accumulated in about three years, comprises, also, specimens of indigenous animals, and of the great ant-eater (Myrmecóphaga jubâta), Cape ant-eater, two-horned rhinoceros, koudoo, gnu, several of the Cape antelopes, and other stuffed specimens. It has also a large collection of fossils, some minerals, exotic shells, British land and freshwater shells, a collection of phrenological busts, some coins, some armour, specimens of carving, weapons used by the aboriginal tribes of Australia, the South Sea Islands, &c., a collection of British eggs and nests, specimens of art, and some miscellaneous articles, as corallines, marine productions, &c. In the entomological department are some of the rarer British Lepidóptera. The coleopterous tribes, and most of the other classes, are very imperfectly filled up. The collection of foreign insects is tolerably full. In botany, most of the plants of the neighbourhood are preserved, with some others not to be obtained in this district. Some serpents and lizards from South Africa add to the interest of the collection; and there are also some specimens of Roman antiquities found in the neighbourhood, and among them a fine amphora.

Although closed to the public, the trustees composing the board of management will have great pleasure in showing it to any scientific gentleman interested in any of the branches of natural history included in its stores, and would be gratified in being able to exchange any duplicate specimens they possess for others which are still desired.

During the period in which this museum has been open to public inspection, about 2400 visitors have entered their names in the admission book. — *Anonymous. Dec.* 23. 1835.

The Norfolk and Norwich Museum. — During January, 1836, Professor Sedgwick delivered a most valuable and interesting course of lectures on geology in Norwich, and gave a great impetus to the objects to which the museum is relative. " With respect to the future, the professor said the committee might calculate on his cooperation, as far as one or two lectures, when he came to Norwich [where he has

some clerical duties]; and that he would go along with them in the promotion of the objects of the museum as far as his health and circumstances would allow." (*The Bury and Norwich Post*, Jan. 27. 1836.)

Sussex Scientific and Literary Institution and Museum.— Pursuers and promoters of the pursuit of science, connected with Sussex, have been endeavouring to establish what corresponds to this title. It is instituted on the basis of exhibiting publicly Dr. Mantell's museum (III. 9—17.; VI. 75.; VII. 49.; VIII. 99—102. 125, 126.) for three years, under arrangements agreed on; and subject to the conditions of the public exhibition being, at the option of either party, discontinued at the expiration of that term, or, with the concurrence of both, renewed; and of the Institution's claiming the first offer of purchase, should Mr. Mantell be induced to dispose of it; and has for its objects, besides this, the formation of a permanent county library of reference, and the connexion of a reading-room, and the supplying of lectures on various subjects. Previously to Feb. 2. 1836, a meeting had been held at Brighton, the vicar in the chair; and Lord Egremont had become the patron, and made a magnificent donation; and the donations of others and his had amounted to upwards of 1400*l.*; and several persons had become subscribers, and committees had been formed. The sub-committee had been endeavouring to procure suitable premises in a central part of the town, and had requested cooperation and support, even donations of books, to enable them to carry the Institution's objects into effect on a scale worthy of Sussex and Brighton.

A Zoological Garden is being instituted at Bristol.— *P. M., jun. Bristol, Nov.* 18. 1835.

The Botanic Garden, Bury St. Edmunds, Suffolk.— A list of a few species of animals, almost all birds, and most of these aquatic ones, kept in a living state in this garden, is registered in *Gard. Mag.*, xi. 43. Since then Miss Bevan has presented a pair of the pure white variety of the common pheasant; the Rev. H. Cholmeley, an extraordinary mule bird; Mr. R. Hedley, surgeon, Bury, an Esquimaux dog; and Sir Hyde Parker, Bart., a female of a species of monkey with a prehensile tail, and a young male ocelet. The Esquimaux dog appeared to have suffered much from its passage on board a whaler. (Sir J. Ross, in his Appendix, mentions the remarkable fact, that "an American wolf will go amongst any number of Esquimaux dogs, and carry off any one from amongst them, without the others attempting to attack it; and such is their extreme dread of the wolf, that they begin to

tremble and howl whenever they are aware of its approach.") The monkey and ocelet were brought, a short time ago, from South America, by Capt. Ayres, nephew of Sir H. Parker. A pair of the monkey was brought; but the male died from cold soon after its arrival at Melford, Suffolk, Sir H. Parker's place of residence. (*The Bury and Norwich Post*, Dec. 23. 1835, and *H. T.*, *Jan.* 14. 1836.)

The Islington Literary and Scientific Society. Extracts from their *Third Annual Report*, 1836. — "This Institution may now be considered, so far as human foresight can extend, as placed beyond the reach of failure: the weak and trying state of infancy has been passed in safety, and the stronger period of youth has arrived..... Considerable additions have been made to the specimens of natural history; and attention has been paid to the scientific arrangement and classification in the museum; this, however, is yet far from complete: indeed, the collection is still in its infancy; but" the "committee, nevertheless, with confidence recommend it to the students of natural history, believing that, from its being open to examination, advantages may be derived from it which larger and less accessible collections cannot afford."

The South London Mechanics' Institution. — Mr. W. H. White, who favours this Magazine with many contributions, was, by a bill received, to lecture on Jan. 19. 1836, at this institution, on the atmosphere, its nature, extent, composition, impenetrability, inertia, elasticity, density, refractive and reflective powers, chemical properties, influence on vegetation; the phenomena of winds, storms, hurricanes, meteors, aurora borealis, &c.; and on Jan. 26., on the ocean, its extent, depth, colour, saltness, taste, temperature, luminosity, incessant motion, currents, tides, productions, inhabitants, &c. Mr. White has stated that the Institution, though yet in its infancy, promises well; that Dr. Epps has lectured on phrenology, Dr. Schmidt on magnetism, and Mr. Ricard on steam; and that other lecturers are engaged; that the lectures are generally well attended, and that every one seems anxious to avail himself of the ideas delivered; that a phrenological class is formed, and that other classes are about being formed; and that the Institution has a small but increasing library, which is available to every subscriber.

The Subject of the London Entomological Society's Prize Essay for 1836, *is the Cóccus of the Pine-apple Plant.* — The plan of the essay is, that it do include a description of the natural history of the insect, and of a mode or modes of preventing its ravages, founded upon actual experiment; and be accompanied by testimonials of the measure of success of the

mode or modes. Every candidate is to forward his essay, with a fictitious signature, and the testimonials, and a sealed letter, including his real name, under cover, to the secretary, 17. Old Bond Street, on or before Jan. 4. 1837.

Art. XV. *Obituary.*

Died, on Dec. 28. 1835, *William Turton*, M.D., at Bideford, Devonshire, aged 73, author of a translation of Linnæus's *Systema Naturæ*, of a *Conchological Dictionary*, of *A Manual of the Land and Freshwater Shells of the British Islands*, and of contributions to this Magazine; and hence a man who has distinguished claims on naturalists for grateful remembrance, and for commemoration in the nomenclature of natural history. Mr. Bean, the possessor of a most extensive collection of shells, had awarded to his friend Dr. Turton, while yet living, the compliment of naming a species of Fùsus, Túrton*i*, after him. (See in VII. 493.)

Died, lately, *H. H. Goodhall*, Esq., F.G.S., keeper of the East India Company's tea-warehouse. He was a most diligent collector, and bountiful distributor, of fossil organic remains. A memoir of him is published in the *Gentleman's Magazine*, Feb. 1836, p. 326. — *S. W.*

REVIEWS.

Art. I. *Notices on Works in Natural History.*

Saull, W. D., F.G.S. F.R.A.S. of London, and Member of the Geological Society of France: An Essay on the Coincidence of Astronomical and Geological Phenomena, addressed to the Geological Society of France. Pamphlet, 8vo, 30 pages. 1836.

This short essay proposes to explain, on astronomical principles, the occurrence, in the northern parts of the world, of the remains of animals and vegetables which bear a resemblance to those now found only in warm tropical climates.

Geologists have remarked the abundance of the remains of these animals and vegetables in the strata of our island; and nearly all have been of opinion, that the degree of heat prevailing at some former period must have been much greater than that at present. To account for the change, some have supposed that the pole and axis of the earth were, at some

former time, in a different position from what they are now. Others, amongst whom is Mr. Lyell, have sought for a solution in the supposition that the land above the surface of the waters must have occupied portions of the surface of the globe different from those where the land is now. In the present essay, it is the object of Mr. Saull to show that it is not merely one change of climate, but many alternate changes of heat and cold, that have to be accounted for; and he confines himself to the strata of England for illustration.

He first notices, as the foundation of his argument, that corals are now produced rapidly and in extreme abundance, in the warm regions within the tropics, which is not the case in cold northern climes. He remarks that there are corals above the greywacke, and in contact with it, indicating a warm climate. This is the lowest formation in England in which the existence of animated beings is discovered.

Immediately above the greywacke is the old red sandstone, in which are no corals and only a few shells, which he considers to be a proof that a cold northern climate then prevailed; and the structure of this formation shows it to be marine.

Above the old red sandstone is the mountain limestone, in which the abundance of the remains of what was animated life strikes with astonishment. We discover, for the first time, *N*aútili, Orthoceratítes, Terebrátulæ, Spiríferæ, Prodúctæ, and many others, with an immense number of corals of the greatest beauty: the clearest indications of a hot climate.

Next, in the ascending order, is the millstone grit, the greater part of which is destitute of organic remains, except that, towards the summit, are scales and teeth of reptile fish. This the author considers to be a proof of a cold climate; whilst the sandy structure of this formation, as in the old red sandstone, shows the powerful action of prevailing waters.

Over the millstone grit is the great coal formation, in which is a rich abundance of vegetable remains, resembling the plants of the tropics; as reeds of 30 ft. or 40 ft. in length, palms, palmated shrubs, and arborescent ferns. At this period, then, there was a tropical climate; and, as the plants are gradually found to be less numerous in the upper beds, the author considers this to indicate a gradual approach to a colder climate, which he finds in the next higher formation, the new red sandstone. In its sandy composition he finds proof of oceanic action. There are few animal fossils, and no plants, as might have taken place in a cold climate. The

great masses of rock-salt found in this formation are considered to be a deposition from a salt-water ocean.

In the next stratum, the variegated or red marl, the fossils are chiefly terrestrial, indicating an approach towards a warm climate. This our author thinks he finds in the great lias formation, in which are remains of saurian reptiles, fishes of the ocean and rivers, land vegetables, corals, Pentacrinites, Naútili, fossil wood, and Plagióstoma, *Pínnæ*, and many other Testàcea.

In the lower oolite, our author finds a preponderance of the ocean over the land, from there being none but marine remains.

In the upper oolite, the coralline and Portland oolite, he finds a warm climate, with its corresponding fossils, as the Zàmia of the African forests, and large fossil trees; in the coral rag he finds the marine productions of the tropics; and in the Purbeck strata, the turtles and shells of the land and fresh water. The Hastings beds he considers to be terrestrial.

In the green sand, and in the gault, he finds the climate getting colder, and proofs of a marine origin. The same origin is attributable to the chalk.

At the period of the London clay, he supposes that the waters had retired, except from the valleys, which were tidal lakes, as evidenced by the remains of crocodiles, Naútili, turtles, fishes, Testàcea and Crustàcea, fossilised wood, with plants and seeds of a moderately warm climate, like that of the North of Africa.

From that period to the present, the author attempts to collect evidence of alternation in climate, and of the land being, at alternate periods, covered with water, and dry. In this part of his subject the author is not very successful; at which we do not wonder: the whole of the tertiary geology of England much needs to be remodelled.

The remarkable alternate change of character in the British strata has necessarily attracted some attention with geologists; but no one has hitherto brought forward the same theory as Mr. Saull; and they have been contented with endeavouring to account for the existence of a warm climate at one former period. Mr. Saull thinks that, in astronomy, he has both an explanation and a proof of his views, and he adopts an opinion which was zealously supported by Sir Richard Phillips; that, in the northern and southern hemispheres, there is an alternate increase and diminution of the waters of the earth, in successive periods of 25,800 years, being those of the precession of the equinoxes, and arising from the same cause.

He supposes that he has established the proof of the change

of place in the pole of the earth, by giving a long list of places, which, he says, have changed their latitude and longitude within the last 200 years. The list is unsatisfactory: no authorities are quoted; and many of the places are so obscure, that, without a collection of old gazetteers, it will not be easy to tell where they are; and the supposed variations may readily be attributable to the inaccuracy of observation and of calculation; and we observe that, in the cases of Venice, Rome, Stockholm, and Petersburg, and other known places, the variations, as stated by him, are so exceedingly small as by no means to keep pace with the large differences attributed to the places remote and scarcely known. As little support will his theory obtain form the fact, that many celebrated churches are not now found to stand due east and west. Architects in former days, were not mathematically exact in laying down the points of the compass; and we shall find very great variety of direction in churches in the same county in any part of England.

Altogether, however, the pamphlet is ingenious, possesses considerable novelty, and opens a discussion of points deserving the attention of able geologists and astronomers. — * * *.

Lyell, C., jun., M.A. F.R.S.: The Address delivered at the Anniversary Meeting of the Geological Society of London, on Feb. 19. 1836; and the Announcement of the Award of the Wollaston Donation Fund for the same Year. By C. Lyell, jun., M.A. F.R.S., President of the Society. 8vo, 38 pages. London.

A comprehensive and, at the same time, detailed report of the Society's progress in the extension of the knowledge of geology during the preceding year: this appears to have been very considerable; and the address must be of great interest to every one engaged in the pursuit of this science. "The Wollaston medal has been awarded to Mr. Agassiz of Neuchatel, for his work on fossil ichthyology; and the sum of 25*l.*, from the donation fund, has been awarded to Mr. Deshayes, in promotion of his labours in fossil conchology."

Sowerby's New Edition of the English Botany: to contain Figures and Brief Descriptions of most of the Species of Plants found wild in Britain. Published in fortnightly Numbers.

In V. 707, 708., and VI. 445., are notices of this work. 118 numbers have now (March 15.) been published. From an inspection of the last two of these, the descriptive matter is

concise and clear, and for its conciseness rich; the faithfulness of the figures is known of from the first edition.

Birt, W. R.: Tabulæ Anemologicæ, or Tables of the Wind; exhibiting a new Method of registering the Direction of Wind, by which the Daily, Weekly, and Monthly Variations of the Upper and Lower Currents of the Atmosphere, at several Stations, are shown at one View. In 4to numbers, 4*d.* each. No. I. contains two pages of letterpress and one of an engraved diagram; No. II., two pages of letterpress, and two of engraved diagrams.

Scientific, elaborate, and, one conceives, so much calculated to promote and improve meteorology, as to mark an epoch in the progress of that science. Part of what may be called the grammar and dictionary of the science is given in Nos. I. and II., and, besides, the following contents: — "A register of the upper and lower currents observed at London, during January and February, 1835; with a journal of the clouds, rain, and weather;" and "A register of the lower currents, as observed at Carlisle, Liverpool, and London, during January and February, 1835, with remarks thereon."

In the *Gardener's Magazine*, vol. vii. p. 109. 231. 501—503. 618., vol. ix. 547—549., are views and information on the direction and velocity of winds which may be worth the attention of the author of *Tabulæ Anemologicæ*.

Memorials of Oxford. Historical and Descriptive Accounts of the Colleges, Halls, Churches, and other Public Buildings. Edited by the Rev. J. Ingram, D.D., President of Trinity College.

In No. 39. is an account of the botanic garden, and of the botanical professorship, to the extent of 16 pages.

ART. II. *Literary Notice.*

THE Flora Hibernica will be ready for publication about the middle of April: Part I., comprising the Flowering Plants and Ferns, by J. T. Mackay, M.R.I.A. A.L.S., &c.: Part II., comprising the *Músci*, Hepáticæ, and *Lichènes*, by T. Taylor, M D., M.R.I.A.; and the *Algæ*, by W. H. Harvey: the whole in one volume, royal 8vo, of about 600 pages. See in p. 147., note *.

THE MAGAZINE

OF

NATURAL HISTORY.

MAY, 1836.

ORIGINAL COMMUNICATIONS.

ART. I. *Notes on the Habits of the Magpie.* By CHARLES WATERTON, Esq.

THIS beautiful frequenter of our woods and plains was notorious, two thousand years ago, for pertness of character, and volubility of tongue. Ovid, who knew more of birds than any man of his time, gives us an account of a family of young ladies in Macedonia, who were all changed into magpies; and he expressly tells us, that they retained their inordinate fondness for gabble long after they had lost the lovely form of woman.

> "Nunc quoque in alitibus, facundia prisca remansit,
> Rauca garrulitas, studiumque immane loquendi."
>
> And still their tongues went on, though changed to birds,
> In endless clack, and vast desire of words.

If similar transformations were to take place nowadays, I suspect that many a father here in England would have to look for his lost daughter, chattering amongst the lofty branches of the trees in his park.

I protect the magpie with greater care than, perhaps, any other bird, on account of its having nobody to stand up for it. Both rich and poor seem to entertain so great an antipathy to this gay and lively bird in its wild state, that I often wonder how the breed has managed to escape utter extirpation in this populous district. The country gentlemen all agree in signing the death warrant of this friendless bird, because it is known to suck eggs, and to strangle young game; whilst, in general, the lower orders have an insurmountable prejudice against it, on the score of its supposed knowledge of their future destiny. They tell you that, when four of these ominous birds are seen together, it is a sure sign that, ere long, there will be

a funeral in the village; and that nine are quite a horrible sight. I have often heard countrymen say that they had rather see any bird than a magpie; but, upon my asking them the cause of their antipathy to the bird, all the answer that I could get was, that they knew it to be unlucky, and that it always contrived to know what was going to take place. My keeper both hates and fears a magpie; but self-interest forces upon the fellow the unpleasant task of encouraging the breed, in order to keep well with me. He was once in conversation with the keeper of a neighbouring gentleman, at the door of a little alehouse in the village of Heath, when a magpie flew into a tree hard by. "I must have thee killed," said the gentleman's keeper, "otherwise, there will be a blow up betwixt me and my master." "Ah!" rejoined my keeper, "were I to kill a magpie, my master would soon blow me out of his service." The keeper thought this too good to be lost, and I had it from his own mouth.

I love in my heart to see a magpie, for it always puts me in mind of the tropics. There is such a rich glow of colour, and such a metallic splendour of plumage, in this bird, that one would almost be apt to imagine it must have found its way here, from the blazing latitudes of the south.

I am fully aware that it has propensities of a sufficiently predatory nature to bring it into general disrepute with civilised man; but let us remember that, like the carrion crow, it only exercises them to any serious extent for about two months in the spring of the year. At that season, it certainly commences operations with surprising assiduity. Cacus himself, that ancient thief, when he was about to steal the cows of Hercules, never exhibited greater cunning than that which this bird puts in practice after it has discovered a hen's nest in the yard, or a place of sitting game in the field. Both the magpie and the carrion crow, transfix the eggs with their beaks, and then convey them through the air.

After the season of incubation is over, the magpie becomes a harmless bird (unless the pilfering of a little unprotected fruit be considered a crime), and spends the remainder of the year in works of great utility to man, by destroying millions of insects, and by preventing the air from being infected with the noxious effluvium arising from the scourings of slaughter-houses. The cattle, too, are in some degree benefited by the prying researches of this sprightly bird. At a certain time of the year, it is often seen on the backs of sheep and oxen, freeing them from vermin, which must be exceedingly troublesome to them. In Demerara, where the magpie does not exist, this friendly office is performed by a hawk. Widely different is

the object of the jackdaw's visit to the backs of sheep and oxen: it goes there for fleece; the magpie for filth.

I cannot suppose, with some naturalists, that the dome of the magpie's nest is intended for a defence; because the hole at which the bird enters is always open to an enemy; while the contents of the nest are quite visible through the dome itself.

The young of the magpie being hatched blind, the eggs are never covered when the parent bird leaves the nest. I am satisfied in my own mind, that neither the magpie, nor any other bird, can have the least idea that their nests will be robbed, up to the very moment when their eggs, or their young, are taken away. Did they apprehend such a disaster, we may be assured that their first object would be, to build their nests in a place out of harm's way. Now, the magpie generally chooses the site for its intended incubation, in a spot the most exposed that can possibly be imagined. It will continue to work at the structure of its nest, although we visit the nest two or three times a day; and it will return to the nest, and sit upon its eggs, after those eggs have been handled times out of number. Nay, more; you may take away its own eggs, and substitute those of some other bird, and it will hatch them, and rear the produce.

The magpie (and we may include all other birds) shows not that intensity of feeling for its eggs which it is known to have for its young. Thus, if you take the eggs from the nest, and place them on the ground, the magpie will abandon them for ever; but, if you remove the young to a place to which the parent bird can have access, she will regularly bring them a supply of food.

When there is an addle egg, it is allowed to remain in the nest during the entire process of rearing the young. Birds which make their nests in walls, or in the holes of trees (the starling to wit), bring out the addle egg, which has remained from the last year's incubation, and drop it on the ground, when they begin to renew the nest.

The magpie builds its nest in any tree, no matter of what kind; and it is very partial even to the lowly thorn bush in the hedgerow. The apple tree in the garden; the lonely ash in the meadow; the alder in the swamp; and the oak in the heart of the forest, far from the abode of man; all have their attractions for the magpie; and in these it will form its nest, which is invariably composed of sticks, and clay or earth, and lined with fibrous roots. When I am informed that magpies line their nest with wool, I suspect that there is either an error in the statement, or that the modern magpie has conformed to the

times, and has brought to her nest a kind of furniture wholly unknown to her ancestors.

The magpie lays from three to nine eggs; but seven seems to be the average number, varying in size, and shape, and colour, as much as those of the carrion crow. [VI. 209.]

The female magpie has so near a resemblance to the male, that you can scarcely distinguish the one from the other. This is the case with all birds, where the brilliant plumage obtains before the first moulting.

The sight of a magpie always gives me pleasure; its long tail, and its distinct markings of white and black, having a beautiful effect as it darts through the air. You may know this bird at a very great distance, either on the ground, or in a tree, by the frequent and brisk movement of its tail; always up and down, never sideways.

The magpie seems to have found out that it has at least one friend left in our part of the country. Last year I had thirty-four nests, all of which ushered their young into the world at large; making, on an average of five to the nest, including the parent birds, 238 individuals; an increase quite sufficient, one would think, to supply all the wise men of the county with any quantity of omens. The name of wise man, in Yorkshire, is always given to one who professes to deal in the black art. Even well-educated people of the nineteenth century go to him, in order to recover things lost; or to be put on the right scent, if a cow, or horse, or pig, or relative, be missing.

Magpies are social, though not gregarious in the strictest sense of the word. In places where they are beyond the reach of molestation, you may see them in little parties of fifteen or twenty together, flitting from tree to tree in noisy conversation. Sometimes they will rise to a great height in the air, passing through it with a velocity which seems hitherto to have escaped the notice of naturalists.

Like all other birds in a wild state, magpies become vociferous at the approach of night; and he who loves to watch the movements of animated nature may observe them, in small detached companies, proceeding to their wonted roosting-places in some wood of spruce, pine, or larch, which they seem to prefer to any other. There they become valuable watchmen for the night. Whoever enters the grove is sure to attract their special notice; and then their chattering is incessant. Whenever I hear it during the night, or even during the day (except towards nightfall), I know that there is mischief on the stir. Three years ago, at eleven o'clock in broad day, I was at the capture of one of the most expert and desperate

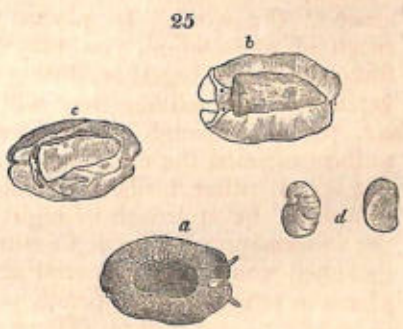
marauders that ever scourged this part of the country. He had annoyed me for a length of time; and was so exceedingly cunning, that, when we went in pursuit of him, he always contrived to escape, either by squatting down in the thick cover of the woods, or by taking himself off in time, when he saw us approach. At last, he owed his capture to the magpies. We were directed to the place of his depredations by the incessant chatterings of these birds in the tops of the trees, just over the spot where he was working in his vocation. He had hanged fourteen hares; and the ground was so covered with brambles and brushwood, that, when we surprised him, he told us that we never should have found him, had it not been for the cursed magpies. His name was Kirk. In the course of the following summer, he set out on his travels towards New South Wales, at the king's expense; having been convicted, at the York assizes, of an overweening inclination for his neighbour's mutton, to which he had helped himself most abundantly.

Walton Hall, Yorkshire, April 6. 1836.

ART. II. *Illustrations in British Zoology.* By GEORGE JOHNSTON, M.D., Fellow of the Royal College of Surgeons of Edinburgh.

LAMELLA'RIA TENTACULA'TA. (*fig.* 25.)

I NEED make no apology for introducing this mollusc to the reader's notice, for it is among the very rarest of its class, and appears to have been hitherto described by Montagu only. The specimen which served for the present figure and description was found, near low-water mark, in Berwick Bay.



a, A view of the upper side; *b*, a view of the under side; *c*, a view of the under side, with the animal in a different state to that in *b*; *d*, two views of the shell.

The *animal*, when extended, is about three quarters of an inch long, of a circular or oval form, the back convex, roughish, of a wood-brown colour speckled with a few irregular reddish and yellow dots, dusky and obscurely papillose in the centre, the margin of the cloak widely overlapping the foot, deeply sinuated in front, and having a slight emargination behind, where

there is a minute process, or appendage. The head is truncate with two white awl-shaped tentacula, which are contractile and originate in the anterior angles, having the eyes, which are black and very distinct, at their external bases. The mouth is terminal, furnished within the fleshy lip with small cartilaginous jaws, and a long, narrow, linear, or riband-shaped, tongue, roughened with spinules arranged in regular series. Above the head, and under the cloak, there is a large slit which leads to the branchial cavity, and the water of respiration is conducted to this wide orifice by a short canal formed by a fold of the cloak; and it is this fold which produces the frontal sinuation, for there is really no interruption in the margin of the cloak. Within the cavity there was retroflected the male organ of generation, which seems very large in proportion to the animal: it is somewhat compressed, obtuse, with a long point directed backwards. Foot oblong, truncate in front, where it is opaque milk-white, the rest of it being watery white. The space between it and the cloak is tinted with black.

The *shell* is concealed and embedded in the cloak, occupying a dorsal and central position. It is 3 lines broad and about 5 long, ear-shaped, convex, milk-white, even and apparently smooth; but, when looked at through the magnifier, it is seen to be wrinkled by the lines of growth; spire depressed, small, consisting of a single whorl; aperture very patulous, oblong, the inferior margin somewhat truncate, the pillar lip flattened, and continued in a spiral form within the shell.

The creature creeps very slowly, and, when in progression, raises itself on the foot, while, at the same time, the tentacula are extended to the utmost, and protruded beyond the margin of the cloak: when at rest, they are kept concealed under this their penthouse. It swims easily in a reversed position at the surface, the foot being then made slightly concave. The form of the foot is variable; for sometimes the animal will expand it until it becomes almost circular, or extend it until it forms an oblong square obtusely pointed behind. When alarmed, the body is contracted so that the edges of the cloak meet together on the ventral aspect, and the foot is greatly narrowed. The eyes are proportionably large, and are visible from below, shining through the transparent skin.

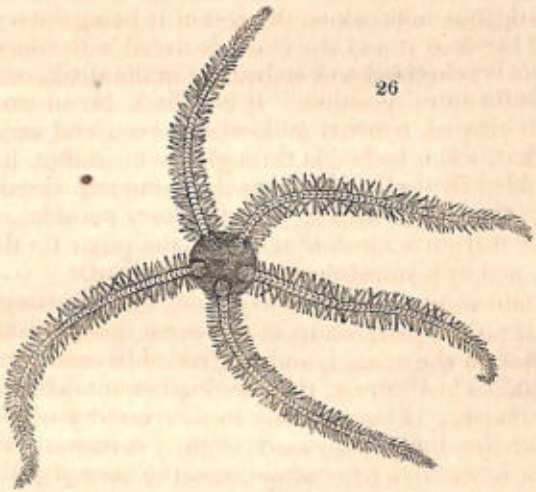
The synonymes, so far as I am in a condition to ascertain them, are,—

Lamellària tentaculàta *Montagu*, in Lin. Trans., xi. 186, pl. 12. figs. 5, 6.; Búlla tentaculàta *Turton*, Conch. Dict., 25.; Sigarètus tentaculàtus *Flem.*, Brit. Anim., 360.:

and, it is curious enough, not one of all the three can be retained. Lamellària is preoccupied in botany; and neither

shell nor animal has any affinity with Búlla. The generic name of Sigarètus was first proposed by Adanson; but the shell which he figures and describes as its type is, properly speaking, external and operculate; and, with such a structure, it alienates itself entirely from the shell before us. Ours, as it seems to me, certainly belongs to the genus Sigarètus of Cuvier, *Règ. Anim.*, iii. 90., which, I need scarcely remark, is not the same as the Sigarètus of Adanson, and, therefore, cannot retain its present designation. From the evidence of Mr. Gray, we know that it, in fact, is synonymous with the more recently instituted genus Coriocélla of Blainville, *Manuel de Malacologie*, p. 466.; and if the Coriocélla has an internal shell, which Blainville denies, our Lamellària tentaculàta may find a resting-place in it.

OPHIU'RA RO'SULA. (*fig.* 26.)



26

O. rósula. Body spinigerous and roughened dorsally with short processes; at the base of each ray a large heart-shaped smooth space formed by the union of two scales.

Synonymes.—*O.* rósula *Fleming*, Brit. Anim., 489.; Borl. Cornw., 259. tab. xxv. fig. 19–24. *Astèrias* pentaphýlla, vària, aculeàta, hastàta, fissa, nìgra, *Penn.*, Brit. Zool., iv. 131–133.; Turt. Brit. Faun., 141.

Hab.—Very common on all the British coast.

Desc.— Body circular or pentagonal, flattened or convex, variously marked and coloured, covered with deciduous spines and roughened with short obtuse processes arranged into five avenues radiating from the centre, and divided by the large heart-shaped scales placed above the base of the rays; scales

smooth, except on the outer edge, where there are a few tubercles, and divided longitudinally by a rough line. Rays 5, long, tapered, generally marked with orange-coloured bands, covered with triangular imbricated scales having a light tubercle-like projection on the distal edge, armed on the sides with numerous strong muricated spines longer than the breadth of the ray. Mouth with 5 pectinated processes. Diameter of the body in one specimen four tenths of an inch, length of each ray 1½ in.; of another specimen the diameter was half an inch, and the length of the rays 2¾ in., so that there appears to be no definite proportion between these parts.

Ophiùra rósula is remarkably brittle: the body will on handling, or when sickly, throw off all its rays, which again will voluntarily break into several pieces; and these, as well as the mutilated body, will survive for several days if kept in salt water; and, under more favourable circumstances, the body would probably reproduce all the lost members.

I may take this opportunity of describing the method of preserving the *Asteriadæ*, which I have found to be the best. The Ophiùræ must be brought from the shore in sea water; where, after being allowed to remain at rest for an hour or so, they will crawl about and expand themselves on the bottom and sides of the vessel. When in this state, remove them with the fingers cautiously, and plunge them *instantly* into a large basin of cold fresh water: they die in a state of rigid expansion, and so quickly, that even the most brittle species have no time to make the contractions necessary to break off their rays. Allow them to lie in the fresh water for twenty-four hours, when they are to be displayed on white paper, and dried very slowly before the fire. With the *Astèrias* less care is necessary. Steep them for a few hours in cold water, then plunge them into a pan of boiling water, and boil them on a quick fire for five or ten minutes, according to their bulk. They are now to be put on a flat plate, and dried very slowly, previously to their removal to the cabinet. They make a pretty and interesting collection, and are preserved as easily as shells are. — *Berwick upon Tweed.*

ART. III. *A Notice of a Mode of killing the Asteriadæ; and of the Occurrence on the Coast of Devonshire of Three Species deemed the Astèrias Jóhnstoni, Ophiùra béllis, and O. granulàta.* By F. H. N. GLOSSOP, Esq.

DR. JOHNSTON mentions, in p. 145, 146., the difficulty of preserving perfect some of the species of the *Astèrias* and

Ophiùræ, owing to the extreme brittleness of the rays, or arms, which "separate from the body with a facility which is truly wonderful." Now, this I have found to be invariably remedied by the immediate immersion of the individual in fresh water, which instantly deprives it of the power of casting off its rays or arms; and it may afterwards be cleaned and dried with great facility. This was first shown me by Mr. Harvey, surgeon, of Teignmouth, whom I had the pleasure, during the past summer, of accompanying in frequent dredging excursions along the coast of Devon.

I may add that we frequently took a species of *Astèrias* exactly coinciding with the figure and description, given in p. 146, 147., of *Astèrias Jóhnstoni*, or *equéstris*: also, Ophiùra béllis and O. granulàta, the latter in great numbers, and both of much larger size than described by Dr. Johnston in VIII. 594—596; the rays being, in many specimens, full 4 in. long. — *St. Peter's College, Cambridge, March* 4. 1836.

[*Sea Fishes are often best killed by Immersion in Fresh Water*: they then die in convulsions, with their fins extended; just as they should be represented in drawings.—*Lansdown Guilding. St. Vincent, May* 1. 1830. Noted in relation to Dr. Drummond's notice of the poisonous effects of fresh water on some sea animals and plants, published in II. 121—127.]

ART. IV. *A Catalogue of the Species of Annulose Animals, and of Rayed Ones, found in Ireland, as selected from the Papers of the late J. Templeton, Esq., of Cranmore, with Localities, Descriptions, and Illustrations.* By ROBERT TEMPLETON, Esq.

ANNULO'SA.

ANNE LIDES *Cuv.*

TUBI'COLA.

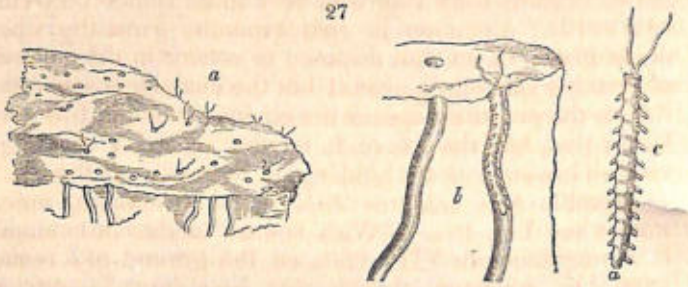
SÉRPULA *Lin.* vermiculàris *Lin.* Common on oyster shells. — S. filifórmis *Rees's Cyclop.*, vol 10. — S. contortuplicàta *Lin.* Common on oyster shells. — S. mínima *Lam.* Among the roots of *Fùcus* digitàtus: common. In a fossil state in Colin Glen. — Vermília *Lam.* tríquetra *Lin.* Common on oysters. — Spirórbis *Lam. nautilöìdes Lam.*, Sérp. spirórbis *Lin.* On *Fùci*, common. — S. spiríllum *Lin.* On Sertulàriæ, corallines, and lobster shells. — S. granulàtus *Don.* On shells and stones. — Terebélla *Cuv.* conchílega *Pallas.* — T. cristàta *Müll.* On the shore at Whitehouse Point, in

little pools in the cavities of rocks. — Sabellària *Lam.* (Amphitrite Cuv.) alveolàta *Lin.* On various parts of the shore of Belfast Lough. — S. crassíssima *Penn.* — Pectinària *Lam.* (Amphitrìte Cuv.) bélgica *Gm.* — Dentàlium *Lin.* entàlis *Lin.* Found on the sandy shores: rare. — D. dentàlis *Lin.* — D. labiàtum *Brown.* — Bròcus *Brown.*

DORSIBRA'NCHIA.

Arenícola *Lam.* marìna *Lin.* Inhabits all the sandy shores. — Nèreis Cuv. pelégica *Gm.* Common under stones on the sea shore, in the black mud. — Spìo Fab. calcàrea (*fig.* 27.),

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S. filicórnis *Fab.?* Body elongate, jointed, on each side series of fasciculi; tentacula rather incrassate, nearly one half as long as the body; eyes not apparent. Found in the pools on the rocks at Whitehead, Belfast Lough, living in minute tubular cavities in the limestone rocks, the tentacula alone projecting, and kept by the animal in constant motion. Stones every where on our shores are met with perforated by these minute animals. *a* represents a portion of limestone rock, and the animals and tubes of the natural size; *b*, the portion of limestone rock enlarged, to show the tubes formed by the animal; *c*, the animal enlarged. — Cirrhátula *Lam.* tentaculàta *Mont.* — Aphrodìta Lin. aculeàta *Lin.* — Halithæ`a Sav. clàva *Mont.* — Polýnoe Sav. squamàta *Pall.* Found among Carrickfergus oysters.

ABRA'NCHIA.

1. Lumbrìcus *Lin.*, *Cuv.** terréstris *Lin.* Common.—*L.* annulàris. Of a bright red, with the body, below the sexual organs, with the rings alternately red and yellow. This species, known by the name brandling, is much esteemed by anglers

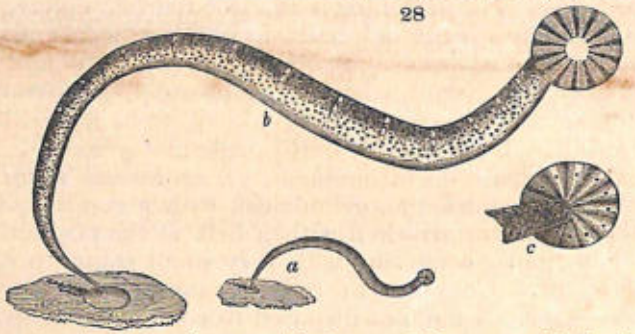
* M. Savigny and M. Dugès have described many species of this genus. I have not been able to get at their memoir, so that I have attached trivial names, merely to distinguish those I am acquainted with, until an opportunity occurs for comparing them with the French species. — *R. T.*

for trout. It is extremely common in manure heaps composed of cow-dung. — *L.* xanthùrus. Of a bright red, the apical rings yellow. This is the gilt-tail of anglers, and is found among rotting oak bark, in old hot-beds and melon frames. — Gordiànus. Of a pale rosy red. Common in cultivated sandy ground, where it is uniformly found contorted, assuming the appearance of a very intricate knot.—L. lívidus. Of a dull red, varied with dull purple and greenish. Common in gardens. — L. omilùrus, O. rubéscens *Temp. MSS.* Body long, contractile, cylindrical, with a compressed lanceolate apex, unfurnished with a belt at the position of the sexual organs, each ring with very small spines projecting backwards. Common in rich grounds, generally where docks grow. I am not disposed to concur in the necessity of erecting this into a genus; but the characters separating it from the preceding species are obvious enough. It is never larger than half the size of *L.* terréstris; and is of a bright reddish brown, with the hinder part, or apex, very flat. *R. T.* — Clitéllio *Sav.* minùtus *Fab.*? At Cranmore, among moss: see VII. 131. [With respect to this little animal, it is suggested, in VIII. 260., on the ground of a remark from Dr. Johnston, that it may be a larva.] — Stylària *Lam.* lacústris *Lin.*, S. paludòsa *Lam.* At Cranmore, in the pond, not uncommon; March, 1811. — Nàis Lin. Cuv. vermiculàris *Gm.* Common at Cranmore, in the pond. — N. serpentìna *Gm.* At Cranmore: see VII. 130. [In VIII. 260., is a suggestion, derived from Dr. Johnston, that this may be a larva.] — Tùbifex *Lam.* rivulòrum *Lam.*, Lumbrìcus tùbifex *Müll.* It forms tubes about 1½ in. high, of the soft black mud at the sides of slowly running rivulets: these tubes lie contiguous to each other. [In VIII. 620, 621., is information on Lumbrìcus tùbifex β *Müll.*, and references to farther information on it in this Magazine: it may be that this variety exists in Ireland as well as in England.]

2. Hirùdo *Lin.* sanguisùga *Lin.* Extremely common. — Erpobdélla *Blainv.* (Néphelis *Sav.*) stagnàlis *Lin.*, bioculàta *Müll.*, *Gm.* In spring water at Cranmore; June 23. 1816. — E. complanàta *Gm.* In Lyster's spring; June, 1808. — E. crenàta? *Trans. Lin. Soc.*, ii. 318. t. 29. Of a pale green colour; head distinct from the body, with two eyes; body divided into segments, each so rounded laterally as to make the sides appear deeply crenated. Found among Confervæ in a ditch at Whitehouse; Aug. 1807. Young ones were observed adhering to the body of the parent. It agrees exactly with Turton's description: see his iv. 71. —

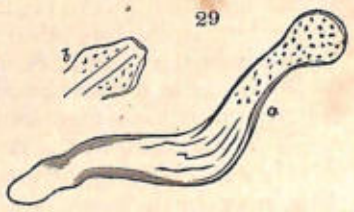
Pontobdélla *Leach* muricàta *Lin.* — Ichthyobdélla *Blainv.* (Piscícola *Blainv.*, Hæmócharis *Sav.*) *Pércæ.* (*fig.* 28. *a*, of

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the natural size; *b*, magnified; *c*, disk magnified, viewed on the back.) It differs from the Geómetra of *Lin.* in many particulars; among others, in having the disk with 14 rays and dark points. It was found, on a perch brought from Lough Neagh, by Miss Templeton. — Próstoma *Duges?* armàtum *Duges?* (*fig.* 29.) Found among Conférva spiràlis from a drain in the bog meadows. *a* represents the animal: it was translucent and gelatinous, with the cephalic points orange, and scattered irregularly. In the P. armàtum of Duges, of which the head is sketched at *b*, the points are dark, and much more regularly arranged on the sides of the gullet. — Borlà*sia* Oken (Nemértes *Cuv.*) longíssimus *Sow.* Common in our salt-water lakes, on the rocks, beneath the sea-weed. A description of it will be found in the *Lin. Trans.*, vol. 9. 2. p. 293. — Górdius Lin. aquáticus *Lin.* Common in rivulets, and, sometimes, moist rich ground.

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RADIA'TA.

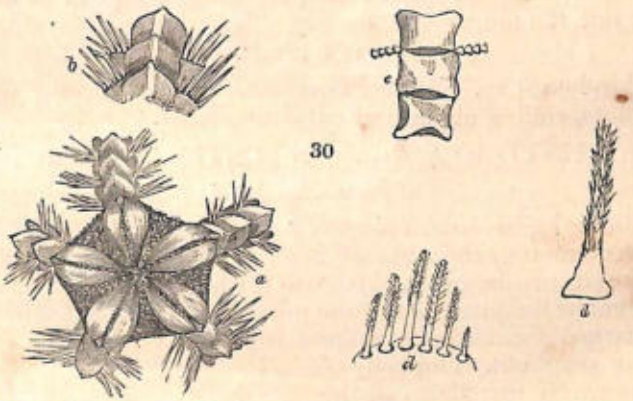
ECHINODE'RMATA.

PEDICELLE'S.

Aste'roïda Lat.

Astèrias Lin. éndeca *Sow.* Occasionally found on our shores. — *A.* pappòsa *Link.* Common about all our shores. The rays vary from 11 to 15. [In VIII. 78., note *, are figures of what is there deemed the young of this species.] — *A.* glaciàlis. Found in Belfast Lough, by Jas. Grimshaw, jun.

Esq. — *A.* oculàta *Penn.*, multífera. Inhabits all parts of our coast, and is eagerly eaten by the codfish. — *A.* rùbens [IX. 144.]. On all our coasts. — *A. equéstris Sow. ? A.* irregulàris *Link ?* [See *A.* Jóhnstoni Gray, IX. 146.] With a pentangular disk, irregularly disposed warts, and a double series of oblong marginal scutellæ, those of the lower range furnished with 4 oblong appendages. Underneath covered with regularly tessellated scutellæ in the angles between each furrow. (*Temp. MSS.*) Found, by James Grimshaw, Esq., in Belfast Lough. The marginal plates of this species have the surface smooth, and not furnished with the small tubercles encircling a large one, to be found in *A. equéstris*. The double series of marginal scutellæ, and the curious tessellated appearance it presents beneath, are not alluded to by the authors who had directed their attention to this genus, and the late Mr. Templeton hence concluded that this was an undescribed species. How far his views were correct, I cannot presume to say, from the extreme variety in the appearance of the species rendering it difficult to characterise them, so as to remove every doubt. *R. T.*— *A.* placénta *Penn.*, membranàcea *Turt.* A specimen found alive on the shore of Strangford Lough; Feb. 1822. — Ophiùra *Lam.*, minùta *Penn.* Found in the pools of the marine rocks of Antrim and Down. — O. lacertòsa *Lam.*



texturàta *Lam.?*, arenòsa *Leach*. This species seems to inhabit all the coast [and those of the Isle of Man and of Britain: see VIII. 68., 465.]. — O. ciliàris *Lin.* — O. filifórmis *Lin.* — O. granulàta *Link ?*, scolopendròides *Link*, echinàta *Lam.* (*fig.* 30.) *a* represents the disk; *b*, *c*, the scales; *d*, *d*, the spines. Among oysters in Belfast market; Jan. 1817. I have some hesitation in referring this species

to the above synonymes. The form of the scales, and the appearance and number of the spines, scarcely agree with the descriptions or figures I have seen; it seems, however, referable to this species, rather than to any other of those described by Lamarck. (*T. MSS.*) [In VIII. 595, 596., are a description and figure of O. granulàta *Flem.*]

Encrinöìda.

E'ncrinus *Guettard* (I'sis Lin.) áster *Lin.* Fragments of this are common enough at Glenarm.

Echinöìda Lat.

Echìnus Lin. esculéntus *Lin.* Not uncommon on many parts of the coast. — *E.* miliàris *Leske.* Great numbers of this species are often thrown upon the shores of Belfast Lough by easterly storms. — *E.* lithóphagus *Leach.* Plentiful in Bantry Bay, where it forms hollows in the rocks, in which it rests: see Tilloch's *Mag.*, 39. 100. — Echinocỳamus *Leske* (Fibulària *Lam.*) óvulum *Lam.* Found on all our sandy shores after storms. — *Spatángus Leske, Lam.* cordàtus *Penn.*, pusíllus *Leske*, arenàrius *Lam.* Found on our sandy shores thrown up after storms. — *S.* purpùreus *Müll.*, lacunòsus *Penn.* Three specimens were dredged up in Dublin Bay. — *S.* purp. var. Resembling in every respect of size and surface the preceding, except in its having 5, not 4, ambulacres.

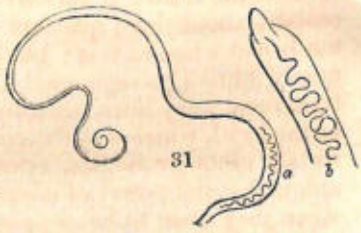
SANS PIEDS.

Thalassèma *Cuv.* Neptùni Gærtner. Found among marine plants, rolling about and extending itself.

ENTOZO'A *Rud.* INTESTINAUX *Cuv.*

Nematöidea Rud.

Trichocéphalus *Rud. Hóminis Gm.*, díspar *Rud.* Not at all uncommon in the cæca of men; but its diminutive size has caused it to be overlooked. — Oxyùrus *Rud.* cúrvula *Rud.* Inhabits the intestines of the horse. One specimen was discharged from a grey mare five years old. The belly of the worm was blackish, the tail transparent. — O. Gàdi. (*fig.* 31. *a*, natural size; *b*, magnified.) Of a transparent white. Intestinal canal convoluted, opaque, white. Body cylindric, contracting in the latter third of its length, so as to become very slender. The



head is somewhat projecting. Length about 2 in. Found in the stomach of a codfish; Nov. 1817. — *A.* scaris *Lin.* lumbricoïdes *Lin.* Inhabits the smaller intestines of man. — *A.* vermiculàris *Lin.* In the rectum of children, rarely in that of adults. — Brachiélla *Cuv.* salmònea. On a salmon purchased in Belfast market.

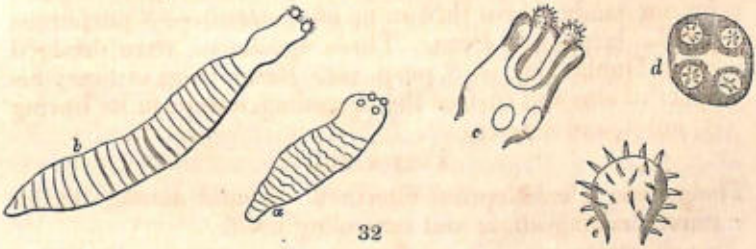
PARENCHYMATEUX.

Trematòdes.

Dístoma *Retz* and *Zed.* hepáticum *Lin.* Common in the hepatic vessels of the sheep.—Planària *Müll.* stagnàlis *Müll.* In plenty in the peat holes at Cranmore. — P. fúsca *Pallas.*

Tæniöìdes.

Tæ`nia *Lin.* vulgàris *Lin.* Common in the human intestines. — *T.* sòlium *Lin.* Rather rarer than the preceding. There are three other species in the museum of the Irish College of Surgeons; but I have not yet had time to examine them. *Temp. MSS.* — Tetrantàris *Temp. MSS.* (*fig.* 32.)



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Body soft, elongated, flat, obsoletely jointed; head oblongato-quadrangular, and furnished with 4 rounded aculeated tubercles (suckers?). — T. Trúttæ. Found in the intestines of a sea trout, which appeared to have been for some time in bad health, as it was greatly emaciated. *a*, animal, natural size; *b*, magnified; *c*, head magnified; *d*, horizontal view of the head; *e*, sucker, highly magnified. Body lanceolate, about three quarters of an inch long, and one quarter broad when at rest; but may be extended till it reach nearly 3 in. The segmental marks appeared to be formed of transverse wavy lines, scarcely depressed. At the extremity of the head, which was flattened, were placed 4 nearly equidistant globular bodies, covered with curved aculei. The animal has the power of advancing these bodies a little way, when they seem to be supported on a neck of considerably smaller dimensions. The animal was very retentive of life,

living eight days in fresh water. March, 1820. — Cysticércus *Rud.* (Hydàtis *Auct.*) hydatígena *Pall.* — C. cellulòsa *Rud.* — Cœnùrus *Rud.* cerebràlis *Gm.* — Echinocóccus *Rud. h*umànus *Zed.*

(To be continued.)

THE Lumbrìci [*the Earth Worms* (p. 234.)], which received a large share of Savigny's attention, and of which he has described upwards of twenty species, as he considers them (the characters of them are in Cuvier's *Analyse des Travaux, &c.*, for 1821), before confounded under the general name of *L.* terréstris, have been since much attended to by Léon-Dufour, Dugès, and Morren. Léon-Dufour's observations, contained in two memoirs in the *Ann. des Scien.* for 1825 and 1828, chiefly respect the mode of reproduction, which he asserts to be oviparous, and not viviparous, as supposed by Montègre (*Mém. du Mus.*, i. 242.) and Sir E. Home (*Phil. Trans.*, 1823, p. 143.) He has discovered the capsules at the depth of 5 ft. or 6 ft. in the earth, and found them analogous to those of the genus *H*irùdo. M. Dugès, like Léon-Dufour, considers (*Ann. des Scien.*, 1828, vol. xv. p. 284.) these animals as oviparous, and thinks that what Montègre took for living young were only intestinal worms. Morren's work (*De Lumbrici terrestris Historia Naturali nec non Anatomia Tractatus.* Bruxell. 1829. 4to), which was crowned by the University of Ghent, is of the most elaborate nature, and, taken in connexion with the researches of the French naturalists, leaves scarcely any thing to be desired as far as regards the anatomy and physiology of the *L*umbrìci. Its author seems in doubt, however, about the numerous species described by Savigny and others. He is more inclined to regard them as simple varieties. He in some measure reconciles the conflicting testimonies of Montègre and Léon-Dufour with respect to the mode of reproduction, by asserting it to be both oviparous and ovoviparous (Jenyns's *Report on the Recent Progress and Present State of Zoology, published in the Report for* 1834 *of the British Association for the Advancement of Science.*)

I have, in the course of the practice of gardening, met with many eggs of the earth worm, and think that I was first told that they were such by the late Rev. G. R. Leathes (p. 164, 165.); and there is proof that they have been such in the fact that, in rupturing many of those met with, a few have included a living miniature worm. The rest of those ruptured have

included a very viscous yellowish matter. The egg is of an elliptical figure, perhaps most pointed to one end, scarcely of the eighth of an inch in length, and externally of the colour of the soil. This last condition renders the egg not obvious, without closely inspecting the soil; and I have seen the most of the eggs that I have seen, in the practice of the potting of plants; in which operation the soil has lain upon a bench at some height from the ground, hence so much nearer to the eye than if upon the ground and one stood erect looking down upon it; and in which one has frequently to take portions of it in the hand. — *J. D.*

Górdius aquáticus. (I. 301.; II. 103. 211.; IX. 236.)—At the meeting of the British Association for the Advancement of Science, held at Dublin, 1835, "the Rev. Dr. Drummond informed the members that, from observations lately made by him, the Górdius aquáticus seemed to be viviparous." (*Edinburgh New Phil. Journ.*, Oct. 1835, p. 400.)

I. 301. Does not the Górdius derive its nourishing fluid by pores from cutaneous absorption? If a true mouth exists, it must be exceedingly minute and retractile. — *Lansdown Guilding. St. Vincent, May* 1. 1830.

Instances of the Appearing of the Górdius aquáticus after plentiful Rain has been produced.—On Tuesday, June 19., after a very heavy storm, an extraordinary phenomenon was observed at the Buckhold Wood, Lydart, Troy Park, and other places in the neighbourhood of Monmouth. The ground and trees were covered with myriads of live snake-like insects, quantities of which were collected by different persons. They are 6 in. or 7 in. in length, about the thickness of a horse-hair, white, and quite transparent. (*Literary Gazette*, June 23. 1832.) It may be fit to take this account with abatement; and then enough will remain, if one identifies the animal with the Górdius aquáticus — and what else could it be? — to make it one of a striking instance of the known fact, that the Górdius is most seen in, or directly after, wet weather.

The poet Cowper, in a letter of his, dated Weston, Feb. 23. 1793, addressed to Hurdis (that, like Cowper himself, amiable and elegant naturalist), has noticed as follows:—"After a very rainy day, I saw on one of the flower borders what seemed a long hair; but it had a waving, twining motion. Considering more nearly, I found it alive, and endowed with spontaneity, but could not discover at the ends of it either head or tail, or any distinction of parts. I carried it into the house, when the air of a warm room dried and killed it presently."

Górdii, and Filària Forficulæ, are reputed to be parasitic in the Interior, or in the Substance, of other Species of Animals.

Filària Forficulæ. In III. 149. and 459., are figures of this species, and notices of its person and habits, and mentions of species of animals that it had been known to inhabit.

Górdius aquáticus, and Species of Górdius.—Do not such of the following instances as relate to insects belong rather to Filària Forficulæ, than to Górdius aquáticus? In II. 211., it is stated, that Górdius aquáticus has been known to inhabit insects; in II. 212., Acrida (by error *A*cnida) viridíssima; in IV. 95., that several were found with one part inside, the other outside, the wall of the stomach, so as to perforate the wall, of a live common frog that, when caught, appeared to be in a sickly and disabled state; in IV. 477., in "the common black beetle;" and in other cases, as under.

I have frequently found, in the spring and summer months, the common black garden beetle, when crushed by the foot, or otherwise, to have contained one, and sometimes two worms of about the size of a hog's bristle, several inches long, curiously coiled up, and possessing animation, as I have several times kept them alive in water for a length of time. — *W. Godsall, Nurseryman. Hereford, Sept.* 29. 1832.

II. 211. Mr. Lambert has recorded, in the *Linn. Soc. Trans.*, an instance of a Górdius taken from Cárabus horténsis. I hope soon to give a satisfactory account of the dreaded Guinea worm, common, in certain years, in the dry islands of this government, but never troublesome in St. Vincent. — *Lansdown Guilding. St. Vincent, May* 1. 1830.

In the *Entomologia Edinensis*, the volume on Coleóptera, is quoted a statement to the amount, that the beetles of the family Harpálidæ "are greatly infected with Gordii," on Mr. Stephens's testimony; and a statement, that Mr. Kirby, on immersing an individual of Hárpalus æ'neus *Gyllenhall* in hot water, observed an intestinal worm, thicker than a horse-hair, and of a brown colour, to become protruded. This is not called a species of Górdius, nor at all denominated. (*Ent. Edin., Coleóptera.*)

J. G. Jeffreys, Esq., has stated, in his "Synopsis of the Testaceous Pneumobranchous Mollusca of Great Britain," published in *Lin. Soc. Trans.*, vol. 16., the following information on "a minute slender species of Gordius." All the species of Limnèus "may be truly termed amphibious, since the nature of their food (animal matter in different stages of putridity) frequently obliges them to seek it on wet and marshy ground. During the spring, they are greatly infested with a minute slender species of Gordius, specimens of which, in

number from two to ten, attach themselves to the interior of the mantle, near its connexion with the neck of the animal. This troublesome parasite does not seem to be stationary, since I have not unfrequently observed it to change its place, and take up, perhaps, more commodious quarters in another shell. This Gordius probably constitutes part of the food of the smaller Dytiscidæ. After I had put two sorts (the D. trifidus and D. crassicornis *M.*) into the glass vessel where the Limnei were kept, I could not detect any signs of the Gordii; though in other cases I have known them to survive even after their guardians had begun to putrefy."

Facts on the Habits of the Common A*scaris.* [A. ? *lumbricöìdes* Lin. (p. 239.)] — It propagates by eggs, which fill the greater part of its body. These are of an oval shape, and are in such numbers, that I cannot form any idea of the amount of them: there must be many thousands within each animal. This creature has an instrument in its mouth, which may be protruded by pressure: it consists of a sheath, and five or six darts, shaped like those of a gnat, but not barbed. — *E. T. S. Feb.* 17. 1834.

ART. V. *Localities of several Species of British Plants, observed during the Summer of* 1835. By CHARLES C. BABINGTON, M.A. F.L.S. F.G.S., &c.

A*RABIS petræ`a.* On the lower part of the precipice called Clogwyn ddûr Arddû, Snowdon. July 29. It does not occur in plenty on any other part of these mountains which I have examined. Clogwyn ddûr Arddû is the lofty mural rock (in which there is a copper mine), having a small lake at its foot, which fronts the tourist during the first half of his ascent of the mountain from Llanberis.

Subulària aquática. In plenty in Llyn Idwel, a lake situated in what is probably the most romantic mountain hollow of Caernarvonshire. Aug. 1. It is most easily accessible from Llyn Ogwen, on the great Holyhead road, being about half a mile from that lake. At its upper end, a small stream flows into it from the elevated lake Llyn y Cwn, passing down through a cleft in the rock called Twll ddû. These two places form one of the most celebrated botanical stations in Wales; and, being many hundred feet above Llyn Idwel, will, perhaps, be the more conveniently reached from Llanberis by ascending the Glyder at a spot nearly opposite the church of that place. It is necessary to distinguish between Llyn y

Cwn and Llyn y Cwm. In most botanical books, the latter name is used in mistake for the former. Any stranger, who may ask his guide for Llyn y Cwm, will be taken to Llyn Cwm Ffinnon, near the head of the Llanberis Pass; a station not celebrated for any rare plants.

As some doubt has been expressed of the true structure of the seed of Subulària aquática, I examined it on the spot, and made the drawing annexed, which is confirmatory of Dr. Hooker's view of the cotyledons being incumbent. (*Fig.* 33., in which the seed of Subulària aquática, without its external coats, is represented.

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Heliánthemum guttàtum. On the right-hand side of a little hollow running up into Holyhead Mountain, at about 50 yards before reaching the descent to the South Stach Lighthouse, Anglesea. Aug. 6.

Elátine hexándra. In the stream flowing from Llyn Mealog, Anglesea, just above the mill. Aug. 3. Just below the same mill,

Callitriche autumnàlis occurs in plenty. This is the only recorded Welsh station for C. autumnàlis. The plant commonly taken for it, in Caernarvonshire, is *C. pedunculàta*, but having its fruit usually sessile. It may be easily distinguished from C. vérna by *not* having any bracteæ at the base of its fruit stalk.

Medicàgo maculàta and denticulàta. These two plants I noticed in the plantation opposite to the terrace at Southend, Essex. June 20. The latter occurs, together with

Trifòlium stellàtum and Vícia lùtea, on a shingle bank close to the river at Shoreham, Sussex, on the opposite side from the town. June 16.

Láthyrus hirsùtus. Amongst bushes, just below Hadleigh Castle, Essex. June 22.

Lòtus màjor. The specific character of this plant appears to be:—heads depressed, many-flowered; stems tubular; claw of the standard linear; apex of the flower-buds stellate. Much of the confusion attending this plant has been caused by supposing that it must always be large, hairy, and upright. I have seen it nearly quite glabrous, and as small as *L.* corniculàtus, but still retaining its characters in a marked manner. Near Holyhead, Anglesea, Aug. 6., I found

L. *corniculàtus var. crassifòlius.* This is a curious form of the common plant, growing in loose sand, and agreeing well with De Candolle's character: "Pilosus, foliolis ovatis subcarnosis, caulibus foliosis prostratis."

Víola flavicórnis. On the sands near Llyn Coron, Angle-

sea. Aug. 4. I have no doubt that this is only a variety of *V.* canìna, caused by its growing in loose sand.

V. *Curtísii*. With the above. It does not appear to be more than a variety of *V.* [sp. not named in MS.], caused by situation; yet all the specimens examined by me retained the characters pointed out by Mr. Forster. (*Eng. Bot. Suppl.*, t. 2693.)

Ròsa *Wilsoni*. On a sloping bank, close to the Menai, between two stone quarries, not half a mile (north) from the bridge, on the Caernarvonshire side. One bush is only a few yards from the edge of the quarry nearest to the bridge. Aug. 5., in fruit.

Càrum verticillàtum. In plenty on the slope of Dinas Emrys, near Beddgelert, Caernarvonshire; on the side of that rock farthest from the lake. July 31.

Arbutus Unedo. It has been doubted if this plant is indigenous at Killarney; but I cannot conceive it possible for any person who has observed it on the spot to believe it to have been "introduced by the Monks of Mucross Abbey," which is the theory of the sceptical. It grows in several isolated spots, far up the mountains, and is in its greatest beauty when springing from the crevices of rock on the islets of the upper lake. My conclusion is, that it is truly an aboriginal native of that country. The fruit is excellent.

Rùmex *praténsis*. On the canal bank at Llangollen, and in a lane leading from Newborough, Anglesea, to a small lake. I had the satisfaction of gathering this recently distinguished species at both the above places, in company with my excellent friend Mr. Borrer, who had previously pointed it out to me near his own residence at Henfield, Sussex.

Euphórbia *corallöìdes*. This plant, which is truly distinct from *E.* pilòsa (with which my friend Dr. Hooker has confounded it), and is proved to be *E.* corallöìdes of Linnæus, by his herbarium and excellent description in the *Amœnitates Academicæ*, occurs in plenty near the parsonage house at Slinfold, Sussex; in a lane, and also in the fields adjoining. July 1. It is supposed to have been introduced by Mr. Manningham, who held the living many years since. That the plant published by me in the *Supplement to English Botany* is the true *E.* pilòsa of Linnæus, there can be no doubt; and, if *E.* corallöìdes had been figured in that work, I should not now have been obliged to make these observations. I trust that Mr. Sowerby will take care to obtain a drawing of it for any continuation of the *English Botany*.

Alìsma *ranunculöìdes* β *rèpens*. In plenty on the margin of Llyn Coron, Anglesea. Aug. 1.

Scheuchzèria palústris. (VI. 368.; VIII. 278., note *.) In

the shaking bogs at Bomere Pool, Shropshire. This station, although given some time since by me in this Magazine, on its discovery, has been overlooked by most botanical authors; and, therefore, I now repeat it here. It is in great plenty, but does not always flower freely, and may easily escape notice.

Potamogèton zosterǽfòlius. In great plenty in a ditch at Baitsbite, near Cambridge.

Eriόphorum grácile Sm. In a bog on the top of Dinas Emrys, Caernarvonshire.

Scírpus Sàvii. Just below the mill on the stream flowing from Llyn Mealog; in a wet place between Newborough and Llanddwyn Abbey; in almost every wet place in Holyhead Island; all in Anglesea. On the ascent of the Hill of Howth, near Dublin. In several parts of Connamara (see p. 129.), and at Kenmare, Kerry. I have a specimen gathered by myself at Caernarvon in 1830, but considered then as *S.* setàceus.

Alopecùrus fúlvus. On the bank of a pond near the Rectory, Copford, Essex.

Agróstis vulgàris var. pùmila; synon., *A.* pùmila *Linn.* and *Lightfoot.* On Henfield Common, Sussex, June 18. 1835. I have also found this pretty little plant near Capel Curig, North Wales. It has very much the appearance of a distinct species; but I have not been able to detect satisfactory characters. It may always be known by its fasciculate mode of growth and very small size.

Polypògon monspeliénsis. In Canvey Island, near Southend, Essex. June 22. 1835. It grows in a marshy spot, by the road side, between the chapel and some houses on the Thames bank.

Festùca rùbra β glaúca; synon., *F.* glaúca [? rùbra] *Winch,* Bot. Guide, 2. 11. On the sands at Shoreham, Sussex; on the opposite side of the river from the town.

Equisètum hyemàle. In the wood at Leixlip Castle, near Dublin.

Woódsia hyperbòrea. This plant, I fear, is now extinct on Glyder Fawr, Caernarvonshire, as Mr. Borrer and myself (in company with J. Roberts, Esq., of Bangor, a gentleman well acquainted with its *exact* locality) could not find a single specimen. July 28. 1835.

Œdipòdium Griffithiànum. Mr. Borrer and I found this rare moss in crevices of rock, on the upper ledges of Clogwyn y Garnedd, Snowdon. July 25. 1835. It was then nearly over.

[In VI. 367, 368., is published a notice, from Mr. Babington, of localities of *Cárex* speirostàchya, Lùzula spicàta, and a var. of *Festùca* ovìna with very hairy corollas deemed probably identical with *F.* hirsùta *Host.*]

ART. VI. *Some Discussion on the Principles on which Clouds are suspended, with a Recommendation, that those who pursue Meteorology do so cooperatively.* By Mr. W. H. WHITE.

As clouds may be reckoned among the most picturesque, pleasing, and useful phenomena of nature, it is somewhat strange that meteorologists have not paid more attention to the contemplation of them, as they, whether rolled into enormous masses, and piled upon each other, exhibiting the shapes of mountains, with summits as white as snow, and valleys, whose openings are distinguished by shades of purple and vermilion (appearances very common in tropical climes *), or viewed in their ever various and lovely characters, —

> " Where, 'midst the changeful scenery, ever new,
> Fancy a thousand wondrous forms descries,
> More wildly great than ever pencil drew;
> Rocks, torrents, gulfs, and shapes of giant size,
> And glittering cliffs on cliffs, and fiery ramparts rise;"
>
> BEATTIE'S *Minstrel.*

are fit subjects for philosophical investigation, and must be admired, by every contemplative mind, for their beauty, and for their endless combinations. What is now luminous will, in a few moments, become coloured; what is coloured will soon mingle into shade; or form the most beautiful and picturesque representations of islands, towns, bridges, arches, ruins, huge rocks, and gigantic mountains.

If, then, clouds are subjects of such great interest, an enquiry into the cause of their suspension in the atmosphere, I consider, will not be uninteresting to your meteorological readers; especially if the few ideas I shall advance should lead to further and more satisfactory enquiries on the subject: for I consider this department of meteorological science to be greatly neglected. This subject has engaged my attention for some time past. I have sought for an explanation of this beautiful phenomenon among the works of our best meteorologists; but I have found nothing satisfactory. The conjectures (for all the opinions I have met with, in the course of my reading on this subject, are mere conjectures) I have seen thrown out on the subject are not only very crude, but very

[* A remark by the late Rev. Lansdown Guilding relative to a notice in II. 297.—In a bright tropical sunset, the sun's rays will often tinge with green a considerable portion of the west. This unusual colour, associated with violet and golden hues, adds much to the gorgeous splendour of a scene which nothing earthly can equal. — *L. Guilding. St. Vincent, May* 1. 1830.]

far from being any thing approaching to a solution of the enquiry, How are clouds suspended? I will just mention one or two of those conjectures before I offer my own remarks. De Luc supposes that each particle of the vesicular vapour which constitutes clouds contains a small portion of hydrogen gas; and this gas, he says, enables the particles, like so many little air-balloons, to remain suspended in the atmosphere at different elevations. This same naturalist also *conceives*, not *proves*, that this hydrogen gas is derived from a *supposed decomposition* of a portion of the water itself. He, therefore, gives no explanation of the *cause*, or proof of the *effect*. Now, it appears to me, and I think it will appear plain to every careful observer of nature, that, if this theory of De Luc had been founded on actual observation, the presence of this hydrogen gas would have been detected, either on the summits of "cloud-capt" mountains, or, indeed, in any other place in a foggy atmosphere; but I am not aware of any meteorologist ever yet having made such a discovery.

I have perused the theory of Mr. Luke Howard on this portion of meteorology with no better success. Howard supposes each particle of vesicular vapour to be "similarly electrified," and that, consequently, they "repel each other." Now, admitting this repelling property to retard condensation, which it would have a tendency to do, it would not prevent the descent of the vesicles; for each globule of water, how minute soever it might be, would be heavier than the circumambient air, and, consequently, would, by the force of gravity, fall to the earth, although with a less velocity than a considerable volume of the same fluid. I, therefore, do not consider the suspension of clouds to be at all accounted for by either of these hypotheses; nor do I know of any other that claims superior attention.

How distinguished soever for learning and science may have been our predecessors, we are not bound to show them deference, by blindly embracing their opinions; for the very spirit which carried them to a certain extent of knowledge in their days would, could they revisit this

"Poor pitiable speck our earth,"

and renew their studies under all the advantages which they themselves so ably contributed to produce, carry them onward to greater improvements, and to the rejection of many erroneous opinions they formerly entertained. We live in a world surrounded by objects of high interest, whose influence has great effect on our existence and comfort, and whose varied impressions strike our senses with wonder and astonishment.

And yet, the more we contemplate the works of nature, the more we are impressed with our own insignificance, and the greatness of the Almighty Creator; and the longer we live, the more we shall find we have to learn; for

"'Tis but a part we see, and not the whole."

In order to ascertain the principle of the suspension of clouds, particular attention will be necessary both to the temperature and density of the atmosphere, as the quantity of moisture it is capable of dissolving greatly depends upon these circumstances. A much larger portion of aqueous vapour, it must be recollected, is held in an elastic form near the surface of the earth, than in the more elevated regions of the clouds. In high regions, even on the summits of high mountains, atmospheric pressure opposes very little check to the natural tendency of water to assume an aeriform state; consequently, the higher we ascend in the atmosphere, the quantity of moisture which is held in solution goes on diminishing, until we arrive at the precise altitude beyond which the effect of diminished pressure predominates, and the aqueous vapour goes on increasing, according to Professor Leslie's *Relations of Heat and Moisture*. This is, then, that medium point in the atmosphere which clouds occupy, and above which they rarely ascend, at least so far as my observations go; and I am led to this conclusion by that beautiful provision made by nature for preserving a constant circulation in the atmosphere by causing every accession of heat to be invariably accompanied by a corresponding decrease in density. Supposing, then, an ascending column of air to have reached that particular height at which its diminished temperature no longer allows of its retaining the whole quantity of moisture it had dissolved near the surface of the earth: it follows, that a portion of water becomes disengaged in that state which is termed by meteorologists vesicular vapour; that is, as I understand it, vapour holding intermixed with it some portion of atmospheric air; hence it appears, that, as the air is considerably more rare about the usual elevation of the clouds (from two to three miles), it not unfrequently occurs, that the watery globules in their descent meet with a stratum of air of that density which is just equivalent to the weight of the vesicular vapour and the contained atmospheric air together. At this point they will remain suspended, till such time as the air contained within the different vesicles becomes of equal density with the surrounding atmosphere; when the particles will coalesce, and form larger drops, and, consequently, become too heavy for the atmosphere to support; and, hence, they

will descend in the form of rain. I think I am borne out in this opinion by the well-known fact, that hailstones, which are evidently derived from the same source, are usually found to be hollow in the centre; and, also, that the low specific gravity of large flakes of snow, which descend so slowly and majestically through the atmosphere, is to be attributed to the same cause. Taking the term vesicular vapour in its common acceptation, as applied to the moisture of clouds and fogs, it seems scarcely possible to conceive any disengagement of moisture to take place, without, at the same time, supposing a certain portion of air to be intermixed with it.

I will now endeavour to put this theory to the test, by applying it to one or two of the principal modifications of clouds, as laid down in Howard's nomenclature. And, first, the cirrus, or that species of cloud which has the greatest variety of extent and direction; sometimes remaining almost stationary for many hours, and at other times undergoing exceedingly rapid changes; so that the cirrus cloud has been denominated the "Proteus of the skies." After some continuance of clear weather, the cirrus is frequently the first cloud to be seen; appearing like fine white threads, penciled, as Mr. Howard has it, on the clear blue sky. These fine thread-like pencilings, if I may so denominate them, occupy the highest station in the atmosphere; and are, I conceive, immediately formed from the setting free of the vesicular vapour; and, hence, they occupy that precise line of elevation at which the quantity of moisture held in an aeriform state is at its minimum. They therefore often remain, in the summer time, for a long time without having any apparent increase or diminution; because, while the evaporation is continually going on from the upper surface, and thereby tending to diminish the clouds, the ascending portions of air keep continually supplying on the lower surface, so that no actual diminution takes place; but, when the ascending portions exceed the evaporation from the upper surface, then the clouds begin to descend, or gravitate slowly towards the earth, and, at the same time, proportionably increasing their bulk; and thus form, in the second place, that modification of cloud, which Howard terms cumulus *; which, also, will be found to occupy that particular line of elevation at which the density of the atmosphere is exactly equivalent, as in the former case, to the weight of the vesicular vapour, containing portions of atmospheric air mixed with it.

I do not submit these observations to your scientific readers

* It is very interesting to witness the inosculation of different modifications of clouds.

with a view of setting aside any of the theories now in use, but only of drawing more attention to the vast and complicated science of meteorology. It is so full of beauty and interest in its details, and requires the aid of the most delicately constructed instruments for making accurate observations, that those who are desirous of becoming well versed in its minutiæ must pay the most unwearied attention to the incessant changes that are constantly taking place in the atmosphere; and, at the same time, every observation should be registered with the most rigid attention and veracity; without which meteorological science can make but little advancement.

But, to bring the science of meteorology to perfection, local observations are not sufficient; it requires a combination of means in all nations. It is not a few scattered observations in a single district, or kingdom, or even hemisphere, that can sufficiently extend our knowledge on this interesting subject. As the science of meteorology is so intimately connected, not only with the agricultural and commercial interests of a country, but also with the health of its population, I shall be very glad to find more attention paid to it, not by individuals alone, but by societies in all parts of the world, which should all make use of the same instruments, adopt the same form of register, and correspond at least once a month. By such comparative observations, I feel fully persuaded, meteorological science would make as rapid progress as other sciences have done; and we might soon be enabled to trace the origin of most of the phenomena that now strike us with astonishment.

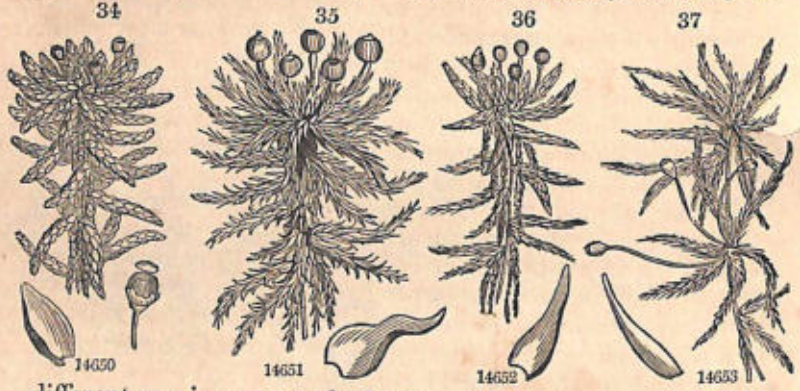
Old Kent Road, March 11. 1836.

ART. VII. *Some Account of the Bursting of a Bog in the County of Antrim, Ireland, on Sept.* 25. 1835; *with some preliminary Remarks on the Nature, Extent, Origin, &c., of Peat.* By WM. PERCEVAL HUNTER, Esq., Member of the Geological Society of France, &c.

I WAS in the westernmost part of the wild, but romantic and picturesque, county of Donegal, when I heard of the bursting of a bog in Antrim. I had read of these "bursts," as they are called, in *Lyell*, and had determined, if any one took place during my rides in Ireland, to visit wherever it might be, and behold with my own eyes the extent and nature of the ravages committed. For this purpose, as soon as I had completed my geological rambles in Donegal, I hastened, by the Sligo and Belfast mail, to the scene of action; and shall now proceed to communicate to your readers the results of

the observations and enquiries I made on the spot: preliminary to which, a brief outline of the nature, extent, supposed origin of, and organic and inorganic objects preserved in, bogs, may not, perhaps, be altogether out of place.

A variety of plants go to make peat: no less than forty different species are enumerated by Dr. Macculloch (*Western Islands*); and, of these, as many as seventeen are, according to Dr. Rennie (*Essays on Peat*), mosses; the chief of which, the *Sphágnum palústre*, possesses the remarkable property of throwing up shoots in its upper part, while its lower extremities are decaying: this moss, indeed, may be pronounced to be the chief constituent of peat. [*Fig.* 34., *S.* obtusifòlium *Ehr.*; *fig.* 35., squarròsum *Web.*; *fig.* 36. acutifòlium *Ehr.*; *fig.* 37., cuspidàtum *Ehrh.**] Rushes and reeds, however, of



different species, are perfectly recognisable in many bogs, besides a great variety of other plants, as already stated.

As to the composition of peat, as shown to us by analysis, Sir Humphry Davy informs us that, "in general, one hundred parts of dry peat contain from sixty to ninety-nine parts of matter destructible by fire; and the residuum consists of

[* The following information on sphagnums (*Sphágna*) is from Johnston's *Flora of Berwick on Tweed*, vol. ii. p. 55. "The *Sphágna* grow in compact elastic knolls, and, by their decomposition, contribute greatly to the formation of peat. Their stems are about a span [7 in.] in length, branched, and densely clothed with soft nerveless beautifully reticulated leaves, of a straw-yellow colour, and which distinguish the genus from almost all other mosses. The Laplanders, Icelanders, and the North American Indians use the *Sphágna* for lining their neat and curious cradles. The moss forms a soft elastic bed, which absorbs moisture very readily, and affords such a protection from the cold of a rigorous winter, that its place would be ill supplied by cloth. Mr. W. Curtis obtained the reward of the Society of Arts for his valuable application of these mosses to the packing of young trees for exportation." This information is interesting separately, and includes some matter correlative with Mr. Hunter's subject.]

earths usually of the same kind as the substratum of clay, marl, gravel, or rock, on which they are found, together with oxide of iron. The peat of the chalk countries of England contains much gypsum; but I have found very little in any specimens from Ireland or Scotland, and, in general, these peats contain very little saline matter." (*Irish Bog Reports*, p. 209.) According to Dr. Macculloch, peat is a substance intermediate between vegetable matter and lignite; its conversion into the latter being caused by the gradual and prolonged action of water.*

Peat has never been found in the tropics, and rarely occurs even in the valleys of the south of France or Spain. Peat, in Ireland, is found in all situations; on the declivities and summits of mountains, in valleys, near and at a distance from rivers and the sea shore, and in the most extensive morasses in level plains and low grounds; where it is found 50 ft. thick and upwards; though in these cases, according to Lyell (*Princ. Geol.*, ed. 4. p. 200.), it, for the most part, owes one half of its volume to the water it contains. The same excellent geologist adds that, on mountainous regions, peat seldom, if ever, exceeds 4 ft. in thickness: this, however, after travelling on horseback nearly two thousand miles in this country, and often beholding with wonder the enormous extent and curious phenomena connected with some of the Irish bogs, I have no hesitation in pronouncing, as applied to Ireland at least, to be a most erroneous statement. On ascending, on Dec. 1., Mangerton, the second highest mountain in Ireland, nearly 3000 ft. above the level of the sea (Carran Tual, which is 3410 ft. above the level of the sea, has recently been ascertained to be the highest mountain in Ireland), and one of the magnificent ridges that tower above the lovely lakes of Killarney;—without exception, with their three hundred rocky, moss-covered, well-wooded islands; the dark green glossy foliage of the arbutus, in other places a stunted shrub, but here a fine tree; the various tints of the gigantic-sized timber, with the luxuriant verdure so characteristic of this damp, misty, but beautiful island; the variety and richness of their botanical treasures, and, above all, their interest in a geological point of view as adjoining the loftiest mountains in Ireland,

* Where the living plant is still in contact with peat, the roots of the rushes, and ligneous vegetables, are found vacillating between life and death, in a spongy half decomposed mass. Lower down, the pulverised carbonaceous matter is seen mixed with similar fibres, still resisting decomposition. These gradually disappear, and, at length, a finely powdered subtance alone is found, the process being completed by the total destruction of all the organised bodies. (*M'Culloch's System of Geology*, p. 130.)

the most splendid, though not the largest, sheets of water in Great Britain;—on ascending Mangerton, I found peat on the slope of its very summit, from 7ft. to 10ft. thick. In Donegal, also, as well as in Mayo, Cunnemara, and many other parts of Ireland, peat is found on some of the loftiest eminences, from 10 ft. to 15 ft. thick. Professor Jameson, moreover, in his *Geology of the Shetland Isles*, informs us that peat, of an excellent quality and considerable thickness, is found on the tops of mountains in the Highlands of Scotland, at the height of 2000 ft. above the level of the sea.

In the same work is an accurate and graphic description of the general appearance of peat morasses, which, as being derived from the professor's own personal observation of the mosses in Scotland, I herewith extract:—

"In describing the general appearance of a peat moor, we may conceive an almost entire flat of several miles' extent, of a brown colour, here and there marked with tufts of heather, which have taken root, owing to the more complete decomposition of the surface peat: no tree or shrub is to be seen; not a spot of grass to relieve the eye, in wandering over this dreary scene. A nearer examination discovers a wet spongy surface, passable only in the driest seasons, or when all nature is locked in frost. The surface is frequently covered with a slimy black-coloured substance, which is the peat earth, so mixed with water as to render the moor only passable by leaping from one tuft of heather to another. Sometimes, however, the surface of peat mosses has a different aspect, owing to the greater abundance of heath and other vegetables, as the *Schœ`ni*, *Scírpi*, Eriόphora, &c.; but this is principally the case with some kinds of what are called muirlands, which contain but little peat, being nearly composed of the interwoven roots of living vegetables. Quick moss, as it is called, is a substance of a more or less brown colour, forms a kneadable compound, and, when good, cuts freely and clean with the spade; but, when it resists the spade by a degree of elasticity, it is found to be less compact when dried, and is of an inferior quality. The best kinds burn with a clear bright flame, leaving light-coloured ashes; but the more indifferent kinds, in burning, often emit a disagreeable smell, and leave a heavy red-coloured kind of ashes. In digging the peat, we observe that, when first taken from the pit, it almost immediately changes its colour, which becomes more or less a deep brown or black, and the peat matter becomes much altered, being incapable of forming a kneadable paste with water. When dry and reduced to powder, as it is often by the action of the weather, it forms a blackish-coloured powdery matter, capable of supporting vegetation when calcareous earth is added."

As to the Extent of Peat, according to Lyell, it is said to extend over the tenth part of the whole of Ireland; according to Wright, it occupies 3,000,000 of statute acres. From what I have seen, I should judge one half of Lyell's statement to be nearer the truth. Such immense quantities of bog land, however, have been, during the last thirty years, reclaimed; and drainage annually increases to such an extent, that it would be difficult, if not impossible, for any one, not professionally engaged on the subject, to state, at present, the actual amount. A hundred and fifty years ago, Dr. Boate, in his *Natural History of Ireland*, described the Bog of Allen as being seventy English miles long, by three or four broad: what its present dimensions are, I know not; but it must, of course, have since diminished greatly in size. The peat morass of Montoire, near the mouth of the Loire, is stated to be more than fifty French leagues in circumference by Blavier, as cited by Lyell.

As to the Origin of Bogs, there appears to be no doubt that they are caused by the cutting down or overthrow by violent hurricanes, floods, or tempests, of extensive forests; thus the site of the old Roman forests of Hircinia, Semana, Ardennes, has been ascertained by De Luc to be now occupied by peat morasses; and the sole remaining traces of the ancient forests, described by Julius Cæsar as existing along the line of the great Roman way in Britain, are to be found, observes Lyell, "in the ruined trunks of trees in peat." The greater part of Ireland, where timber, generally speaking, is now so limited in its quantity, and so stunted in its growth, must have been, formerly, one continued series of extensive forests, possessing timber of, compared with that of our own times, gigantic size and dimensions; for fir has been found in the Irish bogs 90 ft. in length, and been sold for the keels and masts of ships; and oak of 100 ft. in length; and an individual of the latter species is described in the *Philosophical Transactions* as the largest ever known. Fir, oak, and birch are found in vast quantities in the Irish bogs, as also yew and willow: of the former, I saw some very large trunks near the pretty flourishing little town of Enniskillen, in the county of Fermanagh.*

* The following interesting description of the conversion of forests into bogs is from the pen of the late Sir Walter Scott, who, as is well known to his readers, was a most enthusiastic admirer of trees, whose habits or natural history (if I may be allowed the expression) he profoundly studied, and took the greatest delight in observing. Sir Walter Scott, some ten years ago, spent several days on the Lakes of Killarney; and, although one of the keenest observers and best judges of the beauties of nature the world ever possessed, said the trees he had there beheld, growing of such

The Organic Objects found in Peat consist of occasionally almost perfect skeletons of a gigantic but extinct species of *Cérvus* (the Irish elk), which has never been found any where but in Ireland and the Isle of Man; the horns, skulls, and bones of the aurochs (*Bós Urus Lin.*), now only met with in a wild state in Russia, Livonia, and the most northern parts of Europe; and of the domestic sheep, cows, horses, pigs, and other herbivorous quadrupeds. The remains of otters and beavers have likewise been discovered in the peat of Zelanders (*Bulletin de la Soc. Géol. de France*, ii. 26.): but by far the most interesting organic remains discovered in peat morasses are those of our own species, which prove in the most striking manner the extraordinary, almost incredible, antiseptic properties of peat; properties attributed with great probability to the carbonic and acid gases arising from, and the charred wood common in, bogs; charcoal being well known to be a most powerful antiseptic, and to possess the power of purifying water already putrid. Numerous well-authenticated instances of this truly wonderful power are on record; but the following extract from the *Philosophical Transactions*, 1754, "of a letter from Dr. Balguy, giving an

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magnificent size, had afforded him greater pleasure than all the bewitching scenery of the lakes and mountains, which, however, he declared to be superior in their way to any thing of the same kind he had ever beheld. He expressed himself most gratified with the luxuriant woodland of various species, so richly, yet so naturally, blended together on each side of the passage into Turk Lake, by the old Weir bridge:—"Natural woods have long ceased to exist, except in a few instances: this has been owing to various causes. Extensive forests, occupying a long tract of tolerably level ground, have been gradually destroyed by natural decay, hastened by the increase of the bogs. The wood which they might have produced was useless to the proprietors; the state of the roads, as well as of the country in general, not permitting so bulky and weighty an article to be carried from the place where it had grown, however valuable it might have proved had it been transported elsewhere. In this situation the trees of the natural forest pined and withered, and were thrown down by the wind; and it often necessarily happened that they fell into or across some little stream or rivulet, by the side of which they had flourished and decayed. The stream being stopped, the soil around it became soaked with standing water, and, instead of being, as hitherto, the drain of the forest, the stopping of the rivulet turned into a swamp what its current had formerly rendered dry. The loose bog-earth, and the sour moisture with which it was soaked, loosened and poisoned the roots of other neighbouring trees, which, at the next storm, went to the ground in their turn, and tended to impede still more the current of the water; while the moss (as the bog-earth is called in Scotland) went on increasing and heaving up, so as to bury the trunks of the trees which it had destroyed. In the counties of Inverness and Ross, instances may be seen at the present day where this melancholy process of the conversion of a forest into a bog is still going forward." (*Quarterly Review*, vol. xxxvi.)

account of the preservation of two human bodies in peat for fifty-nine years," will be sufficient for my present purpose.

"On January 14. 1675, a farmer and his maid-servant were crossing the peat moors above Hope, near Castleton, in Derbyshire. They were overtaken by a great fall of snow, and both perished: their bodies were not found till the 3d of May in the same year; and, being then offensive, the coroner ordered them to be buried on the spot in the peat. They lay undisturbed twenty-eight years and nine months; when the curiosity of some countrymen induced them to open their graves. The bodies appeared quite fresh; the skin was fair, and of its natural colour, and the flesh as soft as that of persons newly dead. They were afterwards frequently exposed as curiosities, until in the year 1716, when they were buried by order of the man's descendants. At that time, Dr. Bourne of Chesterfield, who examined the bodies, says, the man was perfect, his beard was strong, the hair of his head was short, and his skin hard and of a tanned leather colour, like the liquor he was lying in. The body of the woman was more injured, having been more frequently exposed: the hair was like that of a living person. Mr. Wormwald, the minister of Hope, was present when they were removed. The man's legs, which had never before been uncovered, were quite fair when the stockings were drawn off, and the joints played freely, without the least stiffness."

Towards the end of the last century, the body of a man dressed in the Saxon costume was dug up out of Hatfield Moss in the north of England. His nails, hair, flesh, and everything about him, were perfect and entire.

In the very interesting museum belonging to Mr. J. V. Stewart of Rockhill, in the county of Donegal, whose admirable essay on the ornithology of Ards, in the same county, must be fresh in the recollection of many of your readers [V. 578—586.], I saw a piece of human flesh which exactly resembled a piece of tanned leather saturated with muddy water. This, Mr. Stewart informed me, he himself cut off from the carcass of a man found in a peat moss, about 5 ft. below the surface, near the banks of the beautiful Lough Esk, a few miles from the town of Donegal. By the side of this body was a clasp-knife in a sheath of sheepskin: the knife was rusty, the leather perfectly uninjured. Mr. Stewart also showed me a human bone from the same morass; a thigh bone, as I understood, which had contracted to one half its length and dimensions, though it had preserved its original shape and contour perfect and entire; was of a black colour, and lighter than any bones (not even excepting those of birds,

which, as is well known, are always hollow) I ever saw. This is a very remarkable, and, as it appears to me, wholly unaccountable fact, seeing that bog oak, in common with some other kinds of bog timber, becomes of a darker hue, and increases both in weight and dimensions; its additional weight, which in oak is to a very striking degree, being with great reason ascribed to the presence of oxide of iron, which, on the decomposition of the various plants in peat, of which iron is always an ingredient, penetrates through the fibres of the wood, and in other places, sinking to the bottom of the marsh, forms that well-known mineral, bog iron ore.

As to the Works of Men's Hands, and Inorganic Objects occurring in bogs, the wrecks of ships, oars, and nautical instruments in the Dutch; stone arrow-heads, stone hatchets, and canoes, in the Irish; are the most common. [IV. 543.]

I now proceed to the more immediate subject of this paper. Fairloch Moss, one of the many other mosses going under the name collectively of Sloggan, the largest bog in the north of Ireland, covering, with various breaks, an extent of ground of eleven thousand acres, is the name of the morass where the "burst" about to be described took place. It is situate about seven Irish miles from the small but flourishing linen-manufacturing town of Ballymena, and two miles from Randalstown; and the mail-coach road from Belfast to Londonderry passes by, and, as it will appear in the sequel, divides, as it were, in half this extraordinary burst. The surrounding country is for the most part flat, barren, and uninteresting; broken, however, here and there, especially near Fairloch Moss, by tolerably deep longitudinal valleys. It was close to one of these valleys that the morass burst; a fortunate circumstance; for, had it happened on an eminence, and flowed down thence over a perfectly level country, destruction of property, and of animal and human life, to an immense extent would infallibly have been the consequence: as it was, however, its pernicious effects were very trifling compared with those related to have accompanied other preceding bursts.

On Saturday, Sept. 17., the burst commenced. During the whole of that day it was observed, and, in all probability, the same might have been seen for several days preceding, to swell up gradually in a convex shape, till it had attained the height of 30 ft.; when, about five in the afternoon, a loud noise, like the sound of a mighty rushing wind (so the cottager residing near the spot described it to me), was heard, and the mass of bog sank down for several feet, and a collection of tufts, mud, and water moved forwards, though by no means rapidly, in a north-east by east direction. Here,

however, at a distance of a few perches, its course was interrupted by several rather deep ditches, swamps, rising ground, and other obstacles, against which it appears to have wasted its strength the whole of Saturday night, and during Sunday took a western zig-zag direction, the whole day not moving more than fifteen perches. The greater part of the night of the 18th, and of the early part of Monday, the 19th, it appears to have remained stationary, gradually swelling up in the manner before described. Between twelve and one, however, of that day it again burst with a similar rushing noise, and crept slowly onwards till Wednesday, the 21st; when it is calculated it had moved from the commencement upwards of a quarter of a mile. Here, being again interrupted in its course by a ditch, a hedge, and several small stacks of corn and hay, it moved but little till Friday, the 23d; when, about three in the afternoon, it rushed suddenly forward with the speed, as the peasants expressed it, of a race horse: they found it impossible to keep up with it. It was while pressing thus rapidly onwards, that a hare, pursued by some boys and a dog, leaped on the bog, and, jumping from tuft to tuft, succeeded in reaching the centre of the morass, where it was seen struggling for several minutes, but at last disappeared in the torrent of black mud that flowed down upon it. The dog followed; but, terrified at feeling the ground moving, as it were, from right under his feet, and gradually giving way, leaped off again, and ran away with his tail between his legs, evidently much frightened.

On Saturday, the 24th, it reached the road, which was somewhat higher in this place than the surrounding country, filled up a deep ditch, entered and surrounded a cottage for ten feet, rose considerably, and fell down a cascade, as it were, of mud on the road, with the noise of a powerful roaring waterfall, the road being covered for nearly 300 yards, in the highest place nearly 10 ft.; it then swept forwards rapidly, filled up the opposite ditch, flowed down the continuation of the same longitudinal valley, which was here on a slope for nearly half a mile; when it stopped, as if to rest and recruit its strength, within a few perches of the river Maine.

On Sunday, September 25th, it again moved forward, and rushed into the river, which, at this spot, and for some yards up the stream, is only 4 ft. deep, and drove back the channel for several hours; then rose above the banks on the opposite side, and moved up some rising pasture land, and would have committed incalculable mischief, by, in addition to its own ravages, laying the whole country for miles around under water, had it not been that the stream, being thus

dammed up and driven back, rose in its turn also, and acquired additional and, at last, sufficient strength to break through the barrier; and as, but a few yards lower down, the bed of the Maine suddenly sinks to a depth of 12 ft. and upwards, the whole mass of bog was most providentially carried down by the stream for seven miles, strewing its sides with peat, and causing the river in some places to overflow its naturally, for a flat country, rather lofty banks, into that huge, magnificent, all but unrivalled sheet of water, the far-famed Lough Neagh *, the marvellous stories respecting whose healing and petrifying properties most persons have heard of, and not a few believed; but for which, it is perhaps almost superfluous to add, there is not the slightest foundation whatsoever.† The bog with its contents did not cease flowing or oozing into the Maine till Wednesday, September 28.

When the bog crossed the river, it killed all the fish: many hundred weight of salmon and trout were collected by the country people, who for leagues around had left their houses, and congregated together in the greatest consternation, to watch, by day and night, what direction the moving bog seemed inclined to take. The eels alone appeared in their element, writhing to and fro their slimy bodies, and revelling in a state of the most luxuriant enjoyment in the deep black mud. The loss ensuing from this event, as it fortunately happened, was comparatively small: not more than seventy acres of arable land, and a few stacks of hay, corn, and firing were destroyed. The only living beings that suffered were the fish and the hare abovementioned. A fact that struck me as being very remarkable was, that the whole mass of this new born bog (if I might be allowed the expression), from 200 to 300 yards on an average in width, nearly three quarters of a mile in length, and at the greatest height 30 ft., had, when I visited it (Thursday, October 15.), not the slightest appearance of disturbance, but looked as if it had stood for several hundred years exactly as I beheld it. At the spot where the bog swelled up 30 ft., it sank after upwards of 20 ft. below its original height, having always been considerably raised, and a small circular pool of water occupied the hollow caused by the depression. This put me in mind of the round ponds described as frequently arising during the earthquakes

* Lough Neagh, according to Inglis (*Ireland in* 1834), is, with the exception of Lake Ladoga, in Russia, a lake in Sweden, and the Lake of Geneva, the largest sheet of water in Europe.

† "Historia sabida de los ninos, no ignorada de los mozos, celebrada y aun creida de los viejos, y con todo esto no mas verdadera que los milagros de Mahoma." (*Don Quixote*, por. 1. cap. v.)

in Calabria, 1793. Its strong similarity, indeed, to those productions of subterranean agency, the volcano and earthquake; the current of lava at times moving rapidly forwards, at others more slowly; here rushing across a river, blocking up its channel, and forming a bridge for the stream to wear its way through afterwards in the course of ages; there entering houses, overwhelming whole cities, and preserving for centuries uninjured, statues, domestic utensils, blocks of stone, &c.; must be apparent, I think, at once to every one who reads the above account: but the resemblance, of course, is merely manifest in a few of the effects, there being not the slightest connexion in their origin; the one being caused, the wisest among us know not exactly how, the other being evidently and solely owing to a superabundance of water and putrid matter.

To furnish some idea of the ravages of this moving bog, I add, that no less than forty men had been employed for several days, when I visited it on Thursday, and had not succeeded in removing it entirely away from the road. This, as may be supposed, occasioned considerable inconvenience to the country; the mails and coaches to and from Londonderry and Belfast having to go round by a circuitous route.

Kenmare, Co. Kerry, Ireland, Dec. 28. 1835.

ART. VIII. *On a Fresh-water Deposit, containing Mammalian Remains, recently discovered at Grays, Essex.* By JOHN MORRIS, Esq.

THIS deposit, which is situated about a quarter of a mile to the east of the village, has been long worked for the manufacture of bricks; but it is only since some recent and deeper excavations have been made in the pits, that the peculiar fossil remains belonging to them have been discovered. The deposit, which extends east and west, and about a quarter of a mile in width, fills up a valley between two ridges of irregular height; that to the north being part of a long range of chalk hills, extending from Purfleet for seven or eight miles parallel to the river; and that to the south consisting of rubbly chalk with irregularly disposed flints, about 30 ft. high, which you pass over in proceeding from the village to the brick-field.

The deposit being worked in three different pits, an opportunity is afforded of examining its stratification for more than half a mile. The section of the first, or western, pit, at the

south side, is, vegetable mould, &c., 3 ft.; loam and sandy clay, with few plants and chalk pebbles, 10 ft.; a bed composed of rounded and angular chalk, and iron, flints, quartz, sandstone, indurated claystone, nodules of white chalk and calcareous marl, fine sand and comminuted fragments of shells, exposed about 4 ft. In the middle of the pit is the following section: — burnt brick earth, 2 ft.; loam and sand, 6 ft.; black iron clay, 1½ in.; coarse sand, 2 in.; greyish white sand, 6 in.; gravel bed noticed before. On the north side occur, loam and sand, 18 ft.: ferruginous sand, with angular flints and rounded chalk pebbles, 2 ft., containing numerous individuals of the following Testàcea, — U'nio; Cyrèna, Cyclas, Paludìna, and many of their opercula; Valvàta, Planórbis, Lymnèa, A'ncylus, Hèlix, Pùpa, Carýchium, and Bùlimus; fragments of bone, vertebra of a fish, and a small tooth: loam and sandy clay, 4 ft. A debris obscures the lower part; but the workmen informed me that the beds extended 15 ft. deeper, below which is the chalk. As the strata have a general inclination of 15° to the north, it is probable that the sandy beds on the south side have been subsequently removed. The nodules of chalk in the gravel bed appear to have been fissured in every direction, and again agglutinated by oxide of iron; so that one mass, when divided, consists of eight or ten separate pieces. The Testàcea in the sandy bed on the north side are not the least worn by attrition; but it is difficult to procure perfect specimens, especially of the U'nio, as they are very much decomposed by the oxide of iron contained in the bed.

In the second pit is the following section: — black mould, 1 ft.; burnt brick earth, 2 ft.; loam and reddish-coloured sand, with flints, the lower part waved and irregular, 5 ft.; iron sand, red and yellow, with horizontal patches of white, 12 ft.; brown sandy clay, 10 ft.; two beds of shells, containing the same as in the first pit, with the addition of a species of A'nodon, 2 ft.; a layer of lignite, reeds, leaves, &c., blue clay, with mica, 15 ft., the upper part containing U'nio and A'nodon in great numbers, and sometimes very much compressed. Below this, the workmen informed me, is a bed of gravel and sand resting upon what they term the "bull's head," or iron flint bed, which reposes immediately upon the chalk. This pit afforded the rich deposit of

Mammalian Remains, of which the following may be noticed: — an almost entire skeleton of the elephant, found 9 ft. below the brown sandy clay, and associated with the shelly bed, one of the teeth weighing, when cleaned, 17 lb.

4 oz., and another nearly as much *; remains of the hippopotamus; horns of the ox and deer; a canine tooth of the bear; and numerous other bones, more or less perfect. They still contain much phosphate of lime, but are strongly impregnated with iron. These remains are not confined to the shelly bed, being sometimes found, though rarely, in the beds above and below it. In the upper part of the blue clay the remains of a tree were found.

In the third, or eastern, brick-field, the upper beds thin off, the brown sandy clay coming within 7 ft. of the surface, and is worked to the depth of 15 ft.: the lower part contains numerous fragments of shells, with some few layers of more perfect ones. Still further to the east, the whole of the beds thin off, and, apparently, disappear beneath the marsh.

On the upper surface of the general section there is very little accumulation of diluvial gravel; the gravelly debris, with comminuted shells, being found beneath the loam and sandy clay, in the western pit, but does not appear in the eastern, the shelly fragments being there mixed with the fine sand. The strata have a general inclination of 15° to the north. The layers of the loam and sandy clay appear to be made up of small flat fragments of shells, arranged parallel to each layer, the laminæ varying from eighteen to twenty in number in the thickness of an inch. The sandy beds present an appearance of false stratification: and it is not uncommon to find horizontal alternating with wavy and transverse layers. The shells are irregularly distributed: some genera are more abundant at one spot than another; the Unio and Anodon occurring in the blue clay of the second pit; while, in the first, the unios are mingled with the other Testàcea of the sandy bed. The lignite is also variable in its position, sometimes dividing the shelly beds, and at others occurring below them. Besides the occurrence of chalk nodules on the loam and gravel beds, they are found much smaller, though more numerous, sometimes containing a chalk fossil, in the shelly beds; where I have also detected two species of coral, probably belonging to the same stratum.

Similar deposits, containing bones, associated with shells, have been found at Stutton, Suffolk, and Copford, Essex, mentioned in VII. 274, 275., and VII. 436—438. The same genera of shells are found in the beds at Grays as at

* One of them is said to be in the British Museum, the other in the possession of Mr. Hemming, the proprietor of the brick-field. At first, the bones were considered by the men valueless; but, after the proprietor's attention had been called to them, there were enough collected together to make a cartload.

Stutton (VII. 274.), though the species in the former are at present not so numerous.* It is remarkable that the Cyrèna trigónula *Wood* occurs in great abundance at both places. The specific characters of the Stutton shells appear to have been identified with the recent types. Many of them at Grays are also identical, though some few species are certainly different†; as Unio, Ancylus, Hèlix, a species of Valvàta which differs from the common V. piscinàlis in the general roundness of the whorls, and greater elevation of the spire.

The mineral character of the Copford deposit appears to be similar to that at Grays; but the shells are much less perfect, as the Valvàta and the opercula of Paludinæ have only escaped destruction, the other genera being mostly found as fragments. The existence of the chalk nodules in the blue clay at Copford is an interesting fact, as I have only found them at Grays in the beds above that stratum.

At Southend and Ilford, Essex, various animal remains have been found associated with shells; and, in offering the preceding account to your readers, I hope that further researches in this county may be attended with fresh discoveries.

Many of the above observations were made in company with Dr. Mitchell, F.G.S., to whose kind attention I was first indebted for the knowledge of this interesting locality.

Kensington, March 16. 1836.

ART. IX. *A Notice of the Occurrence of certain Bodies in the Greensand at Cambridge, that are similar to those found in the Gault at Folkstone, as described in* p. 47.; *and some Information on the Greensand and contiguous Strata at Cambridge.* By DELTA.

SEEING, in p. 47., an account of some fossil bodies occurring in the gault at Folkstone, I immediately perceived an analogy between them and certain substances found in the greensand at Cambridge.

This bed lies between the chalk marl and gault, and seldom exceeds 2 ft. in thickness; while the stratum above it varies from 14 ft. to 20 ft.; and that below usually extends to 100 ft. or 150 ft. beneath the surface. Although, however,

* I have refrained, at present, from offering a specific list of the shells and bones found in this deposit, as I hope in a future communication to give a more perfect list of both.

† From the information of Mr. G. B. Sowerby.

the greensand is in itself by no means extensive, its scarcity of substance is fully compensated for by its abundance of organic remains; among which may be enumerated several species of Terebrátulæ, *O*streæ, Dentàlia, Ammon*ites*, *N*aútilus, Belemnites, and other shells, together with vertebræ, bones, and teeth of sharks and other fishes, mingled occasionally with fragments of Crustàcea. Saurian remains are comparatively rare, but teeth and bones of the crocodile have been found.

The substances under consideration occur in considerable abundance, and may be considered as highly characteristic of this bed wherever it occurs in the neighbourhood. Their colour is generally black or light brown; and all of them, for the most part, exhibit external as well as internal traces of organisation, being penetrated transversely by white streaks of a peculiar character. They vary very much in shape and size, though none of them are very large. Some of the forms they assume closely resemble those of fæcal substances; a few are occasionally met with containing scales, while others enclose shells and corals: indeed, many resemble decayed madrepores, and some have an appearance like that of wood or bone. It seems difficult, however, to account for their exact nature, number, and eccentricity of the forms which they assume. I think, however, there can be no doubt as to their identity with those of Folkstone, though occurring there in a different stratum. This fact is certainly interesting, though none are found in the gault at Cambridge, which contains fossils sparingly disseminated over its upper part, but they are more numerous in the lower. As I do not, however, attempt to determine what they are, I shall conclude these partial observations by mentioning their occurrence in two distant localities. — *London*, *Jan.* 23. 1836.

ART. X. *Retrospective Criticism.*

MR. C. T. WOOD's Remarks on the extravagant Price of Works on Subjects of Natural History. (p. 213—216.) — We are told, in p. 216., that "none but the public can be blamed for the continuance of the grievance. As long as individuals will continue to purchase at any price the booksellers choose to ask, so long will they be obliged to be cheated of half their money's value; but, if they will apply through the proper sources, they will be enabled to double or triple their literary meal with the same money." Now, I by no means dispute the high price of the works alluded to: whether or not they

be *dear* in proportion to the expense attending their publication, I cannot judge; and I want to be put into a knowledge of "the proper sources" through which I may be able to obtain such works at one third of their published price. I want this for two reasons: first, because I cannot afford to spend much money for books; and, secondly, because I don't choose to be "cheated." As, however, one fact is worth a thousand theories, I will feel much obliged if Mr. Wood will inform me how, and where, I can get the following works at one third of their published price: *The Transactions of the Linnæan Society*, *The Transactions of the Horticultural Society*, *The Transactions of the Geological Society*, Sweet's botanical works, Haworth's work on British Lepidóptera, Hooker's *Monograph of the Jungermannia*, Lindley and Hutton's *Fossil Flora*, Griffith's *Cuvier*, Selby's *British Birds*, Stephens's *Illustrations of British Entomology*. I know of no means, at present, by which I can obtain these works, and a long catalogue of others which I could name, but at the published price; and, therefore, I am obliged to be content (or rather discontented) without them. If Mr. Wood will have the goodness to inform me how and where I can procure them for one third of the published price, I am sure he will not only be rendering me, but also the public in general, a most essential service. — *C. April* 7. 1836.

Mr. C. T. Wood's Remarks on the extravagant Price of Works on Subjects of Natural History. (p. 213—216.) — I quite agree in the remarks of C. T. Wood on the extravagant prices of books of natural history. It has always appeared to me great folly to dress up *working* books in fine array, and thereby prevent their general use and extensive sale: the former, a public, the latter an individual, evil: for, if brought out at a moderate price, hundreds would be benefited, instead of tens; and the same ratio of profit would reward both authors and booksellers. — *Phi. April* 10. 1836.

[*The Question of the Office of the Gland upon the Rump of Birds.* (p. 158—164.)]

[*A Correction* of an omission, which Mr. Waterton has advised us of our making in his last published communication on this subject. In p. 159., lines 22—26., for "A very moderate attention to ornithology would have taught him that there are birds with tails and birds without tails. So," read "A very moderate attention to ornithology would have taught him that there are birds with a tail and birds without a tail. All birds with a tail have invariably a rump, and, of course, they must have the oil gland. All birds without a tail have no rump; of course they can have no oil gland. So."]

I think that I can now put this question to rest. Ere I do so, I will just glance over the rambling paper by the Rev. F. O. Morris [p. 159—164.], and drop an ornithological remark or two on it, as I pass my eye along it.

The apostrophe which his reverence makes to the feline tribe shows that he has neglected to study the anatomy of his cat, at his own fireside. After quoting a remark of mine in a former Number [V. 413.], viz., "that when the nature of the gland and the form of the bill are duly considered, it is rational to conclude, that the application of the hard bill to the soft gland would be very painful to the bird," his reverence exclaims [VIII. 162.], "Then thrice unfortunate are ye of the feline race: if this be so, how must your faces suffer, *it is rational to conclude*, when you wash them with your paws: 't is marvellous that your talons allow any part to remain unscratched of the contracting pupils of your eyes: dreadful must your suffering be." What sympathetic stuff! The beaks of birds, *not* being retractile, must necessarily present a hard substance to the soft gland; but the claws of all the feline tribe, *being* retractile, every individual of that family can draw them in, and present to its eyes and face a paw as soft as velvet, whenever it is inclined to make its toilette.

The gland in birds (whether they be land fowl or water fowl) is always perfectly developed, and of a capaciousness proportionate to the size of the bird.

His reverence informs us that he himself has *seen* tame ducks apply the bill to the *gland*, and then to the feathers. Indeed! Pray how could *he* manage to see the gland, when the duck itself cannot possibly see it? The feathers of all birds are ranged obliquely on the skin, and are movable at pleasure; but in ducks a thick coat of down rises at the roots of the feathers, and the muscles which move the feathers have not the power to expand this down so that you may see through it, or to divide, or to separate it.* Now, the gland of the duck is completely enveloped in a very dense tuft of this down; so that the duck could not obtain oil from the gland, if it wanted it, because the oil would be entirely absorbed by the intervening body of down. His reverence could no more see the gland of a duck through this down, than I could see his own heart through the folds of his cassock.

The oil which proceeds from the gland, when applied to the feathers, has exactly the same effect upon them, whether

* I send by this opportunity the glands of a duck, a Canada goose, and a woodcock to Mr. Loudon, for his inspection and that of his friends.

it be applied when the bird is alive, or whether it be applied after the bird is dead.

His reverence further remarks: "I very much doubt whether the objector (meaning me) has ever actually seen a bird catch one of these famous insects with its bill." Had the reverend pastor dissected as many birds and beasts as I have done, and attended as much to their habits, he would not have many doubts on this point. In dissecting his birds, he would have seen that many of them were much infested with lice; and he would have been fully convinced that birds do free themselves from these lice through the instrumentality of the bill, by finding the swallowed insects on dissection; unless, indeed, he gravely came to the conclusion, that the lice had voluntarily entered the body at the other end. I myself have actually swarmed with ornithological lice; for, after applying the alcohol and sublimate to the skin of the bird which I was dissecting, they would take the alarm, and, passing up my sleeves, would be in my hair in a trice. After finishing the bird, I used to take to the river; and there I started the little fugitives into the stream, by scrubbing my head and body with a lemon. I was never put much out of the way on these occasions; for I knew by experience that ornithological lice cannot thrive, or exist even for a few days, on the human body. Monkeys catch and eat their own fleas. Birds and negroes catch and eat their own lice. All this I have witnessed times out of number.

In another part of his paper, the Rev. F. O. Morris remarks, that the "*à priori* argument is certainly in our favour." I have nothing to do with "*à priori*;" my business in this interesting investigation lies *à posteriori*, as the position of the gland evidently shows. But to the point. Some months ago, after a long search, I procured an uncommonly fine fowl without a rump. She is here now, at liberty to follow nature's course, on the island where I live. I have given her for a companion a fowl with a rump, and have introduced to their acquaintance a noble male Malay, in order to see how the young will be provided for in the nether extremity. These birds are always in sight of the windows, to which they come to be fed. They are for ever applying their beaks to their feathers; and there is never the slightest difference or change to be perceived in the appearance of the feathers of the hen with a rump, when compared with those of the hen without a rump. In a word, the feathers of both birds are quite perfect. I invite any naturalist to examine their plumage, or their feathers separately, with a powerful magnifying glass; and, if he can perceive the least alteration in the state of the

feathers of these two hens, I will cheerfully acknowledge that I have been in error. After a shower of rain, the feathers of the rumpless hen dry just as fast, and in as fine order, as the feathers of the hen with a rump; and, if you immerse both these birds in water, the feathers of each will become equally saturated in the same space of time; and they will dry again in the same space of time, with equal beauty, just as they appeared before immersion. Then it follows, that, if the feathers of a fowl without an oil gland are at all times in as perfect a state as those of a fowl with an oil gland, the oil gland can be of no use whatever, as far as the texture and preservation of the feathers are concerned. Hence I conclude, that Nature never gave the oil gland to birds in order that they might lubricate their feathers with its contents.

Occasionally there is a discharge from the gland; and, when this is the case, the down which surrounds the gland becomes really anointed, and loses every particle of its former light and airy appearance. Now, if this oil thus changes the appearance and very nature of the down in the vicinity of the gland, it could not fail to leave a visible mark on the other parts of the plumage, when supposed to be applied to them by the bill of the bird. But, somehow or other, it so happens, that neither by the scent, nor by the touch, nor even by the sight aided by the strongest magnifying glass, has any body yet perceived the smallest portion of the oil on the feathers of a bird. By the way, Audubon says [I. 119.] he saw the whole plumage of his new species (no new species) of eagle covered with it. But his account contradicts itself. I keep my two fowls purposely for demonstration in matters appertaining to the oil gland in birds. Any naturalist can have access to them, or can be accommodated with the loan of them, should he wish to add to the experiments which I have already made. — *Charles Waterton. Walton Hall, March 5.* 1836.

The Question of the Office of the Gland upon the Rump of Birds. (p. 158—164.) — The *Magazine of Natural History* has this morning (March 1.) brought me some witticisms of Mr. Charles Waterton's; which a little common sense will easily dismiss. When I said that birds "may be seen," before a shower of rain, anointing their feathers with the contents of the oil gland which they possess, I used the expression for persons whose eyes are *not blinded by prejudice*, and I mean to *assert a fact* (the common interpretation of the words bears me out), and not to hint a possibility; so that it is sheer affectation in Mr. Waterton, in his flippant way, to call the expression "may be seen" "by no means satisfactory." I

repeat again, that they *may be seen*, that I have seen them, and that so has every other observer, always excepting Mr. Charles Waterton.

His next sentence it seems that I have answered already in my paper which followed his; so I will go on to the following one, where he gives the dipper credit for being a *water* bird; saying that, if I had compared the nature of a land bird's plumage, with that of a water bird, I should surely not have made the assertion I did: so much for his knowledge of ornithology! But why, he asks, do I propose to make the trial by drying the birds "in the sun?" "that very act *alone* would insure the unsightly appearance," &c. I say it *would not;* I have known birds lie in the sun for hours together, even when quite dried, and receive no injury *therefrom;* and, even granting that it did injure them, is not the trial *as good* for the land bird as for the water bird? Have they not both an *equal* chance? Place them both *in* the sun, or both *out* of it "si mavis," only place them both under equal auspices, and the contrast I predicted will be brought about. Facts are stubborn things, and Mr. Waterton finds them so. I should like now to ask who has shown himself a "novice in the nature of plumage?" As to the "chemical, or other tedious process," I will beg leave to assure Mr. Waterton, that *I* am quite content with the good oldfashioned way of stuffing a bird, and have never tried any newfangled experiments, and have, therefore, failed in none: he, probably, cannot say as much: so much for his suspicions! He wished, it seems, to shift from his own shoulders to mine the charge of "bungling;" but his attempt has proved rather a failure.

Then, next he considers it exceedingly arrogant to accuse him of prejudice. I, however, think rather differently, particularly as his prejudice is not opposed, as he would have us to believe, against my inexperience, but against the experience of all who know anything at all about the matter; and he tries to evade the imputation, by telling us an old story about a Frenchman, which has about as much to do with the subject in question as Mr. Charles Waterton's illustrations generally have; just about as much as his story, the other day (VIII. 516.), about the divings of old Nicholas Pescé, had to do with the "subaquatic promenade" of the *Cinclus aquáticus*; speaking of which, from his proceeding to say (IX. 159.) that I have not refuted any part of his theory advanced on that subject, I should think that he has not read p. 638. of Vol. VIII., where I have taken the only three arguments he has advanced, and overturned them one by one. From seeing my name signed at the bottom of the preceding page, he probably sup-

posed that I had gone no farther; but, if he will take the trouble of turning over the page, he will find his arguments demolished without quarter. He asks for a demonstration where it is evident (as I have shown) that none can be given, (for who can actually *see* a bird imbibing the oil); and then affirms, that nothing else will satisfy him. This is rational conduct, truly. The other demonstration has already been given by eyewitnesses, who have seen the dipper walk underneath the water. (See Mudie's *Feathered Tribes*, as quoted by S. D. W., in VIII. 638.)

Now, we come to his "barn-door fowl *without a tail*," "risum teneatis amici?" which he introduces as an answer to my question, whether any birds are *without the oil gland*. [The correction prefixed to Mr. Waterton's communication in p. 266—269., should be taken cognisance of here.] Another instance this of his cleverness at illustration! Really, Mr. Charles Waterton, I had given you credit before for some little knowledge of the rudiments of natural history, which little, it seems, you had no claim to. What, Sir! are we to infer from your "barn-door fowl's" having no tail, that, therefore, it has no oil gland? What, in the name of all the barn-door fowls that ever lived, have the *feathers* of a bird's tail to do with its anatomy? Answer me this question, and get over this how you can. Stay, yet one more question. How many converts are there to your theory about the oil gland? I will tell you: just as many as have embraced your method of stuffing birds, given to the world so many years ago in your *Wanderings*; and, what is more, the number will always remain the same: but on this subject you shall hear from me again. "We shall meet at Philippi." Let me only add that, while you were *wandering* in *South America*, I was acquiring an experimental knowledge in *England* of its *native* birds, which you will never possess. — *F. O. Morris. March* 1. 1836.

ART. XI. *Instances of Man's Progress in the Extension of his Knowledge of Natural History.*

A BOTANICAL *Society has been established in Edinburgh.* — At a meeting which took place on March 17., the Society, was constituted under the title of "The Botanical Society of Edinburgh." The meetings are to be held on the second Thursday of every month, from November to July inclusive. Professor Graham has been elected president, and Drs. Greville and Balfour vice-presidents, for the present year. The advancement of botanical science is the object of the Society.

Its operations will, for some time, be confined principally to the holding of periodical meetings, to correspondence, to the formation of a herbarium, and the interchange of specimens. The last is a new feature in the constitution of such a society, and will be conducted by a committee, in accordance with certain rules embodied in the laws. The desiderata of botanists in all parts of the kingdom will be supplied, as far as possible, from the Society's duplicates; and individuals will secure the important advantage of exchanging the botanical productions of their respective districts for those of others more remotely situated. The benefits resulting to science, as well as to individuals, by this arrangement, will, it is hoped, be considerable; especially in regard to the geographical distribution of plants in the British Islands, and the formation of local floras. The Society, besides, contemplates an extension of this plan, by promoting an exchange of specimens with botanists in other parts of the world. The members will be divided into the following classes: — resident, non-resident, foreign, and associate. Any person wishing to become a non-resident member must be recommended by two individuals belonging to some scientific or literary society, and pay a contribution of two guineas; which, without any additional payment, will entitle him, as long as he continues annually to send specimens to the Society, to a participation in the duplicates. To become a foreign member, it is necessary to transmit 500 specimens, including at least 100 species; or a botanical work of which the candidate is himself the author; the former alternative, only, entitling him to a share of the Society's duplicates. To continue to participate in these duplicates, he must afterwards contribute annually 300 specimens, including at least fifty species. The flora of Edinburgh, which is particularly rich, will afford a constant supply of valuable duplicates; and others will be regularly obtained from other parts of Scotland, especially the rarer alpine species. Local secretaries will be appointed in different parts of the kingdom. In the meantime, all communications are to be addressed (postage paid) to the secretary, W. H. Campbell, Esq., 21. Society, Brown Square, Edinburgh. — *M.*

REVIEWS.

ART. I. *Notices of Works in Natural History.*

WEBB, P. B., and Berthelot, Sabin; Membres de plusieurs Académies et Sociétés savantes: Histoire Naturelle des Iles

Canaries. Ouvrage publié sous les auspices de M. Guizot, Ministre de l'Instruction Publique. In fortnightly parts: 4to, as to the text and some plates; folio, as to the atlas. London, Hunneman, 9. Queen Street, Soho; Paris, Béthune; Carlsruhe, Herder.

This work is prospectively noticed in p. 112. Since the date of the publication of that notice, four numbers have been seen; and it is pleasant to state, that these are of so scientific and interesting a character, as to mark the work as one likely to include stores of information of very high interest to the naturalist. The four numbers cited relate to botany, under divisions of it entitled, "Aspect Général de la Végétation dans les Iles Canaries," and "Distribution Phytostatique." This last term seems about equivalent to soil, climate, and situation. It is an obvious character of the matter presented, that the facts and inferences stated are viewed in relation, whether confirmative or combative, to the general conclusions received in the science: this character much conduces to render local subjects of general interest.

Of plates there are ten. Five of them are 4to, and represent as many species of plants, with many figures of the dissected parts of the flower and fruit. All the figures are beautifully delineated, are printed from stone, and are not coloured. The remaining five plates are those of the atlas, and are folio. Three of them represent views of three regions in the Canaries: the term for each of them is "Vue Phytostatique:" it is a landscape scene, with the species of plants represented *in situ*, and with their general botanical features. One of the remaining plates is entitled "Facies," and exhibits the species of plants that predominate in one region associated within the plate, and in their general distinctive features. The remaining plate is a double one, and represents "Profils Phytostatiques de l'Ile de Ténériffe," on the points of the compass N., S.E., and S.W. The profiles are graduated into measures of elevation by parallel lines passing across them; and the general kinds of the species of plants that occupy the profiles are indicated by the profiles being covered with different colours representative of them. The general kinds indicated are: Plantes du littoral et des coteaux maritimes, plantes des ravins, région des lauriers et des plantes forestières, région des bruyères et des cistes, région des pins, région des légumineuses frutescentes. The work is deemed cheap.

The Royal Cornwall Polytechnic Society: Third Annual Report of the Society's Transactions. 8vo, 146 pages, and

some engraved diagrams, and a few woodcuts. 1835. 2*s.* 6*d.*

The treatises on subjects of natural history are three: two of them, "Treatises on the Natural History of the Pilchard, with particular Reference to the Fisheries of Cornwall;" the other, a "Meteorological Register kept at Ashfield, near Falmouth, for the first Six Months of 1835." The two treatises on the pilchard are prize ones: one of them is by J. Couch, Esq.: it occupies 28 pages, and is followed by remarks on some other species of fishes, and by notes by one of the judges. The other treatise is by Mr. John Chester, and occupies 6 pages. Lovell Squire, jun., is the author of the meteorological register: it is an elaborate one.

Smith, Egerton: The Elysium of Animals: a Dream. 8vo, 105 pages, and two engravings. London and Liverpool, 1836. 3*s.*

> "The heart is hard . . . .
> . . . . . that is not pleased
> With sight of animals enjoying life,
> Nor feels their happiness augment his own.
> . . . . . .
> . . . . A thousand images of bliss,
> With which kind Nature graces every scene,
> Impart to the benevolent, who wish
> All that are capable of pleasure pleased,
> A far superior happiness to theirs,
> The comfort of a reasonable joy."
>
> COWPER'S *Task*, book vi.

Every naturalist, whose heart is in sympathy with these opinions, would read with interest Egerton Smith's *Elysium of Animals*, whose object in the production of it has been "to promote the good cause so feelingly and so effectively advocated by the benevolent practical Christians to whom the public is indebted for that excellent work *The Voice of Humanity.*"

A part of the plot of *The Elysium of Animals* is a supposing as follows:—Animals of the earth, whose life has terminated therein, are now in a state of elysium in a certain island, upon which a ballooner, who had left the earth and become wrecked, alights. This event induces a convocation of the animals, and an arraignment of the man in relation to this question, "Is man deserving of mercy from those animals which have been subjected to his domination during their earthly pilgrimage?" The kinds of animals that give evidence on the question are, the horse, the bull, the bear, the cock, the monkey, the turnspit-dog, the bull-dog, the ass, the cat, and the elephant; and their evidence is mainly against man, but with some exception on the part of the dog and horse. It is desirable not to pursue

the plot further here. The evidence of the animals named is the moral of the work; a remembrancer to man of

> . . "the persecution and the pain
> That" he "inflicts on all inferior kinds,
> Regardless of their plaints."
>
> COWPER'S *Task*, book vi.

This tone of crimination in the work detracts from the elysium-like ideas to which the title had bespoken the expectation; but one may esteem the author's purpose not the less: one does so.

Eyton, T. C.: A History of the Rarer Species of British Birds. Intended as a Supplement to the History of British Birds by the late Thomas Bewick. "In two sizes, royal 8vo, and demy 8vo, to correspond with" Bewick's work. 180 pages, and numerous woodcuts, executed by Mr. Mark, Wellington, Shropshire; the latter consisting of more than 40 figures of 40 kinds of birds, and of vignettes. Price of the demy 8vo size, 10*s.* 6*d.*

The author has stated that the principal objects that he had in producing this work are two: one, to complete, as far as lay in his power, the series of woodcuts of British birds begun by the late Thomas Bewick, thus enabling those to whom it may not be convenient to purchase more splendid, but more expensive, illustrations, to possess, at a moderate cost, a series of woodcuts, accompanied with descriptions of the British birds, from which they will be able to recognise any that may, at any time, fall into their hands; the other, to present a complete systematic catalogue of British birds, with the synonymes of the principal authors in ornithology, and a rectification of Bewick's names, in as concise and simple a form as possible.

The author "possesses nearly a perfect collection of British birds, and has" had "the assistance of some eminent naturalists in his undertaking."

The work has been published in three portions. The kinds figured and described in the first portion are named in our p. 109., except the black redstart, omitted. The kinds figured and described in the second and third portions are, the cinereous shearwater, dusky shearwater, pomarine skua, arctic jager, Iceland gull, little gull, Sabine's xeme, Caspian tern, arctic tern, black noddy, hooded merganser, red-crested pochard, western duck, surf duck, harlequin duck, Bewick's swan, Tengmalm's owl; White's thrush, shot by the Earl of Malmsbury; Lapland bunting, gull-billed tern, rock grous; and a hybrid kind of bird, the offspring of the male pheasant

and the female of the black grous: and, described only, the brown-headed gull.

The histories of the species seem able. The subjects of the vignettes are very interesting, and are various in kind.

"The arrangement of the catalogue is nearly that of the Baron Cuvier, published in the last edition of the *Règne Animal*. Alterations, however, occur, in the arrangement of the families, in the order Passeres, among the gulls, and in the order Lamellirostres." The author has invented a few new names, and is the first namer of White's thrush.

Cooper, Daniel: Flora Metropolitana; or, Botanical Rambles within Thirty Miles of London. Being the Results of numerous Excursions made in 1833, 1834, and 1835; furnishing a List of those Plants that have been found on the different Heaths, Woods, Commons, Hills, &c., surrounding the Metropolis, more particularly the Counties of Surrey and Kent; chiefly from actual Observation, and from the latest Authorities; intended for the Student in Practical Botany: with a List of the Land and Freshwater Shells of the Environs of London. 12mo, 153 pages. London, S. Highley, Fleet Street, 1836.

A rich collection of local lists. The species in each are grouped according to the natural system. In each order a reference to the description of it in Lindley's *Synopsis of the British Flora* is given. "Additions [of localities and of species and localities] will, of course, be continually made to all the lists; which, if forwarded to the author, with the name of the finder, will be most thankfully received, especially if kindly accompanied with specimens." The work is likely to much avail those who would attain to a knowledge of species as conditioned in the circumstances of their life and growth.

An index of the genera is supplied, and, by means of the citation of pages under each genus, an index of the species and their localities. Thus much is very well; and, perhaps, it is all that it was prudent to venture upon in a new kind of work (new in kind as to its metropolitan quality), which could only be expected to be desirable to botanists; but, should the measure of their purchase of it be such as to cause the production of successive editions of it, it seems to one that it would be a palpable improvement, that might then be supplied, to add a natural-system list of all the species registered in all the local lists in the work, and to give under each species a synopsis of all the localities in which, according to the local lists in the work, the species had been found; and a reference to the mentions of species in the local lists.

These things would facilitate any one's choosing the locality in which he would seek for any species, and, if other cases of the species besides their locality should be embraced in the work, would avail as a means of generalising on these in relation to the natural system. In the first edition a notice of the case, the kind of the substratum, is given in some instances.

Partington, C. F., Professor of Mechanical Philosophy, Author of various Works on Natural and Experimental Philosophy, &c., Editor: The British Cyclopædia of Natural History; combining a Scientific Classification of Animals, Plants, and Minerals; with a Popular View of their Habits, Economy, and Structure. In parts, each of 64 pages, with two plates by Landseer, and several woodcuts, 1*s.* "The various articles are written expressly for this work, by authors eminent in their particular department." The parts with the plates coloured, 2*s.* each.

I wish to offer a few remarks on a well-known periodical work on natural history, Partington's *Cyclopædia of Natural History*. It has hitherto appeared monthly, each number containing about 60 pages, and many woodcuts, for 1*s.* Twenty-two numbers are now published; and these contain a greater mass of valuable information on natural history, than was probably ever before brought together within the same compass, or at so small a price. A large proportion of the articles are by the most talented writer on natural history in Britain, Mudie; and the articles avoset, bee-eater, beaver, falcon, &c, fully sustain his high reputation, as an accurate observer, philosophic reasoner, and eloquent writer. It is on this account that I am sorry to see carelessness, or any appearance of a falling off, which may be detected in some of the last numbers. Under the representation of a pair of the blue nonpareil (Aurélla amœ`na), or, perhaps, the crimson-necked finch, at p. 538., is written "reed bunting!" and for "painted buntings," is printed "painted beauties." The woodcut at p. 541. could hardly be recognised, were it not for the underscription, "Haw Grosbeak." And the corn-bunting is a duplicate of what was given in the article "Emberiza." Nor is there any unity of system pervading the work. One writer takes Cuvier as his guide, another Macleay and Vigors, and another himself. The history of species, likewise, is sometimes given under the family head, sometimes under the generic name, and sometimes the specific one: why not *always* the latter? The editor tells us, that each of the three volumes is to contain "from 850 to 900

pages:" the first volume, however, contains but 812, including the introduction. The paper, likewise, in some of the later numbers (especially that for December), is of very inferior quality to the preceding. It is much to be regretted that the editor restricted himself to three volumes; a very small allowance for a work which is to take in the whole of nature. Some of the plates, as the giraffe and the brahminy ox, are worthy Landseer's name; but the greater portion (except the insects, trees, and flowers) are mere scrawls: some additional woodcuts would have been far preferable. Had it not been for the high talent observable throughout the publication, I should not have thought it worth while to make these remarks; which, it is to be hoped, will have their intended effect in the proper quarter. — *C. T. Wood. Foston Hall, Derbyshire, Jan.* 15. 1836,

[In VII. 382. 605, 606.; VIII. 247.; are notices of this work.]

The Society for the Diffusion of Useful Knowledge: The Penny Cyclopædia; in Numbers, 1*d.* each.

In VIII. 680. is an indication of subjects in natural history that have been treated on in the *Penny Cyclopædia:* the following are more. *Bòa*, Boármia, Boat-bill (Cancròmia), Bob-o-link or rice bunting (Dolíchonyx oryzívorus *Swains.*), in No. 275.; Bog, 278.; *Bolètus*, 281.; Boltèn*ia*, 283.; Bómbus, *Bombýcidæ*, 285.; Bombycílla, 285, 286.; *Bombýlidæ*, 286.; Bonàsia, 289, 290.; Bone, Bonéllia, 290.; Booby, 290, 291.; *Boragíneæ*, Borâssus, 293.; Boswéll*ia*, 302.; botany, 302, 303.; Bothynóderes, Botrýllus, bots, 304.; Brachyélytra, Brachìnus, Brachiònus, Brachiópoda, 310; Brachýcerus, Brachypodìnæ, Brachýpteryx, 311.; brain, brain of animals, 313.; Branchiópoda, 314.; Bréntides, 320.; British Museum, 328.

Zornlin, Rosina Maria, Author of "*What is a Comet, Papa?*" The Solar Eclipse, or the Two Almanacks, containing more Enquiries in Astronomy. Small 8vo, 98 pages, with some woodcuts. 1836. 1*s.*

One would deem it a very eligible work for the youth of families in which they have been accustomed to designate and view objects in a scientific manner.

ART. II. *Literary Notices.*

A MAGAZINE to be devoted exclusively to Zoology and Botany has been proposed, of the character and plan as follows: — It

is to be entirely under the superintendence of Sir W. Jardine, Bart.; P. J. Selby, Esq.; and Dr. Johnston of Berwick upon Tweed; and is to be conducted upon truly scientific principles, and rendered a register of the progress of man's discovery in the two sciences, and a medium for the publication of the researches of a rising band of young and zealous scientific naturalists. The contents are to be of the kind now to be indicated. Section 1., original papers: monographs, history of any particular class; description of species; details of anatomical structure; disquisitions on the habits, affinities, and distribution of animals and plants; essays on nomenclature; biographies. Section 2., reviews. Section 3., translations, &c. Section 4., intelligence. The work is to be published, a number on the first day of every second month; and each number is to contain 6 sheets of 8vo letterpress, with illustrative plates and woodcuts: its price 3*s.* 6*d.*

A new work, to be entitled *Scientific Memoirs*, is about to be published, at convenient intervals, the first part in May, 1836. The work is to be edited by Richard Taylor, Esq.; and is intended to contain a selection of the most important memoirs from the *Transactions* of the various academies of science and philosophical societies, or from foreign scientific journals; and may be considered supplementary to the *Philosophical Magazine*, and other periodical works of the same class, or a distinct work: its size is to be 8vo. (*Phil. Mag.*, April.)

Minerve, ou Choix des Mémoires les plus importans qui paraissent dans les Pays Etrangers, sur les Sciences Naturelles: publié par Emile Jacquemin et plusieurs savans Français et Allemands. The prospectus of this work is dated Paris, July, 1835, and has lain long by. It was proposed to publish the work monthly. Has it appeared?

The Ornithologist's Text-Book, by Neville Wood, Esq. In VIII. 584. is announced, as in the press, a work by the title, *The Rise and Progress of Ornithology*. This title has been changed to that above, and the work was, on March 21., "nearly ready for publication."

The British Songsters, by Neville Wood, Esq. This title is a preferred one for the work entitled *Sketches in British Ornithology*, announced as in preparation in VIII. 584.: it was on March 21. in progress of printing.

The Flora Domestica, or History of such Medicinal Species of Plants as are indigenous to Great Britain, or are cultivated, and of easy Access in our Gardens; illustrated by numerous coloured Figures; by Benjamin H. Barton, F.L.S.; is announced

for publication in monthly numbers, 2*s.* 6*d.* each, the first on May 2. 1836.

Pœppig, Edward: Reise in Chile, Peru, und auf dem Amazonenstrome. 2 vols. 4to, and a folio one of plates. Leipzig, Fleischer and Hinrische. 1835. This work contains interesting information on subjects of natural history.

In part ii. of vol. 50, of the *Transactions of the Society for the Encouragement of Arts, &c.*, are some contributions likely to be of interest to naturalists: it is thought that the following are very likely to be so:—A. Aikin, Esq., on timber: the point enunciated is rather the mechanical properties, and uses in the arts, of timber; but there is supplied, relatively, a summary of much of what is known in vegetable physiology, of the structure and formation of wood. A. Aikin, Esq., on ornamental woods. The kinds that, "on account of their beauty, are employed by the cabinet-maker in the construction of various articles of household furniture, and of other objects of use or luxury." A "list of specimens of wood from India, &c., presented to the Society by Capt. H. C. Baker, of the Bengal Artillery." Contributions on kinds of microscope.

In the *Analyst*, No. 15., April, 1836, is given upwards of 17 pages of a comprehensive treatise on the natural history of the nightingale, by Edward Blyth, Esq., Tooting, Surrey: it is stated that the rest of the treatise is to be given in the "next number." In No. 15. are other treatises on other subjects of natural history.

Stephens's *Illustrations of British Entomology.* In reply to P. R., there are 5 volumes on Mandibulàta published, which complete the illustration of the beetles; and there are 4 volumes on Haustellàta published, which complete the illustration of the Lepidóptera. Various other numbers are published on other tribes. The work is published monthly.

Birt's *Tabulæ Anemologicæ, or Tables of the Wind*, noticed in p. 224. "It is a very interesting work, but, I fear, too complicated for general practice. There is wanted a good graphic delineation of all his modifications of clouds to make it of more practical utility." — *W. H. W. April* 1. 1836.

Extracts from Letters addressed to Professor Henslow, by C. Darwin, Esq. Printed for private Distribution. — A pamphlet, 8vo, 31 pages. The extracts consist mainly of notices of geological conditions observed by C. Darwin in various specified parts of South America. In a future Number, some matter from these extracts may be presented.

THE MAGAZINE

OF

NATURAL HISTORY.

JUNE, 1836.

ORIGINAL COMMUNICATIONS.

ART. I. *Observations on the Singing of Birds, in Reply to the Question, Why do Birds sing?* (VII. 484—486.) By Mr. W. H. WHITE.

> " Tell me not of the birds in a tropical clime,
> Whose splendour and beauty our own far outshine;
> Though in plumage of silver and gold they be drest,
> Yet my own little songsters I e'er shall love best."

THE return of spring, the bleating of the sheep, the skipping of the lambs, the whistle of the shepherd, the carols of the feathered songsters, have forcibly reminded me of Mr. Conway's question, " Why do birds sing?" (VII. 484—486.) As the singing of birds, both in the cage and in a state of freedom, has always been a source of great delight to me, I will venture to offer a few remarks on Mr. Conway's question, which, I agree with him, is a " question of some difficulty:" still it is a question of peculiar interest to every lover of nature; and, although I should greatly prefer reading the opinions of some one much better qualified than I am to do ample justice to the subject (and I know of no one more capable than Mr. Waterton, as alluded to by S. D. W. in IX. 207.), yet I should consider myself deficient in common etiquette, were I to withhold any ideas, how humble soever they may be, from a fellow-enquirer, if I thought that those ideas were in any degree calculated to throw any additional light upon the subject of enquiry. If, after all, I shall fail, like those who have previously given their opinions on this subject, to give a satisfactory solution to the question, I shall not consider the attempt altogether useless, if it stimulate others to follow up the enquiry till a complete answer be obtained, and that, too, upon such rational principles as shall stand the test of succeeding generations.

The following observations upon the *exciting cause* of song

in birds (for that I consider to be implied by the question, "Why do birds sing?") are chiefly original.

Take any song bird,

> "Cheerful tenant of the bough;"

say the nightingale,

> "Sweet songstress of the night,"

than whose, none of our woodland songsters' sounds are so full, so prolonged, so harmonious, especially when our ears are greeted

> "At the silent solemn hour,
> When night and morning meet;"

when so sweetly pouring from his tiny throat

> "A cadence soft and holy
> As the gentlest song of earth;
> Too blithe for melancholy,
> Too calm by far for mirth;"

I say, take any song bird, and we shall soon perceive the difference between the melodious warblings of these interesting and innocent creatures, and the horrid scream of the "carcass-loving vulture."

[*The Means by which Singing Birds sing.*] — The *Fringillidæ* and the Sylviadæ appear to be the two principal families upon which the voice of song has been conferred; and, therefore, a reference to the structure of their organs of song will be necessary to answer the question proposed. If we listen attentively to the warblings of our various little songsters (and, if with a musical ear, our gratification will be greatly increased), we shall find that each species has a scale of notes peculiar to itself, and, also, peculiar modulations of voice; hence, to form a correct judgment of the formation of their varied and beautiful intonations, it may not be improper to delineate the organ by which those various and melodious strains are produced; and, also, by way of comparison, the organ of voice in those species of the feathered race which are denied song. [See in *figs.* 38. and 39.]

To any one wholly unacquainted with the construction of the organ of song in birds, it must appear a matter of very great surprise, how an instrument so small, and possessing so much simplicity, should produce such an almost endless variety of sounds; but the strength and compass of the voice of a song bird depend on the size and proportionate force of the larynx, which, in the female, is small and weak; and which, I think, in a great measure, accounts for her want of song, or, at least,

for her want of that force and power which a more ample organ confers on the male.

Mr. Conway asks, "Do not the females of some birds sing occasionally as well as the males?" This question I can answer in the affirmative. The subdued and interesting warble of the hedge sparrow (Accéntor modulàris *Cuv.*) is not at all uncommonly to be heard. The female of the reed bunting may, also, frequently be heard in the close of the evening; and some others of the smaller species of songsters; but their notes are always very feeble, and less musical than those of the males, owing, I have no doubt, to the smallness and weakness of the tracheal tube, as before observed.

I believe that musicians generally allow the notes of birds of all kinds to bear a strong resemblance to wind instruments, and the tones of the human voice more accurately to resemble those of the Æolian harp; and this difference seems to be thus accounted for: the different intonations of the human voice are produced by the tension of two chords, called *chordæ vocales*, which are stretched across the aperture of the superior part of the laryngeal tube, called *rima glottidis* [the aperture named the glottis *]. But these *chordæ vocales* are wanting in song birds, and their various intonations and modulations are made by the extending and contracting of the laryngeal tube itself, which is both coated and lined with a very fine membrane, so as to give it every possible degree of flexibility. Besides these essentials to the production of so many varied tones, the laryngeal tube is further furnished with five pairs of muscles, called the muscles of voice, which greatly assist in contracting the diameter of the laryngeal tube, in almost imperceptible degrees, so as to produce almost every degree of intonation and modulation so apparent in our feathered warblers. We have only to witness the singing of the canary or nightingale in a cage, to perceive the contraction and dilatation of the larynx, in order to assure ourselves that these observations are in perfect accordance with the construction

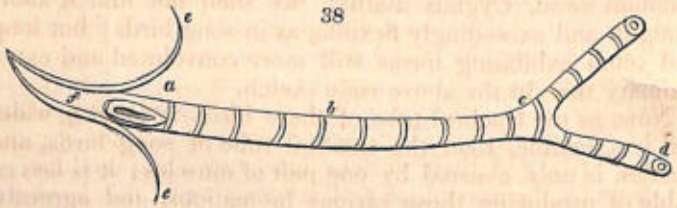
[* It has been shown by M. Dodart (*Rees's Cyclopædia*, vol. xxxvii., art. Voice), that the extension and contraction of the glottis is caused by two tendinous cords in its two lips. The more the aperture is lessened, the higher becomes the tone of voice, because the wind then passes through with greater rapidity. The small size of the glottis in female singers causes the high tone of their voice.

There is didactic information on the organs, and more their functions, concerned in man's articulation, in the 8vo, not the 12mo, Murray's *English Grammar*, ed. 26th, p. 32—35., under the title "The Nature of Articulation explained." Information on the glottis is included; but its figure is not stated: this, in a MS. from which the initial part of this note is taken, is compared to an oval, coming to a point at each end.]

of the organs of song. But I hope to make these observations more clear, by noticing, that, in the vulture, and other birds of that kind, the muscles of voice are entirely wanting; while the gallinaceous tribes, as well as the waders and swimmers generally, have but one pair of muscles. The *P*sittácidæ [parrot family] possess three pairs of these muscles of voice: but no birds, I believe, are found to possess four pairs of muscles; hence, the more we look into the construction of the organs of song in birds, we shall find the more reason to be convinced of their adaptation for the highly interesting and agreeable employment of their vocal powers; and the more, also, shall we see of the power and wisdom of Him who created them.

The trachea in song birds (*fig.* 38.) is always short and straight; and, according to the slenderness of the cartilaginous

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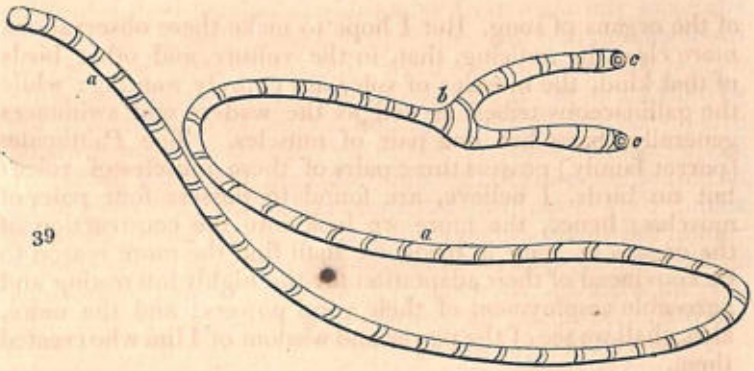
The trachea, or windpipe, of the song bird: — *a*, the superior larynx; *b*, the tracheal tube; *c*, the inferior larynx; *d*, the bronchus, which passes to the lungs; *e e*, the os hyoides, or bones of the tongue; *f*, the tongue.

rings, and the spaces between them, so will be the variations of the notes, and the almost endless variety of modulations and inflections, arising from the rapid motion of the laryngeal tube, producing those wonderful effects (to my ears, at least) of piano and forte, or soft and loud; sounds not only vying with the proudest efforts of art on the violin, flute, clarionet, or even the mellow-toned harp, but still keeping up a strain that never wearies by repetition, but increases our delight by every new variation.

> " Well do I love those various harmonies,
> That ring so gaily in spring's budding woods,
> And in the thickets, and green and quiet haunts,
> And lonely copses."
> ——— " Their tones
> Are sweeter than the music of the lute,
> Or the harp's melody, or the notes that gush
> So thrillingly from beauty's ruby lip."*

If we notice the tracheal tube of wading and swimming birds (*fig.* 39., which is a rude sketch of the trachea of the

* J. M'Lellan, jun., an American poet.



The trachea of the common swan, a species of bird to which song is denied :—*a a*, the larynx in the convoluted form ; *b*, the inferior larynx ; *c c*, the bronchi.

common swan, *Cýgnus mùtus*), we shall not find it short, straight, and exceedingly flexible, as in song birds; but long, and often exhibiting forms still more convoluted and extraordinary than in the above rude sketch.

Now, as the tracheal tube of these birds is longer, wider, and less flexible, than the tracheal tube of song birds, and, besides, is only assisted by one pair of muscles; it is less capable of producing those various intonations, and agreeable sounds, which characterise the *Fringíllidæ* and the Sylvìadæ; hence, the longer, wider, and more convoluted the tracheal tube is, the more do the sounds produced through it resemble those of the French horn, or the trumpet, or other bass instruments, and the fewer intonations and variations it is also capable of producing.

These few observations, I think, will tend to show, more or less clearly, why some birds sing, and others do not; namely, because some birds possess those requisite organs for producing various sounds, while others are entirely destitute of them.

[*The Cause why Singing Birds sing.*]—Having endeavoured to show that particular species of birds have certain organs in every respect adapted for song, I shall now make a few observations on the exciting cause of their singing.

It will probably be more difficult to account for this, than to describe the formation of the organs of singing; and, therefore, in reply to this part of the question (for I consider the question a twofold one), I would ask, do we sufficiently understand the language of birds, to account for the many different intonations of voice? [VII. 481—483. 501—503.] May there not be some particularly sympathetic or affectionate

strains of the male bird, admirably calculated both to soothe the female during her tedious period of incubation [IX. 206.], and, at the same time, to dispel that *ennui* [weariness], which we may suppose (though erroneously) the male in some degree to feel during the period he is thus left alone, and which strains are not used on any other occasion? Does the song of birds always exhibit to our dull ears the same particular sounds? I think, if we closely attend to the early song of the robin, the thrush, or any other early singing birds, we shall find these first joyful welcomings of returning spring to possess very different intonations from those songs, or more melodious warbles, used during the period of incubation.

I speak from observation.

The subject of my first notice is a pair of robins, observed during the last week of the year 1829, and the early part of 1830. I listened very attentively to the very plaintive song of a robin on several mild winter mornings: it was sweet, and very melodious; and followed by a response from another in a neighbouring bush, not in the same strain: they might proceed from a female, but in tones equally pathetic and plaintive. To this innocent and, to me, unintelligible dialogue I have often listened for half an hour at a time; during which periods, I remarked that one bird never repeated, or rather uttered, a new strain, till the response had been given by the other. I continued to listen to this pair of robins till the period of their preparing for their broods occupied their attention; when the strains became more lively, and much shortened. I should, therefore, be inclined to consider those warblings as songs of joy.

My next subject of notice is a thrush (*Túrdus mùsicus*), which, for three successive years, took his stand on the topmost twig of a fine chestnut tree, during the fine mornings in the months of January and February; and from that lofty spray, when

> ——— "Jocund Day
> Stood tiptoe on the misty mountain's top,"

would he pour out one of the sweetest and most plaintive songs imaginable; to which a response was given, equally melodious and equally plaintive, by another, from the top of a distant tree. This seemed to me to be a peculiar language, adapted to the peculiar season of the year, and which I observed to give place to more lively and more rapid strains as the season of summer advanced: or could it be that I felt my own spirits more exhilarated by the genial warmth of spring, and more animated by the gaiety and activity of all nature, as it were, in active motion around me, and, therefore, transferred the idea to the feathered vocalists?

An attentive, and, at the same time, a musical, ear, by repeated observations, may do much to confirm these observations.

What, then, is the stimulating cause to sing? Is it not their having every requisite organ for song by their peculiar construction, and their being excited by the seasons? Solomon, in his inimitable song (*Song of Solomon*, ch. ii. v. 11. 12.), tells us that "The winter is past; the rain is over and gone; the flowers appear on the earth; *the time of the singing of birds is come*, and the *voice of the turtle is heard in our land.*" Therefore, they know the appointed seasons for song; and the exciting cause may be the return of day, the genial warmth of spring, the peculiar delight of preparing for and superintending their callow brood; and many others that might, probably, be mentioned, were we better acquainted with the precise meaning of their various intonations, which we denominate song.

Mr. Conway says, "The meadow pipit, when disturbed from her nest, will mount up into the air to a considerable height, and then descend slowly, warbling with all her powers, until she reaches the ground." Admitting this to be a fact, I ask, is that warble poured forth with the same joyful strains as if she had mounted up into the air of her own accord? I doubt not, if we more carefully examine the tones of birds, we shall find that they differ according to exciting circumstances. I happen to know a gentleman whose father had an extensive aviary; and, from his being a good musician, he copied the notes of his various little songsters, who could sing without either gamut, pitch-pipe, or metronome, and transferred them to his violin; by which means he was enabled to comprehend much of the feelings of his joyous inmates, by their various intonations of slow and graceful warblings, or of quick and hurried movements, as if denoting displeasure. Hence, I think, if we paid more attention to the song of birds at particular seasons of the year, and under various exciting causes, we should be enabled to discover that their tones, or warblings, were in strict accordance with the impulse of the moment, whether the excitement to sing was the genial warmth of spring, the dawn of the morning, disturbance in the act of incubation, or alarm on the approach of danger. As they have no other language than that which issues from their melodious throats in the form of song in which

"To tell their tender tale,"

it becomes observers, ere they come to positive conclusions on

their song, to listen well to its particular strain, and, from its particular modifications, to judge of its producing cause.

Mr. Conway asks, "Why is the nightingale more joyous than other birds during the night?" The nightingale is a bird of shy and retired habits, and sings "concealed in the thickest part of a bush or small tree;" and, therefore, the night, especially if bright and moonlight, is best suited for the bird's pouring forth its peculiarly affecting strains, in strict accordance with its constitutional habits. Besides, were the nightingale to sing only during the day, we should lose all the beauties and graces of his song [V. 426.], as the din and bustle of surrounding occupations, the cawing of rooks, the chatter of the magpie, and the unceasing and noisy chirp of the sparrow, would reduce this favourite songster of the night to a level with the poor insignificant hedge sparrow; and, therefore, her evening vigils are in strict unison with the unerring wisdom and design of that sacred and omnipotent Being, that spake her into active existence, and who clothes even our varied climate with new, rich, and sublime beauties every returning spring.

What can more powerfully stimulate the little warblers of the grove to song,

"Or tune their throats to harmony,"

than a serene sky, a pure—a balmy air, a lovely fragrance wafted by gentle zephyrs, which seem to give additional exhilarating spirits at every breeze? all nature becomes decked in her richest robes; all is harmony; all is admirably calculated to transfuse delight into the mind; and, as Milton expresses it,

——— "To the heart inspiring
Vernal delight and joy.

. . . . . .

They * feel a power, an impulse all divine,
That prompts to song: they feel it and obey.
Their song is heightened by the genial warmth
Of summer; thus cheerfully they warble
Forth in accents sweet their heavenly songs,
In sweet accordance with their Maker's will."

As the season of spring stimulates the feathered songsters to fill our woods, and groves, and fields, with melody, so the return of winter hushes into silence their tuneful pipes, and leaves our woods to desolating blasts and howling tempests.

S. D. W. (IX. 207.), in reference to this question, says, that "recourse must be had to the most useful of sciences, phrenology."

* Birds.

The only ideas I am in possession of, relative to the phrenological structure of the head of song birds, I can only give from memory; but from what work, I am, at the present time, not able to say; but, to the best of my recollection, the author was Transatlantic. As far as I can recollect, this author says, there is a great peculiarity in the construction of the ears and head of song birds. There is almost a direct passage from one ear to the other; so that, if the drums of the ears (membranæ tympani) were perforated, water might be poured in at one ear, and it would run out at the other: this is not the case with man, or other animals. Now, this passage in the head of song birds, occurs in a cavity which passes round the head, and is formed by the two bony plates of the skull; the upper plate being supported by several small thread-like pillars, which rest upon the lower plate, which is immediately above the brain.

Now, I am not aware that any other creature has been examined which possesses this peculiarity of structure in the head; though I should think that very quick hearing animals, as the mole (*Talpa europæa*), must possess something of a similar construction, as this peculiarity of construction is strictly conformable with the principles of acoustics, or the doctrine of sounds. [Some notice of the structure of the organs of hearing of the mole is in V. 298.]

Admitting the anatomy of the head to be as above described, birds sing in the full enjoyment of that propensity which nature has implanted in them, heightened into joy by the peculiar construction of the head for the reverberation of sound, which must be attended with infinite delight to the bird itself. How to answer the question, "Why do not females sing as well as the males?" agreeably to this phrenological doctrine, I confess I am at a loss, unless the head differs in its internal structure; for I cannot discover any external difference in the developement of the organs of song, between males and females.

Old Kent Road, April 1. 1836.

[In II. 376. is a brief abstract of part of a treatise "On the Organs of Voice in Birds," which Mr. Yarrell had produced, and which had been read at meetings of the Linnæan Society.

In I. 341—348. is a review of Jennings's *Ornithologia*, in which, in p. 346, 347., the reviewer, Professor Rennie, has criticised a notion that he had apprehended Mr. Jennings to have expressed, to the amount that the singing birds of America are fewer, and sing with less sweetness, than the birds of the Old World: see in sequel, I. 414—421.; II. 111—113.

The late Rev. Lansdown Guilding had remarked upon the subject as follows: —

"Mr. Jennings could not have alluded to North America, and was perfectly correct in saying that the birds of hot countries do not equal those of the temperate zone in the sweetness of their notes [II. 112.]: the fact is known to every traveller;

——— "For Nature, here,
Content to lavish on the feather'd race
All beauty's radiance, gives to other climes
The tribes melodious."

In this island [St. Vincent], we have only one warbler, confined to the mountains and inaccessible forests, but surpassing in melody every thing around him, and said to equal the nightingale, but, since the destructive eruption of the Souffrière, it has become very scarce; a thrush, with a few sweet but unconnected strains; and a pretty chirping wren, that sometimes warbles at daylight in the neighbourhood of country houses. Such is our scanty catalogue of songsters; while the brilliant humming birds, and other beauties, are mute, even in the season of their nuptials.

"Like vivid blossoms glowing from afar,
Thick swarm the brighter birds. For Nature's hand,
That, with a sportive vanity, has deck'd
The plumy nations, there her gayer hues
Profusely pours. But, if she bids them shine,
Array'd in all the beauteous beams of day,
Yet, frugal still, she humbles them in song."

The hoarse and piercing scream of the parrot flock, soaring above the loftiest monarch of the forest; the melancholy whistle of the hawk, as he sails away "to more profound repose;" attract, indeed, one's attention in the silence of these solitudes: but have they anything to recommend them for their sweetness?" [*Lansdown Guilding. St. Vincent, May* 1. 1830.]]

ART. II. *Notes on the Habits of the Chegoe of Guiana, better known by the Name of Jigger* (*Pùlex pénetrans*); *and Instances of its Effects on Man and Dogs.* By CHARLES WATERTON, Esq.

——— "Priore relictâ
Sede, novis domibus habitant, vivuntque receptæ." OVID, *Met.*
Leaving their former haunts, beneath the skin
They form new settlements, and thrive within.

THIS apparently insignificant insect far outdoes the bug in the exercise of its noxious qualities. The bug attacks you in

an open manner, makes a hearty meal, and then retires to enjoy it: but the chegoe commences its operations upon you so gently, that they are scarcely felt; and it terminates them in a way that calls for your most serious attention. In a word, it approaches you with such insinuating address, that you absolutely feel a kind of gratification, at the very time that it is adopting measures which will infallibly end in your certain torment.

Soon after the chegoe has entered your skin, you experience a pleasant itching kind of sensation, by which you begin to suspect that all is not right; and, on taking a nearer view of the part, you perceive that the skin is somewhat discoloured.

I know it is supposed by some people, that the accounts concerning the chegoe have been much exaggerated. I am not of this way of thinking, for I myself have smarted under its attacks; and I have minutely inspected the foot of a negro, which was a mass of ulcers, formed entirely by the neglected ravages of the chegoe.

Guiana is the native country of this insect. In that hot and humid region, which is replete with every thing that can please our imagination, or administer to our wants, we must not be surprised to find here and there some little drawback; some few obstructions in our way; some thorny plants to impede our journey as we wander on.

The chegoe resembles a flea; and, had you just come out of a dovecot, on seeing it upon your skin, you might easily mistake it for a small pigeon flea; although, upon a closer inspection, you would surmise that it is not capable of taking those amazingly elastic bounds, so notorious in the flea of Europe.

Not content with merely paying you a visit, and then taking itself off again, as is the custom of most insects, this insidious miner contrives to work its way quite under your skin, and there remains to rear a numerous progeny. I once had the curiosity to watch the movements of a chegoe on the back of my hand, a part not usually selected by it to form a settlement. It worked its way pretty rapidly for so small an insect. In half an hour it had bored quite through the skin, and was completely out of sight. Not wishful to encourage its intended colony, "Avast, there! my good little fellow," said I; "we must part company without loss of time. I cannot afford to keep you, and a numerous family, for nothing: you would soon eat me out of house and home." On saying this, I applied the point of my penknife to the place where the chegoe had entered, and turned it loose upon the world again.

In the plantations of Guiana, there is generally an old negress, known by the name of Granny, a kind of "Junonis anus," who loiters about the negro yard, and is supposed to take charge of the little negroes who are too young to work. Towards the close of day, you will sometimes hear the most dismal cries of woe coming from that quarter. Old Granny is then at work, grubbing the chegoe nests out of the feet of the sable urchins, and filling the holes with lime juice and Cayenne pepper. This searching compound has two duties to perform: first, it causes death to any remaining chegoe in the hole; and, secondly, it acts as a kind birch-rod to the unruly brats, by which they are warned, to their cost, not to conceal their chegoes in future: for, afraid of encountering old Granny's tomahawk, many of them prefer to let the chegoes riot in their flesh, rather than come under her dissecting hand.

A knowing eye may always perceive when the feet of negroes are the abode of the chegoe. They dare not place their feet firmly on the ground, on account of the pain which such a position would give them; but they hobble along with their toes turned up: and by this you know that they are not suffering from tubboes (a remnant of the yaws), but from the actual depredations of the chegoes, which have penetrated under the nails of the toes, and there formed sores, which, if not attended to, would, ere long, become foul and corroding ulcers. As I seldom had a shoe or stocking on my foot from the time that I finally left the sea coast in 1812, the chegoe was a source of perpetual disquietude to me. I found it necessary to examine my feet every evening, in order to counteract the career of this extraordinary insect. Occasionally, at one overhauling, I have broken up no less than four of its establishments under the toe nails.

In 1825, a day or two before I left Guiana, wishful to try how this puny creature and myself would agree during a sea voyage, I purposely went to a place where it abounded, not doubting but that some needy individual of its tribe would attempt to better its condition. Ere long, a pleasant and agreeable kind of itching under the bend of the great toe informed me that a chegoe had bored for a settlement. In about three days after we had sailed, a change of colour took place in the skin, just at the spot where the chegoe had entered, appearing somewhat like a blue pea. By the time we were in the latitude of Antigua, my guest had become insupportable; and I saw there was an immediate necessity for his discharge. Wherefore, I turned him and his numerous family adrift, and poured spirits of turpentine into the cavity which

they had occupied, in order to prevent the remotest chance of a regeneration.

The Indian and negro wenches perform the operation of extracting chegoes with surprising skill. They take a pin, and, by a very slow process, they lay the part bare, and contrive to work quite round the bag which contains the chegoe and its offspring. As soon as this has been effected, they turn the bag out, whole and uninjured; by which means none are left in the hole to form a new colony.

For my own part, I never troubled these gentle operators; although I have looked on many a time, and admired their exquisite skill, whilst they were fingering the toes of my acquaintance. Once, however, I had it not in my power to be my own surgeon, and, on that occasion, a faithful old negro performed the friendly office.

I was descending the Demerara, with an inveterate tertian ague; and I was so much exhausted by sitting upright in the canoe, that I no sooner got ashore at an Indian's hut, than I lay down on the ground at full length. Sickness had pressed so heavy on me, that I was callous to the well-known feeling which the chegoe causes. I was quite unconscious that there were nine thriving nests of chegoes in my back, until one was accidentally observed by the old negro; and this led to the discovery of the rest. I handed him my penknife, and told him to start the intruders. Sick as I was, I wished an artist were present at the operation. The Indian's hut, with its scanty furniture, and bows and arrows hanging round; the deep verdure of the adjoining forest; the river flowing rapidly by; myself wasted to a shadow; and the negro grinning with exultation, as he showed me the chegoes' nests which he had grubbed out; would have formed a scene of no ordinary variety.

Dogs are often sorely tormented by the chegoe; and they get rid of them by an extremely painful operation. They gradually gnaw into their own toes, whining piteously as they do it, until they get at the chegoe's nest. Were it not for this singular mode of freeing themselves from the latent enemy, dogs would absolutely be cripples in Guiana.

But it is time to stop. I have penned down enough to give the reader a tolerably correct idea of one of the smallest, and, at the same time, one of the most annoying, insects, which attack both man and beast in the interminable region of Guiana.

Walton Hall, Yorkshire, March 21. 1836.

[We have asked of Mr. Westwood the favour of his supplying figures, and what information he can, in elucidation of the personal characteristics of the chegoe, or chigo. The following article, translated by Mr. Shuckard from a recent German work, with the accompanying figures, is the result of our application, from which it will be seen that several interesting facts respecting the real nature of the transformations of the chegoe, still remain in obscurity.]

ART. III. *An Account of the* Pùlex pénetrans L., *translated from Pohl and Kollar's Work, "Brasiliens vorzüglich lästige Insecten;" that is, On the Noxious Insects of Brazil;* by W. E. SHUCKARD, Esq.

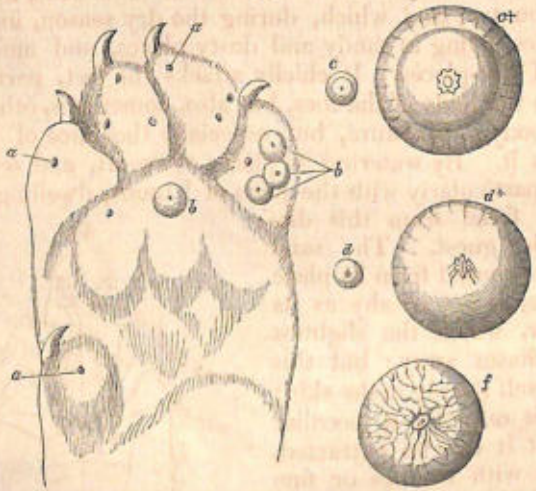
PU'LEX PE'NETRANS Lin.

The Sand Flea. In Portuguese, Bicho; and called Tunga by the Brazilians.

Pùlex fusco-rufescens; rostro tenuissimo dimidii corporis longitudine.

WE may reckon amongst the most troublesome and dangerous insects of Brazil a close relation of our flea, but which

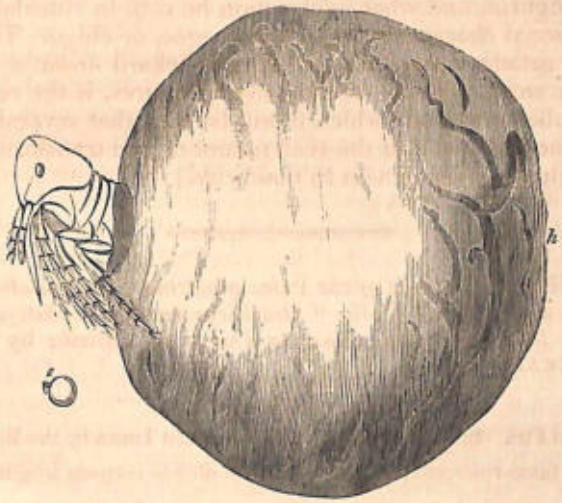
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A dog's amputated foot, with the nests of the sand flea (*Pùlex pénetrans L.*) in several spots.

a a a, Form of this nest, immediately after its insertion on the first day.
b b, Cavities which remain in the parts, after the balls formed by the expansion of the body of the sand flea have been extracted, on the second or third day after its insertion.
c c, An extracted peeled ball, both of the natural size and magnified, with the anal aperture of the flea, seen from behind.
d d, A similar ball seen from before, both of the natural size and magnified.
f, One of these balls opened from the anus, freed from the cellular membrane, and enlarged, whereby the conglomeration of eggs is seen

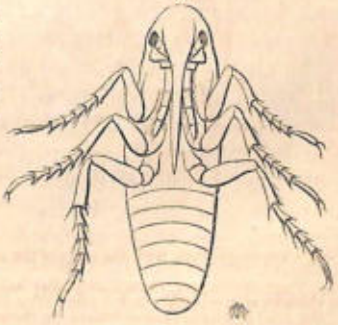
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A similar ball, both of the natural size (*c*) and magnified (*b*), seen in profile, in which the belly of the flea is already swollen, and the head and feet externally free; but internally the anal aperture of the insects formed and visible.

does not incommode the inhabitants in their beds, but in the open country, and which, during the dry season, incredibly multiplies, living in sandy and dusty places, and among the ashes of fire-places. It chiefly attacks the feet, particularly between the nails of the toes, but also, sometimes, other parts of the body. Moisture, but especially the juice of lemons, destroys it. By watering its places of resort, and scrubbing rooms, particularly with the juice of lemons, dwelling-houses may be freed from this disagreeable guest. The sand flea, thus roused from its place of abode, is not so shy as its congener, which the slightest attack chases away; but this buries itself deeply in the skin; and it is only by a peculiar skill that it can be extracted, and this with needles or fine knives. Although much smaller than the common flea, it occasions, by its constant irritation, the most violent and alarming indisposition, particularly where it has nestled in great numbers. Inflammation

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The sand flea, both much magnified and of the natural size, seen from the ventral side.

bad swellings and ulcers, and even death, are the consequences of their intrusion, especially in animals in which their extraction is not so easily effected. M. J. Natterer thus lost his excellent hound. A multitude of these fleas had inserted themselves in all the four feet, and the poor animal became the sacrifice of their love of nestling. By means of these feet, which were cut off, and sent in spirits to the Imperial Museum at Vienna, we have been enabled to give an accurate description and figure of this remarkable insect.

On the dog's foot (represented at *fig.* 40.) the brown points *a* are the spots where a sand flea has inserted itself. If these spots be examined with a lens, a small hole is discovered in their centre; and, if it be carefully loosened around, a small vesicle, or ball, will fall out of the integument, leaving behind it an empty space, as represented in *fig.* 40. *b.* These balls contain the sand flea half-enclosed in a membranous vesicle. By using some care, the insect can be extracted from this, which then resembles a berry of the mistletoe (*Viscum álbum L.*) *Fig.* 40. *c.* represents one of these fleas magnified. It is transparent, and it has, on the surface turned outwards, a small aperture, surrounded by a brown circle, which is the anus. On the surface turned inwards towards the skin, the head and feet of the flea are seen. (*fig.* 40. *d.*) The whole ball, therefore, is nothing else than a gravid female, swollen to an enormous size, which, seen in profile, appears as represented at *fig.* 41. *e.* If the extremely delicate membrane of the abdomen be opened, a conglomeration of white, transparent, immovable, cylindrical eggs present themselves, which are figured at *fig.* 40. *f.* They are innumerable, and they hang in a filiform cellular membrane together. The nearer these eggs are to the anal aperture, the larger is their size; and the nearer the centre of the whole mass, the smaller they become.

As all the sand fleas we examined had the same form, and all had a more or less swollen abdomen, it would seem that females only, and after impregnation, insert themselves into the integument of animals, to find there a more abund nourishment for the developement of their eggs. As, beside no larvæ or maggots were found in the feet, but tolerably forward eggs at the orifice of the anus, it is probable that the female, like that of our common flea, lays its eggs on the ground, where they then transform themselves into larvæ, pupæ, and perfect insects.*

* Dr. K. D. Rodschild, in his work "*Medecinische*," &c., 8vo, p. 307., is of opinion that the sand flea lays no eggs, but that the larvæ are deve-

The male of the sand flea is unknown. *Fig.* 42. represents a less swollen female, from beneath. By comparing the sand flea with our common flea, we find that the former absolutely belongs to the genus *P*ùlex, and is distinguished chiefly from the latter by its longer proboscis, and by the anterior legs being placed nearer to the head. Some specimens of the sand flea, extracted from the foot of a negro, differ from those of the dog's foot only by being black; but they are accurately distinguished by both the natives and the negroes; the one we have described being called bicho de cachorro (dog flea), and the latter merely bicho de pé When, in spite of the boots with which the feet may be protected, this little monster contrives to nestle in the foot, so soon as any irritation is felt on the feet, nothing can be advised to be more promptly done, than to cause them to be extracted from the skin: otherwise, in less than twenty-four hours, a bag is formed, in which some hundreds of eggs are contained; and, subsequently, the part ulcerates. The negroes are, in general, the best operators; and they use for the purpose a little knife or needle, by means of which the bag is carefully extracted. If this should burst, the pupæ fall out, and an ulcer ensues. To prevent this, tobacco dust or juice, or lemon juice, or calomel, is rubbed into the wound, and thus the pupæ are killed. But, should the nestled sand flea be entirely neglected, and allowed to remain, the eggs develope themselves; a fearful

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Professor Oken, in his *Lehrbuch der Naturgeschichte*, Jena, 1815, vol. iii. p. 402., thinks the *P*ùlex pénetrans is no flea, since it does not change into the pupa, and that it probably belongs to the *A*cari; in favour of which its mode of life, its instincts, and nestling propensities speak.

[Mr. Westwood has informed us that the late Rev. Lansdown Guilding had treated of this animal in unpublished MSS. of his, and that he had applied to it the generic name of Sarcóphaga, and that it certainly is one of the *P*ulícidæ.

In V. p. 480. is a short notice on the habits of the chigo, as it is there named, by William Sells, Esq., who has there remarked, "The chigo, I apprehend, is a species of *A*carus."]

bad swellings and ulcers, and even death, are the consequences of their intrusion, especially in animals in which their extraction is not so easily effected. M. J. Natterer thus lost his excellent hound. A multitude of these fleas had inserted themselves in all the four feet, and the poor animal became the sacrifice of their love of nestling. By means of these feet, which were cut off, and sent in spirits to the Imperial Museum at Vienna, we have been enabled to give an accurate description and figure of this remarkable insect.

On the dog's foot (represented at *fig.* 40.) the brown points *a* are the spots where a sand flea has inserted itself. If these spots be examined with a lens, a small hole is discovered in their centre; and, if it be carefully loosened around, a small vesicle, or ball, will fall out of the integument, leaving behind it an empty space, as represented in *fig.* 40. *b.* These balls contain the sand flea half-enclosed in a membranous vesicle. By using some care, the insect can be extracted from this, which then resembles a berry of the mistletoe (*Viscum álbum L.*) *Fig.* 40. *c.* represents one of these fleas magnified. It is transparent, and it has, on the surface turned outwards, a small aperture, surrounded by a brown circle, which is the anus. On the surface turned inwards towards the skin, the head and feet of the flea are seen. (*fig.* 40. *d.*) The whole ball, therefore, is nothing else than a gravid female, swollen to an enormous size, which, seen in profile, appears as represented at *fig.* 41. *e.* If the extremely delicate membrane of the abdomen be opened, a conglomeration of white, transparent, immovable, cylindrical eggs present themselves, which are figured at *fig.* 40. *f.* They are innumerable, and they hang in a filiform cellular membrane together. The nearer these eggs are to the anal aperture, the larger is their size; and the nearer the centre of the whole mass, the smaller they become.

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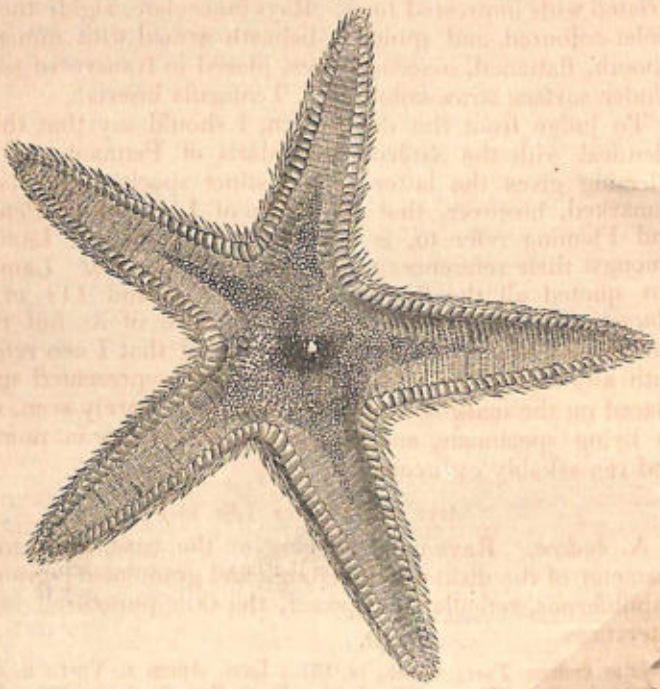
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ulcer follows, which frequently extends to the bones, and then requires the amputation of the limb.

ART. IV. *Illustrations in British Zoology.* By GEORGE JOHNSTON, M.D., Fellow of the Royal College of Surgeons of Edinburgh.

ASTE`RIAS ARANCI`ACA. (*fig.* 43.)

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1. *ASTE`RIAS aranciaca.* Rays 5, lanceolate, flattened, one third longer than the diameter of the body; the margins with a neat border of equal granulated tubercles; back covered with very close, even, small, tubercles.

Astèrias aranciaca Lin., Syst., 1100.; Müll. Zool. Dan. Prod., 234, no. 2831.; Lam. Anim. s. Vert., ii. 563.; Flem. Brit. Anim., 486. *A.* irregulàris *Penn.*, Brit. Zool., iv. 128. *A. equéstris Barb.*, Gen. Verm., 86. pl. 10. fig. 7. (pessima); Turt. Gmel., iv. 132, but not of his Brit. Fauna; Bradley Phil. Ac. of Works of Nature, pl. 4. fig. 1, 2.; Encyclop. Méthod., tab. 110. fig. 2. 4., and tab. 111. fig. 3, 4.

Hab. — The British shore, in deep water. Leith shore. *Dr. Coldstream.* Not uncommon in Berwick Bay.

The extreme diameter of this pretty species is 3½ in., the disk being about 1 in., and the length of the rays 1½ in. It is regularly stellate, flattened on the dorsal aspect, which is of a livid purplish colour, and covered with closely set, even, minute tubercles, while a row of much larger ones runs along the margins of the rays, in the manner of a neat beading. The tubercles are crowned with very short papillæ, and the marginal ones are rough or granular, having a resemblance to the surface of a strawberry. The centre of the back is usually umbonate; and the operculum, placed at a side, is striated with impressed lines. Rays lanceolate, rigid; the tips violet-coloured and spinous; beneath armed with numerous smooth, flattened, osseous spines, placed in transverse series. Under surface straw-coloured. Tentacula biserial.

To judge from the description, I should say that this is identical with the *Astèrias* irregulàris of Pennant; but Dr. Fleming gives the latter as a distinct species. It may be remarked, however, that the figure of Link, which Pennant and Fleming refer to, is quoted by Linnæus and Lamarck amongst their references to the species before me. Lamarck has quoted all the figures in plates 110. and 111. of the *Encyclopédie Méthodique* as representative of it; but those enumerated among my synonymes are all that I can refer to with any confidence. In these there are represented spines placed on the marginal tubercles, which are rarely seen, even in living specimens, and which are always few in number, and remarkably caducous.

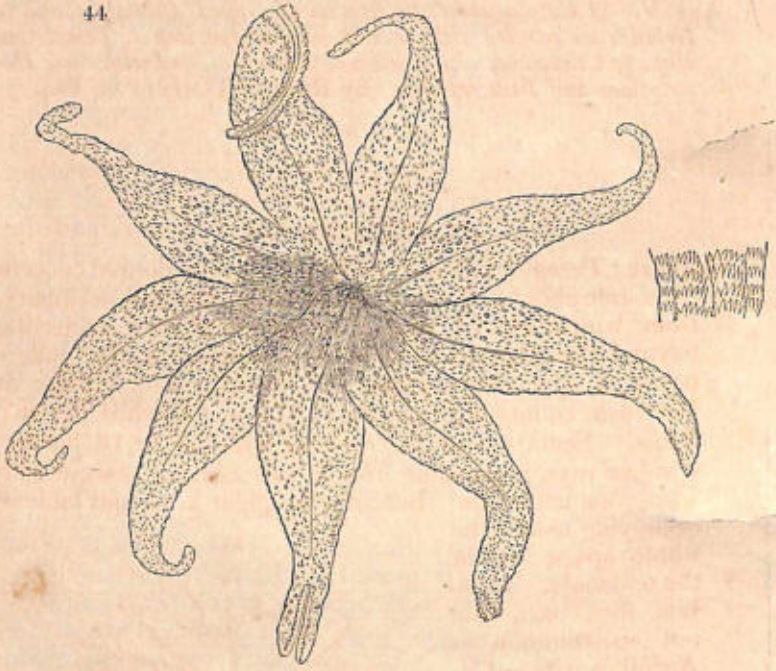
ASTE'RIAS E'NDECA. (*fig.* 44.)

A. *éndeca.* Rays nine, bulging at the base, equal to the diameter of the disk, which is rough and granulated; granules papilliferous, reticularly disposed, the skin punctured in the interstices.

Astèrias éndeca Turt., Gmel., iv. 131.; Lam. Anim. s. Vert., ii. 560.; Sowerby Brit. Misc., p. 49. pl. 24.; Penn. Brit. Zool., iv. 134.; Flem. Brit. Anim., 487.; Encyclopéd. Méthod., tab. 113. fig. 3., tab. 114. fig. 1., tab. 115 (good), and tab. 116. fig. 1.

Hab. — In deep water, on the Scottish coast: common.

This species attains a size 9 in. across, the diameter of the disk being equal to the length of a ray. The colour varies from a light purple to an orange and yellowish red; but some purple is almost always present in the form of lines radiating from the centre. The upper surface is slightly convex, the skin tough and loose, roughened with equal minute tubercles



or granules of a white colour, and connected by a sort of network formed by cartilaginous lines, the interstices appearing punctured. These punctures are red, and seem to serve for the protrusion of the soft respiratory or aquiferous tubes. The granules are surmounted with a crown of minute papillæ. Rays rounded, tapered rather suddenly from the base, very flexible, and armed underneath with two series of pectinated spines on each side of the tentacular furrow. The outer series is narrower than the inner, which is continued forwards to the mouth, while the outer is arched to the base, and joins its fellow of the adjacent ray; a triangular space, roughened with pectinated tubercles, being thus formed between the bases of the rays and the mouth. Under surface yellowish.

Berwick upon Tweed. [*Received on April* 16. 1836.]

ART. V. *A Catalogue of the Species of Rayed Animals found in Ireland, as selected from the Papers of the late J. Templeton, Esq., of Cranmore, with Notices of Localities, and with some Descriptions and Illustrations.* By ROBERT TEMPLETON, Esq.

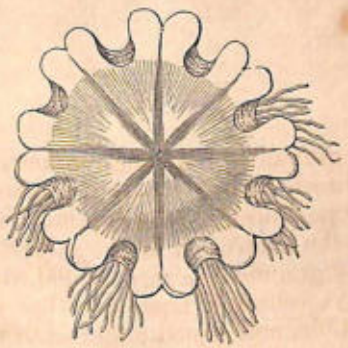
(*Continued from* p. 240.)

RADIA'TA.

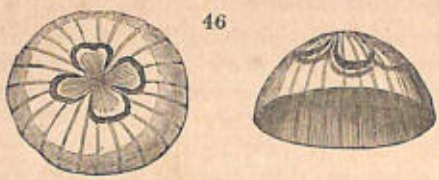
*A*CALE'PHA *Cuv.*

Æquòrea *Peron.?* radiàta. Pellucid; a rose-coloured concentric circle about half way between the centre and periphery, from which extend numerous concolour rays projecting beyond the edge so as to form a marginal fringe, underneath no appendages apparent. Breadth 3 in. Shore at Portrush, county Antrim; July 1815. — Callírhöe Peron.? dùbia. Semitransparent, convex, with 10 or 12 fuscous obsolete rays, proceeding from a dark centre; margin with numerous tentacula. Beneath, irregular arms and laminæ occupying nearly the whole space within the tentacula. Inhabits the coast, but not so common as Aurèli*a* aurìta.—Cyànea *Per.?* inscrípta. (*fig.* 45.) Semitransparent, brownish, with a dark centre, from which proceed 8 obscure rays, to the middle of 8 emarginate lobes, which crown the margin, the intervals between these lobes having a lunate, transparent, plicated membrane, semicartilaginous, and with numerous tentacula in fasciculi proceeding from beneath them. Found on the shore near Carrickfergus; September, 1812.—Aurèli*a*? aurìta *Müll.* Transparent, colourless, with 4 heart-shaped purple marks meeting centrally, and 4 plicated arms between them, the margin fringed with fine appendages. Very common during the summer months. — Ephỳsa *Peron.* símplex *Penn.* Found occasionally at Donaghadee.— E.? hemisphæ'rica. (*fig.* 46.) Hyaline, faint traces of obscure radii, 4 purple cordate marks meeting at the centre. Common on the coast. —

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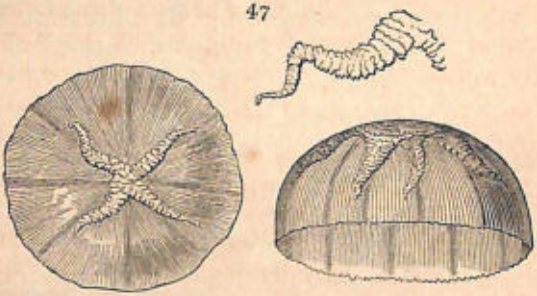


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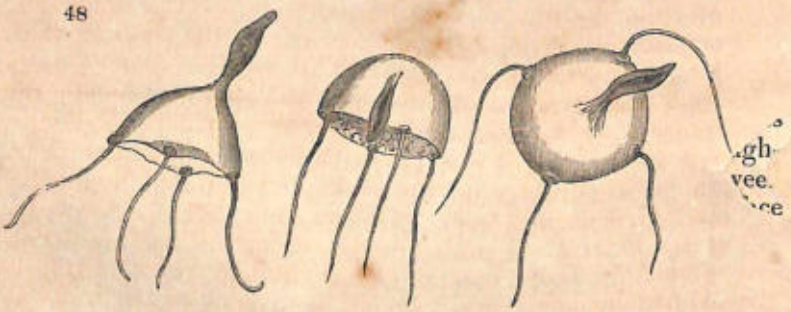
Ocýrhoe? *Peron.* (Cassiopèa? *Lam.*) cruciàta. (*fig.* 47.) Hyaline; 4 arms, pale purple, corrugated; 8 darker, fine rays, and numerous dusky obsolete ones. — O. tuberculàta *Penn.* Semipellucid, brown and granulated in the middle; 15 rays, of a triangular form, their apices inwards, of a bright

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brown, the edges darker, accompanied by a circular brown macula within their base, and one in the intervals of their rays. Beneath 4 elongate arms; no tentacula. — Piliscelòtus. Body hyaline, hemispherical, the apex somewhat produced, and terminating in a fleshy, elongated, spindle-

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shaped appendix. Margin of the body with 4 moderately long tentacula, each tentaculum arising from a small tubercle. — P. vítreus. (*fig.* 48.) Hyaline, bell-shaped, with

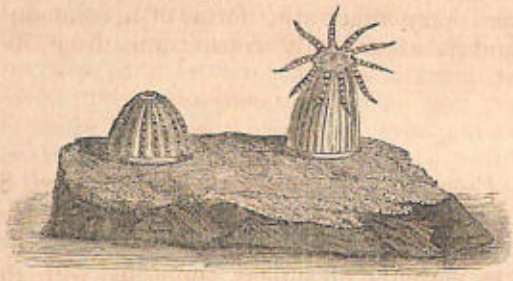
4 brown tentacula arising from the margin, nearly equidistant; the centre produced into a long dark brown appendage somewhat thickened in the middle. Found in the pools on the limestone rocks at the Whitehead; June 25. 1812, moving with a pretty quick but steady motion, by expanding and collapsing the body, which was so extremely transparent, that scarcely any part was visible, but the dark brown appendage, and the marginal tentacula. The marginal tentacula were dilated at their base. —Appendix. Medùsa scintíllans of Macartney is very common at Bangor and Glenarm. — Béroe Müll. píleus *Gm.*? Occasionally detected in our deep bays. — Cùcumis *Fab.* fúlgens *Macartney.* A great number were found floating in with the waves on the shore of Dundrum Bay, west of St. John's Point. — Velélla *Lam.* mùtica *Lam.* Very common at Magilligan, floating in on the water during westerly winds.

PO'LYPI.

CARNO'SI.

Actínia *Lin.* equìna *Lin.*, hemisphæ'rica *Penn.* Common on the rocks and stones on every part of the coast. While engaged in sketching this species, which was immersed in a bowl of sea water, considerable surprise was experienced, on pressing it slightly, to see several completely formed young ones, of different sizes, protruded from the mouth. In every respect they resembled the parent, except in the fewer number of the tentacula, which, in the very smallest, and, it is presumed, the youngest, were only 4; and they gradually increased in number as the animals increased in size; so that the age may, perhaps, be judged of from the number of the tentacula. — A. senìlis *Lin.*, crassicórnis *Bast. Lam.* Common on the rocks at Bangor, and other parts of the coast. The colour varies from dark to more or less light red, and occasionally the tentacula are beautifully variegated with dark and light red bands, tinged with prismatic hues. — A. effœ'ta *Brug.* In great numbers on the rocks between Ballyholm Bay and Groomsport, county Down; Sept. 1811. — A. sulcàta *Pennant.* Most probably the young of the preceding. Found at Ballyholm Bay near Bangor, Sept. 1811. — A. pedunculàta *Penn.* Found in a pool on the rocks at the north end of the Island of Rathlin; August, 1795. — A. monìle. (*fig.* 49.) With a cylindrical body of a light cinereous green, marked with from 14 to 16 lines of bead-like tubercles; the circumference of the disk is also striated,

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and with a single range of variegated tentacula. Rare: a few specimens were found on the shore of Belfast Lough, near Holywood, April, 1803. They were, when contracted, scarcely larger than a pea, and had only 10 tentacula. Perhaps the young of a larger species. —A. diánthus *Ellis ?* pentapétala *Penn. ?* Conic, rounded above, of a green or greenish yellow colour, with a few scattered warts in longitudinal rows; disk light blue, often divided into 11 lobes; tentacula numerous, pale, in from 5 to 7 fasciculi, variegated with dark annuli. In the hollows of the rocks at Ballyholm Bay, Bangor. — A. margaritífera. (*fig.* 50.)

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Body subconic, low, and very much dilated at the base, deep brown inclining to chestnut, with longitudinal and concentric plaits; mouth conic, striated; at the base of the tentacula a series of light blue ovate lobes. On the coast of the Copeland Isle; August 1811. — Lucernària *Müll.* aurícula *Müll.* octoradiàta *Lam.* Found adhering to the *Fùci* on the shore at Ballycastle, and in the Cave near Dunluce Castle, county Antrim, in great numbers; July, 1815. The form of this species was strictly campanulate. The rays varied in number, in different specimens, from 5 to 8; the latter number being in no instance exceeded. The colour was tawny, or pale brown, with a dark brown streak extending along the middle of each ray.—L. quadricórnis *Müll.*, fasciculàris *Flem.* Found on the coast at Donaghadee, after a strong easterly gale, adhering to a

fragment of *Fucus serratus*; Dec. 1796. When at rest, it assumes very much the form of a common drinking-glass, and is exceedingly conspicuous from its beautiful rose tint.

(*To be continued.*)

ART. VI. *Proposals for instituting Meteorological Stations in various Parts of Britain, and a cooperative Use of them.* By Mr. W. H. WHITE.

THERE is, perhaps, no subject connected with the various operations of nature, that affords greater interest to the admirer of natural phenomena, than meteorology. It is, at all periods of the year, a pleasing and, in many instances, a useful employment, to notice the different changes of the weather, especially in so variable a climate as this is. Meteorology, both in its ordinary and in its extraordinary manifestations, furnishes abundant materials for the contemplation of the scientific enquirer.

As there are several correspondents of this Magazine who take considerable interest in the science of meteorology, I beg most respectfully to propose to them, and to others interested in the science, the propriety of adopting some efficient plan to carry into effect a unity of purpose in making observations; and this, I think, can only be effected by establishing several meteorological stations, both in north and south Britain; and by each observer using the same kind of instruments, making observations at the same appointed time, and using the same formulæ in each journal. The maximum, minimum, and mean results might be brought into conjunction once a month, in the *Magazine of Natural History*. Such a plan of observation would not only render each meteorological station of greater value, in consequence of its useful association with others, but it would become an object of the highest importance to meteorological science. Astronomers have set the example, by planting astronomical stations in all parts of the globe; and I feel persuaded, if meteorologists would do the same, with respect to the constantly variable climate of Britain alone, taking care to record each observation with philosophic fidelity, the result from such a union of labours would be of the greatest importance to meteorological science; and, at the same time, be a means of unveiling many of those mysterious phenomena which at present evade scientific research.

I shall be most happy to take my station in the field; and, though I do not aspire to take the rank of a general, I may be useful as a pioneer.—*Old Kent Road, Jan.* 14. 1835.

[It is hoped that the date of this communication will not detract from the interest of it; and, although Mr. White's kindred views, of subsequent date, in p. 251., may be held to do so, the present one may serve to further the same end, and it differs in proposition it includes being limited to Britain. It is given now, contemporaneously, with the following one by Mr. Marshall, partly from a sense of justice to Mr. White, as a means of recording his sympathetic and earlier vote for the extension of meteorological knowledge. Has not the British Association for the Advancement of Science suggested cooperation in the prosecution of meteorology, in their prospectus, or *First Annual Report?* A printed copy of a "Meteorological Diary, kept by S. Moss, chemist, Cheltenham," which includes the "general summary" for "1835," that is now present, has excited the idea that, if a society of persons addicted to meteorology could be instituted, and local reports were supplied to it, and summarised by it, there would be efficient means of furthering the object of Mr. White and Mr. Marshall; and that suggested, in p. 314., by Mr. Bree, in a letter received from him in 1832.]

ART. VII. *Summary of the State of the Weather and Temperature at Kendal, Westmoreland, in* 1835, *with Remarks; a Speculation on the Atmospheric Conditions which may excite Wind; and a Notice of an observed Manifestation of Aurora Borealis, and of the Occurrence of an Earthquake.* By SAMUEL MARSHALL, Esq.

Months.	Barometer.			Thermometer.			Quantity of Rain in Inches.	No. of rainy Days.	Prevalent Winds.
	Maxim.	Minim.	Mean.	Maxim.	Minim.	Mean.			
January -	30·54	28·62	29·77	51°	12·5°	34·70°	5·349	15	S. W.
February -	30·14	28·50	29·41	50	29	40·35	8·820	27	W.
March -	30·40	28·57	29·69	52	28·5	41·09	5·049	18	W.
April - -	30·20	29·40	29·88	61	28	5·78	1·589	18	W.
May - -	30·00	29·18	29·62	64	32	2·02	3·063	18	W.
June - -	30·20	29·19	29·85	78	39·5	57·49	1·234	10	S. W.
July - -	30·09	29·44	29·51	73	46	58·44	6·259	14	W.
August -	30·10	29·28	29·77	74	45	60·21	3·107	12	W.
September -	30·00	29·00	29·44	66	40	53·20	7·815	20	S. W.
October -	30·18	28·64	29·51	59	32	46·47	4·386	19	N. W.
November -	30·36	28·93	29·67	53	29	41·84	6·311	19	W.
December -	30·33	28·98	29·89	49·5	21·5	38·17	2·889	15	W.
Annual mean	30·21	28·98	29·66	60·67°	31·92°	47·33°	55·891	205	W.

The year 1835 has enabled me to complete a series of observations on the meteorology of Kendal for the last fourteen years. There are, I believe, few places in England where the meteorology of any district has been registered for so long a period as that of this town, registered in it in consequence of the successive labours of several individuals having contributed to this important object. So long ago as the

year 1788 such observations were noted (see Dalton's *Meteorological Essays*, 2d edition), and, with some interruptions, have been continued to the present time. Could such a series of observations be kept in various districts, important deductions might, probably, be drawn from them, which would tend to throw light on this interesting branch of knowledge. It must be confessed, that, for want of these, the science is obscured, from the absence of data sufficient to do more than deduce general results. It is often matter of surprise and regret, that such a number of observers should not be found as would note down the needful particulars, since the employment has many inducements to recommend it: it is simple, and esily performed, without much scientific knowledge; it occupies but little time in registering the state of the barometer, thermometer, winds, and rain; and the instruments requisite for doing this, except a rain-gauge, are in the possession of most men of leisure. Besides, the different fluctuations of the weather are subjects interesting to every class of the community. No change can take place but what influences, more or less, the agriculturist, the traveller, or the party of pleasure. When we recollect that a slight variation of temperature, or in the weight of the atmosphere, frequently produces a powerful effect on the nervous system, we may see that the invalid is dependent for his comfort on these fluctuations; and the personal enjoyment of all is often increased or diminished by these ever-varying changes. Not that the nicest observation can influence or modify these changes; but to observe their causes or effects cannot fail to be highly interesting.

I have pointed out [VIII. 345.] the difference in the quantity of rain taken, in former years, in my gauge and that at Birklands. At the latter place, the quantity for 1835 was 50·64 in., being 5·251 in. less than what fell in Kendal, though at so short a distance as one mile, and so trifling an elevation as thirty yards. The difference in the quantity of the two gauges for the last three years is about one twelfth less at Birklands than at Kendal. The amount taken at Kendal last year is nearly 10 in. less than that which fell in 1834; and at Birklands, nearly 8½ in. The weather in 1835 was much wetter than in 1834, there being twenty wet days more in the former than in the latter year. We have not had so many days in which rain has fallen, in any year, for the last fourteen, as in 1835. The average number of wet days in a year may be stated at 182; therefore, we had last year one ninth more wet days than the average.

The greatest height to which the barometer attains, calculating from the monthly averages, is in May and June, and

the least in February. It is singular to observe, that, in the first quarter of the year, January, February, and March, the average height of this instrument is 29·62 in.; in the second quarter, 29·67 in.; in the third, 29·66 in.; and in the last quarter 29·62 in. The near approach to equality is very striking; the first and last quarter being the same, and the others varying from them only in the hundredth parts. The average height of the barometer in this town may be stated at 29·64 in., which is its annual mean.

The hottest month of the year is July, its average temperature being 59·20°; and the coldest month is January, having an average temperature of 34·57°. The mean of the first quarter of the year is 37·86°; of the last, 43·01°; of the second, 51·31°; and of the third quarter, comprising July, August, and September, 57·05°. The annual mean temperature is 47·31°.

The month in which the greatest quantity of rain falls is November, the average for that month being 6·8 in.; and the month in which least rain falls is May, the mean of which is 2·448. The wettest quarter is the last, and the driest is the second; the two quarters in which May and November fall.

At Bolton, in the south of Lancashire, I find, by tables furnished to me for the last five years, that May and November are the driest and wettest months there; the proportion of rain in May being to that in November as 1 to 2·5; while at Kendal the proportion is as 1 to 2·77. The average between Kendal and London is never less than 5 to 3, nor more than 7 to 3; but generally the latter. The proportion between Kendal and Lancaster is about 4 to 3.

October is the month in which we have the greatest number of rainy days, and July that in which we have the smallest.

The following is the order of the months, according to the number of wet days in each; beginning at October, in which we have the most, and ending with July, in which there are the fewest days in which more or less of rain falls: — October, December, November, and August, equal; September, February, April, March, and July, the same; June, May, and January.

The west wind is the prevalent one in this district, as it occurs ten months in the year. In October and December the w. and s. w. are equally prevalent with us. From tables now in my possession, it appears that at places situated near the west coast of our island, the quantity of rain varies considerably. The average annual quantity at Kendal is 57 in.; at Lancaster, only 45 in.; at Liverpool, 34 in.; at Manchester, 33 in.; Bristol, 29 in.; Ludgvan, near Mount's Bay, in Cornwall, 41 in.; and at Plymouth, 46½ in., being very near that at Lancaster; at Selbone, in Hampshire,

37 in.; at Chichester, 32 in.; at London, 23 in.; at Norwich, 25½ in.; at Ferriby, near Hull, 27 in.; at Chatsworth, in Derbyshire, 27½ in.; at Nottingham, 23½ in.

These different quantities show very clearly, that on the western side of England much more rain falls than on the eastern, or in the midland counties, where observations have been made. This may be accounted for, in a great measure, by the extraordinary quantity of moisture brought from the Atlantic Ocean and Irish Sea, towards the western coast, by the winds from the s. w. and w., which prevail along this coast of our island. This moisture being attracted by the hills which run in this direction, both in Wales and in Lancashire and Westmoreland, causes a deposit greater than in any other part of our island. The hills of Cumberland and Westmoreland, with the great range between Yorkshire and Lancashire, arrest the progress of the clouds and currents of air, and deprive them of the superabundant quantity of rain which they contain. This aqueous deposit is often so complete, that on the western side of these hills the rain is copious, while on the opposite, or eastern, side the weather is either fine at no great distance, or the clouds are light and fleecy; while those on the western side were thick and loaded with moisture, before the attraction of the hills occasioned them to part with the water they held in solution. This I believe to be universally the case in mountainous districts; and I intend to apply it only to the explanation of the quantity of rain which falls in this district being greater than in any other part of England with which I am acquainted; at least, where observations have been long enough made with sufficient accuracy. The local circumstances of the town and neighbourhood have the chief influence in producing this effect.

It may not be improper, to notice the extraordinary adaptation of the soil to the large quantity of rain which falls here. A limestone soil, like ours, requires a large proportion of moisture, to preserve vegetation from the effects of drought in certain seasons of the year; and, on the contrary, were the soil of a clayey nature, the excess of rain above what would be requisite would soon manifest itself by the extreme humidity of the ground, which would, of course, be unfavourable in the opposite degree to vegetation, and be equally injurious to the health of the population. The adaptation of the soil to the extraordinary moisture is a source of gratitude to the bountiful Author of all our blessings.

The winds in this district, as I have before observed, are generally from the west. They prevail from this quarter and

the s. w. more than all the rest. When the wind is strong from the latter point, or from the south, we have the greatest quantity of rain, and sufficient to occasion, very frequently, the river Kent to overflow its banks. The greatest floods usually originate in a wind from the south, which blows for a while from that quarter; and, as it moves to the west, the rain gradually subsides. The opposite points of the N. N. E. and E. are, with us, dry quarters; for, though we have occasionally rain with the wind from all these points, yet it seldom lasts long. Snow is almost invariably accompanied with a S. E. wind.

But little dependence, however, can be placed on observations on winds in this valley. And this remark will probably apply to most places situated in mountainous districts, as the eminences will most likely give a direction differing from its original one to any current of the atmosphere. This may be illustrated by the circumstance of our often meeting a current of wind in a street, which current has been deflected from its original direction by the intervention of the houses and other buildings. When the wind is long in the E. or N. E., the weather is invariably dry to an extreme. In the spring of the year, that is, in March, April, and May, we have, for some weeks together, a dry unhealthy current setting in from the N. E. During the prevalence of this wind the skin is dry and uncomfortable, the insensible perspiration being carried off more rapidly than usual; and, in consequence, invalids and persons inclined to pulmonary affections, suffer much from this English sirocco, as it resembles the sirocco in some of its effects, but differs from it in its being a cold wind. This is, perhaps, the only wind we have in this country which can properly be styled periodical, as it is so very markedly at this season of the year, and at no other. The winds of the torrid zone mostly blow in the same direction, or in opposite directions in stated periods; but this is not the case in the temperate zones. Here the direction of the wind perpetually varies; and "as changeable as the wind" is proverbial in this country. The evident irregularity of the winds has long perplexed philosophers to assign adequate causes for such variations; and, perhaps, little more can be advanced to this day than the very usual conclusion, that partial changes of temperature are the chief general causes of all winds.

While the barometer, in the torrid zone, seldom varies but in a trifling degree, in the temperate zone it is not less fickle than the wind. This indication of a loss of weight in the atmosphere can arise only from a local diminution of elasticity in this fluid. On this general ground, therefore, I conceive,

may be explained the cause of the only periodical wind which we have in this island: I mean that which prevails, generally, from about the middle of April to the 7th or 8th of May, and sometimes longer; as, for instance, in 1835, it prevailed till the 18th, which is later by several days than is usually the case. In Sweden and Norway, the face of the country is covered with snow till the middle of May, or longer. This frozen covering, which has been formed during winter, grows gradually shallower, to the 15th or 16th of May, or until the sun has acquired 17° or 18° of N. declination; while, on the other hand, the valleys and mountains of England have received an accession of temperature of 24° or 25°. On this account, when the temperature of Sweden and Norway is cooled down by snow to 32°, that of Britain is 24° or 25° higher than that of the preceding countries; because, while the ground is covered with snow, the rays of the sun are incapable of heating the air above 32° (the freezing point). For this reason, the air of England is 24° or 25° more heated than that of the before-mentioned countries. The air of Sweden and Norway will then, of course, by the laws of comparative specific gravities, displace that of England, and, from the relative situation of those countries with this country, will produce a N.E. wind. This current is usually stronger by day than by night, because the variation of temperature in the air of Great Britain is at that time the greatest, being frequently from 50° to 60° about noon, and sinking to about 32° in the night.

I do not submit this hypothesis as capable of determining the exact duration, or the existence, of this current of air during the whole of the period I have mentioned, but think it highly probable that it will account for a N.E. wind prevailing at this particular season, as observations prove that it does.

We have had much fewer Appearances of the Aurora Borealis than we have had for several Years past. One of the most remarkable occurred on Nov. 18. The source of the electric light was not confined to the north, but seemed equally diffused through the whole horizon; and the streams of light darted from almost every point of the compass to the zenith. The greatest quantity, during the time I observed it, issued from the S.E. by S. The streamers were not, in general, in compact streaks of light, but resembled sheets of steam highly illuminated; and, when they reached the zenith, they generally formed into a cloudy appearance, in shape similar to the cloud called the mare's tail. Several times imperfect streaks of light, of a more compact form, stretched across from west to

east, but never formed into complete bows. For a few days before this appearance, the weather was frosty; but after that, to the end of the month, we had no frost.

I have compared the facts which have transpired on the weather during the year 1835, with the prognostics in the weather table, now inserted in most almanacks, and have found that the theory there laid down does not generally apply to this district. In some instances, however, the predictions and the events have coincided most exactly. This table, which is stated to be "constructed upon philosophical consideration of the attraction of the sun and moon in their several positions respecting the earth," has been ascribed to the late Dr. Herschel, but, I believe, without foundation. That these luminaries should, by their attraction, occasion tides in the air, as well as in the waters of the ocean, there can be little doubt; and it is probable that they have a much greater effect in producing atmospheric changes than has been usually attributed to them.

We experienced a Shock of an Earthquake, about 3 hrs. 40′ A. M., on August 20. The motion was sufficiently violent to throw down objects that were but slightly supported, and to occasion windows and doors to shake, and to rouse many from their slumbers. Those persons who were awake at the time were alarmed at the unusual sensation, and describe the motion to be twofold; a lateral one, as though bodies were shaken from one side to another, accompanied by a quivering motion. The sound followed the trembling, and was not so much like the roll of distant thunder, as the noise occasioned by the rapid motion of a loaded cart or waggon at a short distance. The impression produced on such as were awake at the time, as well as on those who were awaked by the shock, was that of terror or alarm. From accounts since received, it appears not to have extended much further than Lancashire, and the western parts of Yorkshire, Westmoreland, the southern and western parts of Cumberland; and to have been bounded on the east nearly, if not exactly, by the great range of hills running from Cross Fell, Yorkshire, to Derbyshire; and to have been most severe in the south of Westmoreland and the north of Lancashire. The morning was unusually clear and serene, and the weather had been clear and sultry for three preceding days. In the evening, there was a great deal of lightning, and but little thunder heard. The following day (the 21st) was very sultry; and in the evening we had a severe thunder storm, and another in the evening of the 22d.

26*th of the* 2*d Month* (*Feb.*), 1836.

[*The Appearances of the Instances of Aurora Borealis on Nov.* 17, 18. 1835, *seen at Bury St. Edmunds, Suffolk.*—The following particulars are taken from the *Bury and Norwich Post* of Nov. 25. 1835. They were splendid in a degree not only uncommon to our latitudes, but to our zone. "On the night of Nov. 17., the aurora was first espied at the north-east point of the horizon, and was of a pale reddish colour, but gradually extended its arch to the north-west, becoming a deep red, and exhibiting this magnificent appearance some time, without shooting out a single beam of visible light. On the evening of Nov. 18., the luminous arch was seen issuing from the edge of a dark cloud, reaching from the north-east to the north-west extremities of the horizon. The arch was of a pale colour, and every instant emitted waves and streamers of great brightness, which, ascending to the zenith, dissipated in space. The light in the northern atmosphere was fully equal to that Sept. he moon at its first quarter. The evening was blustering, of Simolear, and the stars could be plainly discerned through excessivemined vapour."

A most extraordinary Phenomenon in the Heavens [*Clouds*] was seen on Sunday se'nnight, between six o'clock and seven o'clock, at Chewton Mendip. It was the appearance of a regiment of horse with swords drawn, every trooper being distinctly visible, and the whole performing their evolutions in the field of battle, both horses and soldiers appearing perfectly black. The sight lasted for a considerable time. There are many recorded examples of similar sights, from Josephus down to the year 1745: at the latter time, phenomena of the same character, it is said, were seen in Scotland. (*The Bath Herald*, quoted in the *Bury and Norwich Post* of Oct. 14. 1835.)]

ART. VIII. *Monthly Means of the Barometer and Thermometer, and Quantity of Rain, at Ashfield, near Falmouth, Cornwall,* 1835. By LOVELL SQUIRE, Jun., Esq.

Months.	Mean of Barom.	Mean of Therm.	Quantity of Rain in inches.	Months.	Mean of Barom.	Mean of Therm.	Quantity of Rain in inches.
January -	30·01	43¾	2·363	July -	30·00	59⅓	1·759
February -	29·89	45¾	5·137	August -	29·96	59⅓	1·442
March -	29·91	46	3·986	September	29·71	55	5·458
April -	30·08	48⅝	1·513	October -	29·80	49⅝	6·797
May -	29·86	52⅝	2·737	November	29·89	46¼	6·703
June -	30·03	57½	2·709	December	30·20	40⅝	1·647

SUMMARY for 1835.—*Barometer:* Highest, 30·60; lowest, 28·88; range, 1·72; mean, 29·94.—*Thermometer:* Highest, 74; lowest, 23;

range, 51; average maximum, 55½; average minimum, 45$\frac{1}{10}$; mean difference of day and night, 10$\frac{3}{4}$; mean temperature, 50$\frac{3}{10}$. — *Rain:* Greatest quantity in one day (Nov. 2.), 1·452 in.; greatest quantity in one month (October), 6·797 in.; total of year, 42·25 in.

Ashfield, near Falmouth, Cornwall, March 17. 1836.

ART. IX. *Remarks in Recommendation of a System of Calendars of Natural Appearances.* Extracted from a Letter from the Rev. W. T. BREE, M.A.

As to calendars (I do not mean of the weather, but of natural appearances, birds, insects, plants, &c.), under judicious management, they would be interesting, and might not take up much room. If, *e.g.*, one were kept, say in Kent, in Cornwall, in Warwickshire, Yorkshire, Edinburgh, and one still further north; and the same, or nearly the same, articles selected for observation in all; the whole of them, at the e[illegible] of the year, might be formed into a succinct table, which w[illegible]as pleasingly exemplify the difference of seasons in these di[illegible] and widely distant districts. The articles to be noticed [illegible] s. 40′ be such as are tolerably uniform and constant; *e. g.* the appearance and retreat of swallows, fieldfares, &c.; the song of the cuckoo, blackcap, redstart, &c.; kinds of insects that give signs of spring, summer, and autumn, as Vanéss*a* urticæ, Gonépteryx rhámni, Póntia cardámines, cockchafer, Hippárchi*a* Janir*a*, &c.; of plants, such kinds as are pretty punctual in producing their flowers, as the winter aconite, snowdrop, crocus, primrose, blackthorn, whitethorn, &c.; a decided preference being given to wild species, as being less likely to be put out of their usual course by extraneous circumstances, than those under cultivation. A lady who married from this neighbourhood, and went to reside in Stirlingshire, hard by the Carron Works, took with her from a garden nine miles hence a collection of hardy herbaceous plants, many of which, I find, on comparing notes, flower considerably earlier in their Stirlingshire quarters, than they used to do in their former abode in Warwickshire. How do you account for that, when Carron Hall is so very much further north?

Allesley Rectory, near Coventry. Sept. 15. 1832.

My winter aconites have showed their yellow heads and green ruffs a week or ten days since. — *Rev. W. T. Bree, in a letter dated Dec.* 19. 1835.

What a late spring! No swallows, redstart, blackcap, or anything of the kind. — *Id. April* 13. 1836.

Here is May 14., and I have not yet seen a swift; I begin

almost to fear we shall not have any [VII. 465] this season. — *Id. May* 14. 1836.

This is the most backward spring we have had for many years past. — *Dr. Neill. Canonmills Cottage, Edinburgh, in a letter dated March* 31. 1836.

This is a cold and dreary spring. I saw the cuckoo twelve days ago, but, as yet, I have not heard its song. Nearly all the summer birds of passage have arrived. (*From a letter from C. Waterton, Esq., Walton Hall, Yorkshire, dated April* 27. 1836.)

Winter seems to have driven spring quite out of the field; nothing here but gloomy skies, frosty nights, hail-storm days, and a north-east wind. — *Id. May* 5. 1836.)

ART. X. *Short Communications.*

THE Hoopoe (VIII. 511.), an individual of, was shot on Sept. 26. 1835. at Tinnerana, in the county Clare, the estate of Simon Purdon, Esq., who sent the bird to me. It was excessively fat; the stomach was strongly membranous, and contained the remains of caterpillars, and the wing coverts of a beetle. — *T. K. Toomavara, Ireland, Feb.* 12. 1836.

The Carrion Crow (*Córvus Coròne*); *the Subjects of its Food, and that of the Term of its Age.* — Rather a curious circumstance happened, while I was in the southern end of Dorsetshire, in August 1835, with regard to the carrion crow (*Córvus Coròne*). A labourer was cleaning out a pond in the park, and, when returning from his breakfast, saw a snake (*Cóluber Nàtrix*) crossing towards a plantation near; he killed it, and in its inside was a loach (*Cobitis Tæ`nia*), which it had just swallowed. In the course of the day, he saw a crow alight, and then fly off with the snake. This is a kind of food additional to those which are mentioned by Bewick, and which I think has not before been noticed.

There are two of these crows, constant inhabiters of the place. One had its leg broken by a shot from a man, now ng in the parish, upwards of sixteen years ago. — *A Young ralist.* [*Received on March* 3. 1836.]

A Bird's Nest with an Egg in it, found within the Wood of an Oak Tree. — While two sawyers, in Messrs. Garland and Horsburgh's ship-building yard, Dundee, were employed in cutting up an oak log into planks, they discovered a neatly built wren's nest, with an egg in it, firmly embedded in the heart of the wood; which situation, considering the age of the tree, it may have occupied for more than fifty years. (Quoted in *The Sun* London newspaper of Dec. 18. 1835, as from the *Dumfries Courier.*)

[If there is any incorrectness in the account, will our Dundee correspondent be so kind as to correct it? In VI. 460., VIII. 324., are accounts of two other instances of a bird's nest being found within the wood of trees.]

AMPHIBIOUS ANIMALS. — [*Toads found incarcerated in Stone and in Timber* (VI. 458, 459.; VII. 519. 549, 550.): *one found incarcerated in Sandstone.*] — Last summer, a live toad was found incarcerated in solid sandstone, by the workmen who were forming the railroad through Coventry Park. These things, I am aware, not unfrequently occur (we often read of them in the newspapers); but this is the first and only instance that has ever come under my personal inspection. I saw the toad alive the day after it was found. It is a good example of the kind, the block, or rather rock, of sandstone being solid, except the cavity where the toad lay. — *W. T. Bree. Dec.* 19. 1835.

Incarcerated Toads. — Opinions by both Brown and Jeffrey are expressed in the *Edinburgh Review*, to the amount that, "in quarries and in rocks, many [toads] have been discovered, who [this word marks it as the animal, and not the rocks, that is meant], they believe, existed before the flood. [Quite a long period, at least, is intended.] In Chillingham Castle, the seat of the Earl of Tankerville, one, within a period not long past, was found contained in a marble mantel-piece. To this we have to add, what has never before met the public eye, that, some sixty years ago, a stone wall being about to be founded in the neighbourhood of Bamborough, Northumberland, a toad was procured, placed in a stone holiowed for the purpose, and secured by mortar. After a period of thirty-eight years, the wall was removed, and the stone examined, when the little creature exhibited every proof of vitality." (*British Mirror*, quoted in the *Scotsman* for April 2. 1836.)

The Natterjack (*Bufo Rubeta* Flem. (VI. 185—189. 457. 526.) *occurs wild in Ireland.* — I have lately got from Kerry living specimens of the Irish toad, which I announced, at the meeting of the British Association to have observed at Caherfersy, twelve miles from Killarney, in 1805. It is no common English toad, but the natterjack (*Bufo Rubeta*) Fleming, the mephitic toad of Shaw's *Gen. Zoology*, according to Pennant, to whom Sir Joseph Banks appears to have given the first intimation of its localities in England (it having been found on Putney Common, and in Lincolnshire), and the description: the latter exactly accords with our little-known native. It was found by me, thirty years ago, in the place mentioned, where it was known to the peasantry as the black frog; and it was enquiring for them under this name that

led to the discovery. Mr. Magillycuddy, the gentleman who brought me the living specimens about a month ago, informs me that they bury themselves under the dry sand in the winter and may be sometimes seen, in summer evenings, running about like mice in the houses, which they sometimes enter. — *J. T. Mackay. 5. Cottage Terrace, Dublin, Feb. 24. 1836.*

[*The Natterjack is common at Bootle, near Liverpool.*] — Are any of your readers acquainted with a variety of toad, common at the place whence I write (Bootle, near Liverpool), and not existing, so far as I can learn, any where else. The reptile in question differs from the common toad, as being smaller, and marked with a beautifully brilliant gold stripe, from the nose along the back to the rump. It *runs* along the ground, with almost the speed of a mouse, for a short distance; but its striking peculiarity is in its croak, which I can find no terms to describe. In a summer evening, when musically inclined, they certainly produce an agreeable and most extraordinary concert, performed at a pitch that it may be heard half a mile off. They have obtained the name of Bootle organs. — *Henry Berry. Bootle, near Liverpool, August 27. 1834.*

[*The Common Frog* (*Rana temporaria*); *the Questions in* II. 209., *on the external Characters of the Sexes of, and which of the Sexes it is that croaks, &c.*] — The sex of frogs is instantly determinable by the short stout spines (ad arctiorem adhæsionem; non dicimus copulam, nam mas dorso fœminæ vectus, ova gradatim expulsa fœcundat) with which the palms of the male are furnished. The croaking probably proceeds from both sexes, and is probably louder at certain seasons, and in peculiar states of the weather. I have observed, while staying on the mountains, that the tinkling bells of

The Tan [?] *Frogs* (*Hylæ*) are much more sonorous as the night sets in. — *Lansdown Guilding. St. Vincent, May 1. 1830.* [Mr. Blyth has noted, in VIII. 330., of the cuckoo, that its note is very much affected by the state of the weather.]

Are Frogs known to whistle? — Within a few days, I observed a large frog on a footpath, which appeared to have been injured. Its body was distended full of air, and its head bent down unnaturally. On my taking it up by a hind leg, it uttered a shrill long whistle, at the same time emptying itself of air. It repeated this feebly. I have imitated the note exactly, by blowing into a key-pipe $\frac{1}{8}$ in. wide, $\frac{5}{8}$ in. deep. The whistle might, possibly, be accidental; but it was certainly very remarkable, and might have been heard twenty yards off. — *J. W. Beeston. Near Nottingham, November 23.*

1835. [In V. 490. is information on the cries of frogs, but not to the point noticed by Mr. Beeston.]

[*Frogs, the Notices of Showers of, in* II. 103.] — Frogs, or their ova, may be protected in a quiescent state, during winter, in the clefts of banks and in the mud. In the West Indies we have many pools which are annually dried up; but, on the return of the periodical rains, they suddenly abound with fishes, crustaceous and other animals, which have not been brought from higher waters, but must have been preserved in some state in the very spot. — *Lansdown Guilding. St. Vincent, May* 1. 1830.

Fishes. — [*Herring Fry found in Quantity upon Land, and in such a State, as to lead to the Conclusion that they were brought thither by a Water Spout.*] — A remarkable, though not unprecedented, occurrence happened on Monday last, in the county of Ross. As Major Forbes Mackenzie, of Fodderty, in Strathpeffer, was traversing a field on his farm, he was not a little surprised to find a considerable portion of the ground covered with herring fry, of from 3 in. to 4 in. each in length. The fish were fresh and entire, and had no appearance of being dropped by birds, a medium by which they must have been bruised and mutilated. The only rational conjecture that can be formed of the circumstance is, that the fish were transported thither in a water spout; a phenomenon that has before occurred in this country, and which is by no means uncommon in tropical climates. The Frith of Dingwall lies about three miles from the place in question; but no obstruction occurs between the field and the sea. The whole is a level strath, or plain; and water spouts have been known to carry even farther than this. Major Mackenzie has forwarded a small quantity of the fish to the secretary of the Northern Institution. We have just inspected them; and can assure our readers, that, though the fry would go but a small way towards satisfying a few hungry *gillies* [boys, or servants], they will abundantly gratify the curiosity of every visiter. (*Inverness Journal.*) [*The date not copied.* The date from Major Mackenzie, or any friend of his, with any unstated particulars, if any remain unstated, would be deemed of value.]

The White Bait (*Clùpea álba* Yarrell) *in the Frith of Forth, and at Kincardine.* — At the meeting of the Wernerian Natural History Society of Edinburgh, held on March 12., Dr. Richard Parnell made an interesting communication regarding the occurrence, in the Frith of Forth, of the noted little fish called white bait, on which Londoners are wont to feast at Blackwall. Much dubiety has long prevailed concerning this fish; English naturalists having considered it as the fry of

the shad; and those of Edinburgh having overlooked it as the young of the sprat or garvey-herring. It is now viewed by Mr. Yarrell as a distinct species, and is called *Clùpea álba*, from its prevailing white colour. Dr. Parnell exhibited recent specimens from the Forth, and also from the Thames; and he minutely detailed the characteristic marks of distinction between it and the sprat and the young of the common herring, to the entire satisfaction of Professor Jameson, Mr. Wilson, Mr. Stark, Dr. Neill, and other naturalists present. Dr. Parnell observed the white bait plentiful at the stake-nets at South Queensferry. It is likewise common at Kincardine, being constantly entangled in the sprat or garvey-herring cruives, but hitherto neglected on account of its diminutive size. If the Scottish fishermen were taught to discriminate the white bait, and were encouraged to send it in quantity to the Edinburgh market, they might find in it a new source of income, equal or superior to the spirling or smelt fishery. The most obvious marks consist in the very small size, the white bait of the Forth seldom exceeding 2 in. or 3 in. in length; in the brilliant whiteness of its sides; in the body being thinner, or more compressed; and in the head being proportionally longer than in the garvey-herring, or in the fry of the common herring. — *P. N. March* 31. 1836.

Geology. — *The Moving or the Bursting of Bogs.* (p. 251—261.)—A similar phenomenon occurred, some years ago, at the Bog of Allen, county Leitrim, though on a much larger scale; and the amusing incident of a poor "bog-trotter," who had seated himself down upon a few acres of reclaimed land, finding himself one morning "out at sea," the bog having made a movement during the night, has been worked up into a humorous and cleverly told story, if I mistake not, either by Crofton Croker, or by Mrs. S. C. Hall, in her interesting *Irish Sketches*. (*R. M. Montgomery. Bury St. Edmunds, Oct.* 12. 1835. In a letter published in the *Bury and Norwich Post*, Oct. 14. 1835.)

Art. XI. *Queries and Answers.*

Should the Egret (*A'rdea* Garzétta) *be classed among British Species of Birds?* — It is remarkable, that not one British naturalist, up to the present time, has recorded, upon his own knowledge, that the egret has ever been seen wild in this country. The only authority upon which it is classed among British birds, as far as I am aware, is the very vague one of Pennant, who so ranks it from having received the

feathers of some bird shot in Anglesea, which he supposed to have been those of the egret. It is reported, that 1000 of these birds were served up at the celebrated feast given by George Neville, Archbishop of York, at his enthronisation, in January, 1466. Now, Willughby, who was born in Lincolnshire, and was, most likely, well acquainted with fen birds, does not speak of the egret as being found in Britain, but describes a specimen he procured at Venice; from which we may infer, that he never saw the bird in this country. And so little alteration had taken place in the fens between Neville's feast and the time of Willughby, that it is difficult to imagine a cause for their extermination during that period; for it surely is going too far to ascribe it, with Bewick, to the omnivorous guests of the "prince bishop." If the egret was found in England, was it a constant resident? It is said to be migratory in Germany; and, if migratory in this country, it must have migrated south, and, therefore, have left us previously to the middle of winter, at which time Neville's feast took place. This would rather favour the opinion of Dr. Fleming, who thinks that some other bird, probably the lapwing (Vanéllus cristàtus), and not the egret, was served up at that feast. But, even supposing Dr. Fleming to be wrong in his conjecture, might not these egrets have been procured from some other country? Upon the whole, I think that neither Pennant's feathers nor Neville's feast is sufficient authority to warrant the placing the egret among British birds. I have recently been informed, upon good authority, that this bird annually visited Horsey, in Norfolk, till about twelve years ago, and that since that time it has disappeared. Can any of the correspondents of this Magazine throw any light upon the subject? — *Edward Ventris, Clk. M.A. Cambridge, Jan.* 18. 1836.

P. S. — Since writing the above, I have seen the Rev. Leonard Jenyns's *Manual of the British Vertebrate Animals*, in which he speaks of the egret as "an extremely rare and accidental visitant in this country, though supposed to have been more plentiful formerly. Said to have been shot in Anglesey, and also in Ireland, many years ago. More recently, in April, 1824, two specimens are recorded to have been killed near Penzance, in Cornwall, and one of them to have been preserved." Mr. Jenyns has not given his authority.

As the bill of fare, at the feast of Archbishop Neville, is a curiosity interesting as well to the students of natural history as to the disciples of Meg Dods and Dr. Kitchener, I subjoin an extract of it from Leland's *Collectanea*, for the instruction

and amusement of both, in the hope that some one will be stimulated to account for the presence of so many *raræ aves.*

The goodly Provisions made for the same.

Wheate, 300 quarters.
Ale, 300 tunne.
Wyne, 100 tunne.
Ipocrasse, 1 pype.
Oxen, 104.
Wylde Bulles, 6.
Muttons, 1000.
Veales, 304.
Porkes, 304.
Swannes, 400.
Geese, 2000.
Capons, 1000.
Pygges, 2000.
Plovers, 4000.
Quailes, 100 dosen.
Of the Foules called Rees, 200 dozen.
Peacockes, 104.
Mallardes and Teales, 4000.
Cranes, 204.
Kyddes, 204.
Chyckyns, 2000.
Pigeons, 4000.
Conyes, 4000.
Bittors, 2400.
Heronshawes, 400.
Fessauntes, 200.
Partriges, 500.
Wodcockes, 400.
Curlews, 100.
Egrittes, 1000.
Stagges, Buckes, and Roes, 500 and od.
Pasties of Venison, colde, 4000.
Parted dyshes of Gelly, 1000.
Playne dyshes of Gelly, 3000.
Colde Tartes baked, 4000.
Colde Custardes baked, 3000.
Hot Pasties of Venison, 1500.
Hot Custardes, 2000.
Pykes and Breames, 608.
Seales, 8.
Porposes, 4.
Spices, sugered Delicates, and Wafers, plentie.

The Order of certaine Dynners as they were set foorth in Course. First, Brawne and Mustarde, with Malmesey, out of Course.

The First Course.

Frumentie, with Venison.
Potage ryall.
Hart poudred for standard.
Roo poudred for Mutton.
Frumentie ryall.
Signettes rosted.
Swanne with Galendine.
Capons with whole Geese, rost.
Corbettes of venison, rost.
Beefe.
Venison baked.
Great custard planted, as a suttletie.

The Seconde Course.

Jelly, and parted Raysing to Potage.
Venison in breake.
Pecocke in his hakell.
Cony rosted, roo reversed.
Lardes of Venison.
Partrige rost.
Wodcockes rost.
Plovers rost.
Breames in Sauce ponnyvert.
Leche Cipres.
Fuller Napkyn.
Dates in Molde.
Cheston's ryall, a Suttletie.

The Thirde Course.

Blanke Desire.
Dates in compost.
Fytters rost.
Feysauntes rost.
Egrittes rost.
Rabittes rost.
Quayles rost.
Martynettes rost.
Great Byrdes rost.
Larkes rost.
Leche baked.
Fritter crispayne.
Quinces baked.
Chamblet viander, a Suttletie.

Item. Wafers and Ipocras, and Damaske Water to wash in after Dinner.

Here foloweth the servyng of Fyshe in order.

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The First Course.

Pottage.
Almonde Butter.
Red Herryngs.
Salt Fysh.
Luce Salt.
Salt Ele.
Kelyng, Codlyng, and Hadocke boyled.
Thirlepool rost.
Pyke in Harblet
Eeles baked.
Samon Chynes broyled.
Turbut baked.
Frytters fryed.

The Seconde Course.

Freshe Samon Jowles.	Barbelles.	Roches.
Salt Sturgion.	Conger rost.	Salmon baked.
Whytynges.	Troute.	Lynge in gelly.
Pylchers.	Lamprey rost.	Breame baked.
Eeles.	Bret.	Tenche in Gelly.
Mackerels.	Turbut.	Crabbes.
Places fryed.		

The Thirde Course.

Jowles of freshe Sturgion.	Breames.	Shrympes.
	Rudes.	Small Menews.
Great Eeles.	Lamprones.	Thirlepool baked.
Broyled Conger.	Small Perches fryed.	Lopster.
Cheuens.	Smeltes rost.	

Note. Godwin, in his *Catalogue of English Bishops*, gives a slight variation in the numbers, as well as in the names, of some of the dishes. — [*E. Ventris.*]

ART. XII. *Retrospective Criticism.*

MR. DOUGLAS, the Naturalist, the Date of the Death of. (VIII. 411.) — Particulars on the circumstances of the death of Mr. Douglas are published in the *Mirror*, No. 769., March 26. 1836; where it is stated that his death occurred more than six months before Christmas-day, 1834; and not, as we had stated in our VIII. 411., about Christmas-day.

Mr. Ryland's Remarks on the Application of the Quinary System of Classification in Natural History (p. 175—182.), *Correction to.* — In p. 178. line 3., for "Papilionaceæ," read "Papilionacea." I propose to distinguish the rank of tribes by the termination "acea," as that of families is distinguished by "idæ," and sub-families by "inæ" [VI. 487.]. With regard to Glaúx [p. 179. note *] being applied to a genus in botany, with due deference to your opinion, I should give as mine, that, as the animal and vegetable kingdoms are distinct ones, the use of the same name to a genus in each is not objectionable; in support of which, I may just remind you, that some of our most eminent naturalists have designated groups, and even species, of animals with appellations used in botany. — *Peter Rylands. Bewsey House, Warrington, April* 4. 1836.

[That things distinct in their nature should, when designated by names, be designated by distinct ones, is obviously desirable. It is so much so, that no professional authority can supersede the desirableness, which is founded in that feeling of our natures which prompts us to invent means to save ourselves trouble.]

On the Habits of the Water Ouzel, with a few Remarks on the Oil Gland in Birds. (p. 269—271.)

The water ouzel [VIII. 358. 374—376. 514—516. 638.; IX. 158—160. 270, 271.] is sometimes known by the name of the dipper in England, and by that of merle d' eau in France, and is pronounced to be a water fowl by Buffon. Indeed, as the count affected to believe the strange story of Monsieur Herbert, he might have called it the water bird *par excellence;* it being supposed to possess a subaquatic faculty, not granted to any other bird in the creation.

The water ouzel is found in hilly countries, where rapid rivulets wind their way through an abrupt and rocky bed. Here, it is never seen; but I have had opportunities of paying attention to its habits in the county of Northumberland, where it frequents the borders of transparent streams, which meander through the moors. There, you will find its nest, in favoured localities, overhanging the brook; while, ever and anon, you see the bird itself go under water, in quest of its wonted food.

This is the bird which has given rise to so much controversy. This is the bird whose supposed subaquatic pranks have set the laws of gravity at defiance, by breaking through the general mandate which has ordained that things lighter than water shall rise towards its surface, and that things which are heavier shall sink beneath it. If the water ouzel can walk on the ground at the bottom of the water, then, indeed, we may exclaim with the poet,

> "Omnia Naturæ præpostera legibus ibunt,
> Parsque suum mundi nulla tenebit iter."
>
> All Nature's laws will tumble in decay,
> And e'en the world itself will lose its way.

How comes it that writers concede to the dipper alone the privilege of turning nature's mandates topsyturvy? Why do not they tell us, that the grebes, the coots, and the water hens (which last have cloven feet) can walk at the bottom of streams? The question is easily answered. The birds just enumerated frequent waters which are generally either too deep, or too muddy, to allow the eye of man to follow them to any great distance in their descent. Add to this, that these birds are much more shy and wary than the water ouzel, and they contrive to keep out of the reach of observation; thus depriving naturalists of the opportunity of a close investigation of their subaquatic habits. But here, where the grebe, the coot, and the water hen come close to the terrace which rises from the lake, I can steal upon them, and see them dive

whilst I am standing above them; and I can affirm that they never do walk on the bottom. Now, the rivulets frequented by the water ouzel afford numberless opportunities to the observer who wishes to watch the motions of this bird. He has only to conceal himself behind some rock which rises from the stream, or to show himself suddenly on the bank of the brook where the water ouzel is found, and he will see the little bird go under water, and he will be able to trace its downward process. He then fancies that he sees it walk on the ground, when, in fact, it does no such thing; the observer's own eyes, in this instance, giving him false information.

Monsieur Herbert was the first man on record, according to Buffon, who persuaded himself that the water ouzel actually performed the impossible feat of walking on the ground at the bottom of streams; and he communicated his supposed discovery to the count, whose gullet, in this case, seems to have been fully as capacious as that of the Rev. Orpen Morris. The water ouzel appeared, says Monsieur Herbert, "enveloped with air, which gave it a brilliant surface." Now, we all know that this garment of air would have added considerably to the natural levity of the bird. It ought to have had a roquelaure of lead, not of air. "It seemed to quiver," continues Monsieur Herbert. There would have appeared no quivering, had the bird been really walking on *terra firma*.

If the water ouzel, which is specifically lighter than water, can manage, by some inherent power, to walk on the ground at the bottom of a rivulet; then there is great reason to hope that we, who are heavier than air, may, any day, rise up into it, unassisted by artificial apparatus, such as wings, gas, steam, or broom-staff.

The Rev. Orpen Morris now bestirs himself in support of the idle fable; but, being hard pressed for a demonstration of the supposed subaquatic promenade, he refers us to other writers! and there the matter rests.

[*The Question of the Office of the Gland upon the Rump of Birds.* (V. 412—415.; VI. 159—162. 277, 278.; VIII. 375. note *, 514, 515. 637.; IX. 158—164. 266—271.]

His lucubrations on the oil gland require a word or two more from me. He says he had given me credit for some little knowledge "of the rudiments of natural history," to which he now finds out that I have no claim. If Mr. Loudon's readers should agree with his reverence in this, then I am, undoubtedly, in a bad way. I have had the honour of large dealings with them for some years.

They must, by this time, have formed a tolerably correct

notion of the nature of my goods; for I find that I have already furnished them with more than fifty parcels of natural history. I am aware, however, that there are ingredients in some of the parcels, of a nature not to suit persons of certain constitutions; and methinks that these persons would have done well not to have applied to me.* I remember, when I was once feeding my bees, on a cold autumnal morning, that the ass Wouralia (mentioned in the *Wanderings*, and still alive) came up, and looked wistfully at the honey-pot. "Friend," said I, "I dare not give thee any; for Don Quixote is absolute in this case. 'La miel,' says he, 'no es para la boca del asno.' Honey is not for Dapple."

His reverence exclaims, "What, sir! are we to infer from your barn-door fowl's having no tail, that therefore it has no oil gland?" Yes, your reverence; positively, you are. There is not a particle, not an atom, of oil gland in any bird that is not furnished by nature with a tail. Please to accept this morsel of information from the Wanderer, who, according to your own statement, will never possess the experimental knowledge of English birds which you have acquired. (See in p. 271.)

"What," continues his reverence, "in the name of all the barn-door fowls that ever lived, have the feathers of a bird's tail to do with its anatomy?" Every thing, an't please your reverence. The oil gland certainly forms part of the anatomy of a bird; and this oil gland is so intimately connected with the feathers of the tail, that, where this oil gland is wanting, the feathers of the tail are also wanting. See the cassowary, emeu, little tinnamou, and many others. By these two important questions, which you have put to me in the Magazine for May [p. 271.], I am enabled to form an accurate opinion of the intensity of your ornithological studies whilst I was absent in Guiana.

Your reverence promises that I shall hear from you again, on the method of stuffing birds. This is just what I want. I take you at your word, and am quite ready to come up to the scratch, tomahawk in hand, as Fraser wittily calls my dissecting knife. If, during our competition, I do not manage to turn your reverence inside out, may I be doomed never more to ascend a tree in quest of carrion crows!

As your reverence seems to imagine that my wandering in South America deprived me of the opportunity of acquiring an experimental knowledge of our British birds, I beg to observe, that, when I was at the Jesuits' College of Stonyhurst

* See foot note in Vol. VIII. p. 375.

(which I did not leave until my twentieth year), the inestimable fathers of that noble establishment, having studied my disposition, and perceived the bent of it, kindly allowed me to follow it up. So that rhetoric and rambling, classics and climbing, poetry and polecat-hunting, formed part of my occupation; and, ere I took my leave of the venerable towers of Stonyhurst, I had laid a zoological foundation sufficiently solid to enable me to build upon it some future day. I am now at work. — *Charles Waterton. Walton Hall, May* 4. 1836.

Feathers in the Gizzard of the larger Species of Grebe, and why? (p. 202.)—This subject has long engaged my attention. The same circumstance is noticed by Montagu, as having been observed in the crested grebe (Pódiceps cristàtus *Lath.*). Audubon likewise mentions it, in vol. iii. of his delightful *Ornithological Biography:* but the notion of these feathery substances being *feathers* appears never to have entered his head. And, for my part, I fully agree with that excellent ornithologist, in considering them merely the feathery seeds of certain plants devoured by the bird. The supposition that they are actually feathers seems not likely. Could your correspondent supply me with a specimen of this feathery substance, from the gizzard of the grebe? It appears to be most commonly found in the crested species. (See the *Analyst*, vol. iv., p. 172.) — *Neville Wood. Sudbury Hall, Derbyshire, April* 6. 1836.

The Dabchick [(VI. 194. 520.) *Pódiceps mìnor* Lath.], *Remarks on*, incidental in a note on the notice (in II. 404.) of the remarkably swift diving of a certain species of bird. — The velocity with which the dabchick, for instance, will dive, and avoid the shot from one's gun, almost exceeds belief. I have often fired at them about Oxford, where they are so common; but, though in those days I seldom missed a shot, I never killed one of these little birds, as they invariably (even when flying over the surface of the water) dived on seeing the flash. The detonating guns, now so common, will, of course, enable the shooter to obtain them. — *Lansdown Guilding. St. Vincent, May* 1. 1830.

The Purre's (*Trínga Cinclus*) *Breeding at Martin Mere, Lancashire.* (VII. 599.) — I should feel obliged to Mr. H. Berry, if he would state whether the birds which he disturbed from the nests were in that stage of plumage by which the purre is distinguished from the dunlin (T. alpina *Lin.*, T. variábilis *Meyer*); as it is generally admitted by all recent authors, that they are the same species, differing only in the plumage at different periods of the year; the purre being the species in its winter garb; the dunlin in its summer, or breed-

ing, plumage: of which circumstance Bewick does not appear to have been aware. Should those observed by Mr. Berry correspond with the former, it would go far to create a doubt of their identity. Although I saw some hundreds of these birds at the Orkney Islands (V. 416.), during the breeding season, I could not discover a single bird without the black gorget, which is so conspicuous at that season. —*J. D. Salmon. Thetford, Norfolk, Dec.* 8. 1834.

An Individual of the Bonito (*Scómber Pélamys* Linn.) *was taken in the Frith of Clyde, in July,* 1832. (VI. 529.) — In Mr. Jenyns's recently published *Manual of British Vertebrate Animals*, the following remark occurs, which requires some explanation on my part. Speaking of the bonito, he observes, "According to Stewart, it has been taken, though rarely, in the Frith of Forth; and, according to Dr. Scouler, in the Frith of Clyde. In the two last instances, however, it is doubtful whether the present species be intended, or the Pelamys Sarda of Cuvier; to which, also, the name of bonito has been applied." (p. 364.) Now, in as far as I am concerned [*Mag. of Nat. Hist.*, VI. p. 529.], the occurrence of the bonito in the Frith of Clyde is as authentic as any such circumstance can well be. The fish was, assuredly, the *Scómber Pélamys*, and not the *Scómber Sárda*; and the specimen is still preserved in the Andersonian Museum of Glasgow, where an examination of it will remove all doubt on the question. The specimen was purchased in the market, and was in a perfectly fresh state; so that I could not be imposed upon as to the place where it was captured. I may add, that, having seen hundreds of bonitos in the tropical seas, it is improbable that I should commit any mistake in a matter so simple. —*John Scouler, M.D. Kildare Street, Dublin, March* 10. 1836.

ART. XIII. *Instances of Man's Progress in the Extension of his Knowledge of Natural History.*

A PROPOSAL of a Zoological Garden at Edinburgh, dated March, 1836, has been published. It seems to be so comprehensive of the details which it is requisite to consider on such a matter, that utility to others may result from this republication of a portion of it. "To the Parisians we are indebted for the idea of zoological gardens; for it was at the Jardin des Plantes, more than thirty years ago, that exotic animals, instead of being all crammed into one menagerie, were first distributed over a large space of ornamental ground,

in characteristic structures and enclosures adapted to their respective natures. The Paris establishment was originally formed, and is still supported, at the expense of the government. Without having received direct public aid, London now possesses two zoological gardens; one in Regent's Park, the other in Walworth. The Regent's Park institution is on an extensive scale, and the collection is extremely rich. It was set a-going by a society of influential individuals, and is now amply supported by the small admission money paid by visitors. The zoological garden at Manor Place, on the Walworth Road, is entirely a private speculation of Mr. Cross, well known as an indefatigable collector and successful exhibitor of curious and rare live animals. It does the proprietor great credit, the structures being elegant and commodious, and the specimens of animals numerous and in fine condition. Liverpool possesses an excellent zoological garden: it is a private speculation of Mr. Atkins. Dublin has an admirable one in the Phœnix Park, formed and supported by a society like that of the Regent's Park institution, but with the advantage of the grant of a site in the vice-regal domain. A zoological garden, on an extensive scale, is now in progress at Bristol; it may be regarded as a subscription garden, but is liberally fostered by the corporation of that city.

"That the Scottish capital should still be without such an interesting and useful institution, is to be regretted. Education is one of our staples; and education is now extended to general knowledge, and necessarily involves, to a greater or less degree, the study of nature, an acquaintance with the animals, plants, and minerals of our planet. Museums are extremely useful, but no one is satisfied with seeing plants in a *hortus siccus*, or with wax figures of fruits; we must resort to the botanic or horticultural gardens to examine the realities. The means of studying living animals, their characters and manners, is at least equally desirable; and it is believed no one will dispute the propriety of forming a zoological garden at Edinburgh: on the contrary, there appears to be a general desire for so delightful and instructive an addition to our intellectual enjoyments. But the difficulty is, how to accomplish the design. The following hints are thrown out for the consideration of the public: —

"Garden shareholders might be constituted, who should enjoy certain privileges on paying a certain sum; and, when a sufficient number of shareholders or members were obtained to insure the advance of 2000*l.* or 3000*l.*, according to the extent of the plan to be at first adopted, then an offer might

be made to some eminent collector and exhibitor of animals, such as Mr. Wombwell, who might be induced to expend a similar sum in stocking the garden, and to make Edinburgh the ordinary head-quarters for a great number of his rare quadrupeds and birds. Curious animals presented to the Society might, by arrangement, be preserved constantly in the garden, and remain the peculiar property of the institution."

Here follow notices of the respective measures of fitness of certain local sites quoted. The general ideas included among these are, that "dampness is fatal to many foreign animals;" "dry and airy ground" is desirable; and "ground having the surface unequal or varied, possessing knolls, lawns, avenues of large trees, sloping banks, and a pond with an islet in the midst of it."

"A good many acres would be needed; for the elements of a zoological garden are numerous, and of very various character; and, as already hinted, the advance of several thousand pounds would be indispensable. A brief statement of the most important elements will show that both a large space and a large sum will be required. Several houses for birds will be wanted: one for eagles, falcons, and vultures; another for the parrot tribe; a third for gold and silver pheasants and turtle-doves; with an aviary for rare and showy small birds. Monkey houses are always extremely entertaining to the young, and, indeed, are interesting to all persons: one house is required for the friendly congregating sorts, and another, divided by partitions, for those of pugnacious dispositions. The dens for exotic carnivorous animals, such as lions, tigers, hyenas, are expensive, but essential to a respectable collection. Large sheds and yards for wapiti and other deer, with sheds and paddocks for remarkable sheep and goats, and a house and paddock for kangaroos and lamas, are all requisite. A bear's pit must not be omitted. Dog kennels are needed; for many people have no other opportunity of seeing the rare varieties of the canine race of which they often read in books. Ultimately an elephant house, little park, and bathing pond, would be required; indeed, without such accommodation being in readiness, even the temporary visit of a travelling elephant could not be expected. A house and paddock for emus and ostriches, and a pond and enclosure for pelicans, storks, and herons, will be necessary. Pens for pea-fowls, penelopes, curassowas, with a large pond and enclosure for aquatic birds, will likewise be proper. A small pond, surrounded with rockwork, for gold and silver fishes, might be tried. An enclosure for tortoises

and armadilloes, and a house for reptiles, would be required. Monkey-poles would be needed on the lawns, and also movable cages and perches for showy birds during the summer season. The houses for the large Asiatic quadrupeds, for monkeys, and for parrots, must be constructed of stone or of brick, and must be artificially heated; if possible, by the circulation of hot water. A roomy and commodious winter house, heated in the same way, would be proper for sheltering, during the winter season, some of the animals which would occupy open sheds during the summer and autumn months. Lastly, a handsome lodge for the superintendent, and an apartment for furnishing refreshments, may be mentioned as requisite appendages."

"Sir Thomas Dick Lauder, Bart., the Grange House; Professor Jameson, College; Dr. Traill, Albyn Place; James Wilson, Esq., Woodville; Dr. Spittal, Wemyss Place; Convener Dick, 8. Clyde Street; and Dr. Neill, Canonmills Cottage;" are the persons named as those to whom communications on the matter may be made.

Natural History Society for Nottingham and Nottinghamshire.—A public meeting was held at Nottingham on April 5., for the purpose of instituting a society of the title given. The mayor, T. Wakefield, Esq., presided. The results were, appointing the Duke of Newcastle patron; and choosing the officers, except the president and vice-presidents, and six of the council, the choosing of whom was deferred until the annual meeting appointed for June; and some speeches, of one of which the following is a portion:—Dr. J. C. Williams said, that "he hoped Nottingham would not be long almost the only important place without a museum of Natural History. London had the British Museum, but too far off to be of use to us in Nottingham. There was a noble institution at Manchester, another at Leeds, at Birmingham, at Liverpool, at Newcastle, at Hull, at other places, and the last, not least, at Worcester, where the talented and enlightened Dr. Hastings had already shown the importance of such institutions, and published a valuable and interesting work. Men devoted to scientific pursuits as yet have no rallying point at Nottingham, no society for mutual cooperation; they have no place in which they can deposit their collections, nor see the collections of others. Those who study zoology have no opportunity of examining specimens; the resources of an individual will not find them; and the public has not yet done so. For instance, how gratifying it would be to have a collection of British birds! Next on botany: to medical men how important and necessary! Yet is there no collection of plants

for them, rich as the neighbourhood abounds in botanical specimens. There are other scientific persons who delight in the study of botany, which is a healthful and beautiful study, leading to the contemplation of Nature's works in the most lovely forms, in the fields, the woods, and mountains. Again, the important subjects of mineralogy and geology. We have no receptacle for mineralogical specimens. In the increasing traffic of the country, it is of the highest importance we should have a proper knowledge of the minerals of the county. The commercial prosperity of the county depends so much on its minerals, it is quite time we had a receptacle for the registration of local information. The doctor then read an extract from Cuvier, speaking of the importance of the study of mineralogy in showing the formation of organic beings. He then proceeded to speak of fossil remains, the relics of an antediluvian world; a splendid department of natural history opened for our information; tracing in those remains the same design and mechanism which exists in our day. Herculaneum and Pompeii are explored for any relic to teach us the arts and customs of an ancient people; old deeds and records are pored over to give us the manners and habits of our ancestors; but, when we find fossil remains of animated beings, which existed before the deluge, imagination dwelling on the past is surpassed by the realities of nature, and we arise from our studies thankful for the blessings of the beautiful world we enjoy. Let us, then, have a museum to contain these specimens, and to encourage and promote the science. So far as the plans are formed at present, it is intended to have monthly meetings for the reading of essays on English as well as foreign natural history, and the occasional giving of lectures. It is intended to make the society as generally useful as possible; a place where scientific men can meet to receive and impart knowledge; become more known to each other, and assist each other; where men of varied capacities can have scientific intercourse, cultivating good understanding and kindly feelings. It will have another advantage: in this scientific institution differences in religious opinion will not be known, or spoken of: the heated breath of political controversy will have no resting place in this temple of science; and at the close of a harassing day's occupation, here will be repose, with no rivalry, but in the advancement of science and scientific pursuits." (*The Nottingham Journal*, April 8. 1836.)

Durham University Museum of Subjects of Natural History. — The museum of the Durham University was established in the beginning of 1835, when a large and well-preserved col-

lection of British birds was presented by the Rev. Thomas Gisborne, prebendary of Durham. Since then the museum has been considerably increased by presents and purchases; so that, at present, very few of the British beasts and birds are wanting to complete it: those which are wanting are of the rarer species. There are, also, a number of foreign birds, chiefly from North and South America; a small but valuable collection of shells, containing several very rare species; some insects, reptiles, minerals, and geological specimens; and, besides these, a collection of British eggs, and miscellaneous curiosities. A well-preserved herbarium, containing about three quarters of the British flora, systematically arranged, and of easy reference, has been presented. A convenient building has been appropriated for the reception of the museum, which is open daily for the *free* admission of visitors. It is under the government and direction of the board of curators, consisting of the warden and four other members of the University, *ex officio*, and also four persons appointed every two years at the convocation: the funds are supplied by the University. — *K. C.* [*Received on April* 14. 1836.]

The Manchester Museum. — With a view to calling the attention of the proper authorities to the subject, I wish to advert to the difficulty there exists in the way of strangers wishing to inspect the museum at Manchester. No one is allowed to see it without producing a written order. How different is the course pursued at York and Worcester, and what facilities are there afforded to any persons desirous of seeing the respective museums at those places! I think some more *liberal* measure might be adopted at Manchester, as the present arrangement is very inconvenient to strangers; and persons who have only a short time to spare, may, if not previously aware of the rule, be prevented altogether from seeing the museum, coming to it, and finding themselves denied admittance. The disappointment would be the greater, as the museum at Manchester is exceedingly well worth seeing. I hope that these few remarks will have the effect wished for. — *Rev. Francis Orpen Morris. Doncaster, Sept.* 1835.

The Norfolk and Norwich Museum. (p. 217, 218.) — Since the publication of the notice in p. 217, 218., a copy of the *Report* made at the eleventh annual meeting has been received, whence the following notices are cited. One relative to the admission of non-subscribers may be taken first, for the sake of placing it in connexion with the case at Manchester remarked upon above: it is this: — "In future no non-subscriber can be admitted to the museum without either the personal introduction of a subscriber, or a written one naming the per-

son introduced; and no money will be taken for the admission of visitors at the door." As the same regulation obtains at Norwich as at Manchester, there may be some necessity for it, which those familiar with the actual working of either Society best know of. The committee congratulate the subscribers, "not only on the increase of their finances, but on a much more important circumstance, the growing interest which has been evinced by the public in promoting the Society's objects, and the more general diffusion of a taste for scientific pursuits." The committee have, during the winter months of the past year, been enabled to establish a series of *conversazioni*, which have materially promoted the Society's objects. The thanks of the meeting were accorded to J. D. Salmon, Esq., Thetford, Norfolk, and the election of him as an honorary member, "for the valuable services which he had rendered the Institution in the arrangement of the oological department, not only in a scientific but most elegant manner, besides giving a very extensive collection of eggs." The *Report* includes "A list of donations and specimens presented to the museum since the last annual general meeting."

Belfast Museum.—The sixth public meeting of the Natural History Society, for this session, was held in the museum, on the evening of March 9. A lecture was delivered by Mr. James Bryce, Jun., M.A. (of the Belfast Academy),

On the Mineral Resources of the North of Ireland.—It was stated, that the subject was then chosen on account of the importance of having the extent of our resources known, in connexion with the great public works that are contemplated, and the increasing trade and manufactures of the country. In the course of the lecture, a description of the Dungannon coal-field was given, in some detail, as it is the only one which can be of lasting importance to the country: the probability of the future transport of this coal to Belfast was discussed. Mr. Bryce then gave it as his opinion that no coal exists under the freestone of the valley of the Lagan, and the adjacent districts; while he confessed that the borings hitherto undertaken by landed proprietors were made precisely at those places where, of all others, coal was least to be expected. Beds of coal, of very good quality, easily worked, though, probably, of no very great extent, were stated to exist about 40 miles from Belfast, and within a few hundred yards of the sea shore. The Dungannon fire clays and potteries, and a few of the localities of the metallic ores in the North of Ireland, were mentioned. The lecture concluded with directions to be observed in searching for water, and an explanation of the cause of the failure of the recent attempt, near the Poor-House, to

procure a supply of 300 gallons of water per minute for the town. The lecture was illustrated by maps and numerous drawings. (*The Northern Whig*, March 28. 1836.)

REVIEWS.

Art. I. *Notices of Works in Natural History.*

The Society for the Diffusion of Useful Knowledge: The Penny Cyclopædia, in Numbers 1*d.* each.

An advertisement, dated April 21. 1836, is included in the first number (339.) of the sixth volume, and supplies information that "the committee feel assured that somewhat more than a fourth of the whole Cyclopædia is now published; and that "they propose that the work shall be completed in eighteen volumes of the present size; and they pledge themselves that it shall not exceed twenty volumes:" and, farther, that, "in order to comply with the wishes of the bulk of the subscribers, it is the intention of the committee, upon the completion of the [subjects of the] letter B, to publish at the rate of three volumes annually," in monthly parts, 18*d.* each, four to a volume.

The following subjects in, or associable with, natural history are treated on in the numbers in part 40.: broken wind, Bromel*iàceæ*, Bronchitis, Bronchocele, Broussonèt*ia*, and Brósimus, in Nos. 329, 330.; *B*rùchus, 332.; Bryáxis, *B*ùbo, 334.; bud, 337.; Buffon, Bulímulus, Bùlinus or Bùlimus, 339.

Loudon, Charles, M.D., late one of the Royal Commissioners for Enquiring into the Employment of Children in Factories: The Equilibrium of Population and Sustenance demonstrated; showing, on Physiological and Statistical Grounds, the Means of obviating the Fears of the late Mr. Malthus and his Followers. 8vo, 13 pages. 1836. 1*s.*

"It is proposed to show, physiologically, a mode by which, if necessary, a check, both moral and healthful, might be applied to population, founded simply on the laws of nature." This consists in using the capacity for a protracted period of lactation which is given in nature. "But it is not intended to inculcate the adoption of the principle under the actual circumstances of the country; . . . the resources of mankind for the production of food, in the Western World alone, are such as to meet every possible increase of population, for an indefinite number of ages to come."

Wiegmann, Arend, Friedericus Augustus, Dr.: Herpetologia Mexicana, seu Descriptio Amphibiorum Novæ Hispaniæ, quæ Itineribus Comitis de Sack, Ferdinandi Deppe, et Chr. Guil. Schiede, in Museum Zoologicum Berolinense pervenerunt. Pars I., Saurorum Species amplectens, adjecto Systematis Saurorum Prodromo, additisque multis in hunc Amphibiorum ordinem Observationibus. Accedunt Tabulæ Lithographicæ x., Novorum Generum Typos exhibentes. Berolini sumptibus C. G. Lüderitz, 1834; London, W. Wood, Tavistock Street.

"The families are well characterised according to the peculiarities of their outward form, and their osteological peculiarities. The author has added several observations to [on] the genera, and has described a great number of new genera and species from all parts of the world. The coloured plates surpass those of Wagler in accuracy, and give not only a true copy of the scaly covering of the animals, but so represent their habit and physiognomy, that they appear to be drawn after living specimens." (From a notice of the work in the *Philosophical Magazine*, May, 1836.)

In *Nouveaux Mémoires de la Société Impériale des Naturalistes de Moscou*, tome 3., 1834, are descriptions by Dr. Eversmann of 14 species, and figures of 10 of them, which he had observed in various journeys in the Russian Empire: has Wiegmann cognisance of these? Wiegmann's work would be a treat to Dr. Riley: see VI. 262, 263.

Kenrick, W.: The American Silk-Grower's Guide; or, the Art of Raising the Mulberry and Silk on the System of Successive Crops in each Season. Small 8vo, 104 pages. Boston, U. S.; Barrett, and Russell and Co., 1835.

Not any London publisher of works is named as a publisher of this one; but it is not very unlikely that it may be acquired through O. Rich, Red Lion Square, London. The following list of particular subjects treated of may enable any one, desirous for information upon the general subject bespoken in the title, to suppose more definitely how far the work may suit him.

History of silk: its antiquity and commerce. History of the silkworm [this is very commonplace and meagre]: climate, shelter, &c. Mulberry: its history and uses. Mulberries of the kinds black, red, Japan paper, white, shining-leaved, Tartarian, Dandolo [Count] or Morettiàna, and the Chinese or *M*òrus multicaúlis [to which one of the synonymes adduced is "Morus culcallata;" by which it is most

probable the *Mòrus* cucullàta is meant; and this last is propagated in British nurseries]. Cultivation. Soil and situation. Dwarf mulberry tree plantations. Gathering the leaves. Habitations, hurdles, &c. Division of labour. Mode of making silk in Turkey and Italy. Silkworms: amount of food, hatching, feeding, diseases, labour of attendance, and care of attention. Formation of cocoons. Cocoons for producing eggs. Stifling of pupas in the cocoon. Reeling. Second and successive crops of silk. Modern system of Count Dandolo and M. Bonafoux. Weight and produce of cocoons. Produce of silk, and profits on its manufacture. Silk establishments in America.

On the Anatomical and Optical Structure of the Crystalline Lenses of Animals; being the Continuation of the Paper published in the Philosophical Transactions for 1833, *by Sir David Brewster;*

Is the title of a treatise of which the reading was commenced at a meeting of the Royal Society, on Dec. 10. 1835, according to information in the *Philosophical Magazine*, May, 1836; where an abstract of the part that was read is given. Any one who may use this treatise in the study of the subject may, and it is not unlikely, find useful more or less correlative information in a treatise entitled "An Account of the Discoveries of Müller and others in the Organs of Vision of Insects and the Crustàcea. By George Parsons, Esq.;" published in the *Magazine of Natural History*, IV. 124—134. 220—234. 363—372.

Catalogue of Fossil Fish in the Collections of Lord Cole and Sir Philip Grey Egerton, arranged alphabetically, with References to the Localities, Geological Positions, and published Descriptions of the Species: by Sir Philip de Malpas Grey Egerton, F.R.S. F.G.S.

This is the title of a treatise published in the *London and Edinburgh Philosophical Magazine*, the Number for May, 1836, which the author has presented, "in the hopes that it may prove of interest to the geological adept, as exhibiting in a tabular form the stratigraphical position of 227 species; to the student in fossil ichthyology, as affording a clew to the depositories of many new and rare specimens destined to appear in the forthcoming numbers of Dr. Agassiz's *Recherches sur les Poissons Fossiles.*"

THE MAGAZINE

OF

NATURAL HISTORY.

JULY, 1836.

ORIGINAL COMMUNICATIONS.

ART. I. *Remarks on the Question of the Propriety of altering established Scientific Names in Natural History, should they be erroneous.* By C. T. WOOD, Esq.

(*Continued from* p. 144., *and concluded.*)

WITH regard to generic names, it is not necessary that they should have any meaning at all; but, if they have a meaning, it must be consistent with truth. Some authors, as Lindley, have even given preference to unmeaning generic names, both in Latin and vernacular language, on the ground of the difficulty of fixing on some exclusive character. I think, however, that, if the generic name is founded on a striking peculiarity of the genus, it is of little consequence whether it be exclusively applicable or not. Thus, the names longspur and Plectrofanes * apply with equal truth to the genus lark (*Alaúda*); but no one would reject them on this account.

Mr Strickland continues (VIII. 38, 39.):—"If the species with which the naturalist is concerned amounted only to a few hundreds, or a few thousands, then, indeed, the supposed improvement of the nomenclature might be, in some measure, excusable; but, since the profuse fecundity of nature has overwhelmed her admirers with such myriads of forms, that their number alone constitutes the chief difficulty with which they have to contend, it is surely the height of folly to increase that difficulty by bestowing a multiplicity of names on the same object." The multiplicity of the objects with which nature has surrounded us would, in itself, serve as a sufficient reason,

* This name is generally written with a ph, as well as *Phasianus*, &c. For an exposition of the erroneousness of this, see No. xv. of the *Analyst*, vol. iv. p. 118. Silvia is likewise frequently erroneously written Sylvia: see *Analyst*.

even were there no other, why erroneous names should be altered; for if, as no unprejudiced person can deny, erroneous names retard the progress of the student, it is surely "the height of folly" to make the unavoidable difficulties in the path of science a plea for adding others of our own creation. And, besides, even granting, for an instant, that the substitution of correct names for those which are erroneous did add to the difficulties of science, would it be worthy of a rational being to reject the truth because error is more easy of acquirement? Were this principle followed throughout, what a state would the world be in! and it is owing to the number of persons who have held this convenient doctrine, that the human race is so much more backward than it would otherwise have been.

Mr. Strickland proceeds: — "From the excess of this practice, the rectification of synonymes has become the most laborious part of the process of compiling systematic works on natural history; which are, also, thus vastly increased in size and price, and rendered more repulsive to the general reader." Mr. Strickland is quite right here: it is from the "excess" of this practice that these evil results have followed; and, had the writer throughout distinguished between the effects of a practice in excess and in moderation, he would never have exposed himself as he has done. He saw the evil consequences resulting from the abuse of alteration, and hastily condemned it altogether. "If a principle is good," says one of our first naturalists, "its advantages will be more and more apparent, the more it is followed out in *detail*." Few of Mr. Strickland's principles, however, would survive this test. If we condemn a thing because its excess is prejudicial, the most harmless and beneficial things would be denied us. Light, heat, food, study, would alike be condemned by him; for, he would argue, if you give a man the opportunity of eating and studying, 't is ten to one he will do both in excess; and so with alterations in nomenclature: if once you allow them, says he, there is no knowing where they will stop. Reflecting and unprejudiced men, however, are not to be taken in by su[illegible] fallacious reasoning, but will, on all occasions, advocate ste[illegible] and wholesome reform.

Mr. Strickland then proceeds to ask, whether it can be expected that "the whole republic of science will take the trouble of relabeling their cabinets, altering their catalogues, or making notes in their works of reference, because a writer fancies he can improve an established name?" Before this question can be answered, there are two points to be ascertained: first, is the established name objectionable? and,

secondly, is the proposed substitute free from objections? If these two objections are answered in the affirmative, then may Mr. Strickland answer his in the affirmative, and *vice versâ*. But to say that *every* change must be rejected, is as irrational as to say that *every* alteration must be adopted; and, consequently, neither of these extremes will ever prevail among the mass of rational beings, however either may be cherished as pet projects by certain theorists.

Mr. Strickland next informs us: — "Again, if some adopt the alteration, a large number will not; and hence it is that we rarely find the same species labeled alike in two museums." In this case, the writer who changed the objectionable for the unobjectionable is not in fault, but the "large number" of persons who do not adopt the improvement; and it is to this quarter, accordingly, that we must direct our disapprobation. And, if the true principles of classification were understood, and thereby the number of anti-reformers diminished, there would not be this division: unanimity would prevail, instead of the anarchy which Mr. Strickland is labouring so hard (though, probably, unconsciously) to introduce.

"In short," continues Mr. Strickland, "if this practice be once given way to, there will soon be an end of all nomenclature, and, through it, of all science; for true it is, that

> 'Nomina si pereunt, perit et cognitio rerum.'
> If names perish, the knowledge of things perishes with them."

Here Mr. Strickland plainly gives us to understand, that the well-being of science depends on nomenclature: of what vital importance, then, to render the latter as free from error as circumstances will admit! It is rather a strange argument in defence of *erroneous* names, that the welfare of science depends on sound nomenclature. If "the knowledge of things" depends on "names," this is certainly a pretty good reason for paying attention to the correctness of the latter.

Mr. Strickland observes, "Where an old genus is divided into several new ones, new appellations must, of course, be found for them; but, even then, the original name should be retained for that group which is the most typical of the whole." This latter proposition sounds well in theory, but will be found, on many occasions, impracticable. Thus, when the great genus *Motacílla* of Linnæus was divided into many genera, that designation should, according to Mr. Strickland's theory, have been given to the genus treeling* (Sílvia), which

* See the *Analyst*, No. xv. (vol. iv. p. 78.), for "An Elucidation of the Three British Treelings."

would have been obviously absurd. Again, it frequently happens, that naturalists cannot agree on the type of the family: thus, Selby pronounces the genus Sílvia to be the type of its family; Swainson says, on the other hand, *Régulus*; and Blyth, rejecting both, adopts *Ficédula* as the typical genus. And would it not be productive of confusion to bestow the name Silvia on the genus *Régulus*, even should the latter be ascertained to be typical? and would it not be preferable, in this case, to call the family *Regùlidæ*? and so on throughout zoology.

This may, however, be viewed in the light of a digression. We will, therefore, return to Mr. Strickland, and see whether he has any sounder basis on which to rest his dislike of change. "A complete parallel," says he, "seems to exist between the proper names of species and of men. The first discoverer of a species may be regarded as its parent or god-father, who bestows on it any name he thinks fit, and publishes it to the scientific world in some standard work, as in a parish register; and, as the laws of the land forbid men to change their names without due cause, so the laws of natural history ought to be equally severe against those who encumber species with a number of aliases." Let us analyse these off hand assertions. "A complete parallel seems to exist between the proper names of species and of men!" This is a most ill-sorted and unfortunate comparison. The object of the names bestowed on men is to enable us to distinguish individuals by arbitrary signs or sounds: for it is very clear that it would be impossible to find a distinct term expressive of some peculiarity for every human being; and, even were it possible, it would not be desirable. Thus, suppose a person in infancy named "Dark-hair:" by the time he has gained maturity, some accident may have turned his hair white, or he may have lost it altogether; and thus the name would but ill suit him ever after: the *meaning*, therefore, in these names is disregarded. The case, however, is widely different with scientific nomenclature; for, although an individual of the species called the black-capped fauvet (*Ficédula atricapílla*) may chance to be *white*-capped, or a specimen of the genus longspur (Plectrófanes) may have accidentallly lost his spurs, yet this does not invalidate the name for the rest of the species or genus.

I have now briefly exposed the erroneousness of each of Mr. Strickland's arguments, and should have wished to have entered into that detail which so important a subject demands, and which would have made it clear to every capacity. I can only plead in excuse my extremely limited space. Before I conclude, however, I must touch on one or two of Mr.

Strickland's assertions in the *Analyst;* for there, also, be it known, he has "tried his hand" on the same subject. This champion of anti-reform says, the changes in English names "are certain never to be universally adopted." An accomplished naturalist of the present day remarks, that the past is the mirror by which alone we can judge of the future. Let us, then, see what prospects are held out by this mirror. At the time when the fourteenth (the concluding) volume of the *General Zoology* was published (1826), the *Cinclus europæus* of Stevens was universally called the water ouzel; and this was the appellation given it even in that work. Now, however, that erroneous name (the bird is not in the genus ouzel, *Mérula*) is entirely abandoned, Selby having introduced the correct one, "European dipper." The genus *Anthus* was formerly called tit-lark; now, however, pipit is in general use. Several excellent generic names, first proposed by Stevens, are now in general use among naturalists: as examples may be mentioned, thicknee, longbeak, lobefoot, hareld, &c. The same may be said of the generic names in French; on which point Mr. Strickland, if sceptical, may inform himself by comparing the names used by Temminck, Vieillot, and other modern authors, with those of Buffon and others of the old school.

Mr. Strickland's paper in the *Analyst*, though of but half the length of that in this Magazine (VIII. 36 — 40.), is, if possible, as full of unfounded statements and unsupported conclusions; and I shall fully expose its errors in the *Ornithological Guide*, a little work I have in preparation. I, however, agree with Mr. Strickland on one point: the desirableness of having a national nomenclature of science; an object which is also much recommended by Mudie in the preface to the *Feathered Tribes;* but, as this project is not very likely to be soon brought about, we may do very well, in the mean time, if a few rules are attended to: these I have briefly hinted at in a former part (p. 144.); but, for the sake of clearness, I will here reintroduce them. Every name must be *tested:* if it will bear the test, no one has a right to alter it; but, if not, it is the naturalist's *duty* to alter it. First, then, in regard to the specific name: 1st, It must be consistent with truth; 2dly, It must not be founded on a generic character; 3dly, It must not be taken from the name of a person *; 4thly, It must not

* Since writing the above, I have received Lansdown Guilding's opinion on this point: it agrees entirely with my own: — "The nomina adulatoria, or complimentary names, should not be extended to genera. In zoology, the practice has been avoided to a certain extent, and might as well be stopped altogether. In botany, the custom is so ancient and popular, that it cannot be now discontinued." — [*St. Vincent, May* 1. 1830.]

be derived from its likeness to another genus or species. If a specific name will stand these tests, no one has a right to alter it. I may now proceed to show how generic names may be tested: one rule is, perhaps, sufficient: if they have any meaning, it must be consistent with truth. This rule will exclude, among others, the following: *Haliàëtos albicílla*: Lóxia curviróstra, *Nictícorax europæ`us*; *Caprimúlgus europæ`us*; *Phalacrócorax cristàtus*, *Cárbo cristàtus*, &c.

These rules appear to me sufficient, though they may be found to require modifications or additions. I may observe, that Greek names should be avoided. It is to be regretted, that unnecessary changes have been made in scientific names by naturalists of high repute; as, in addition to the confusion produced, an example is thereby set which may be prejudicial to the welfare of science. Thus, Swainson has rejected *Rubécula*, the legitimate name of the genus redbreast, and substituted the Greek name *Erýthaca*, which neither he nor any one else had any right to do. The first was used by Willughby, Brisson, and other old authors. The same may be said of *Ossífraga* (ossifrage), *Ficédula* (fauvet), *Ruticílla* (redstart), *Pluviàlis* (plover); which names certain modern systematists have most unwarrantly changed to *Haliàëtus*, *Currùca*, *Phœnicùra*, and *Charàdrius*. Rennie has altered the name of the wren from *Troglódites* to *Anorthùra*; and this he had a right to do, for *Troglódites* is engaged for a genus of mammals. The great point to be observed is, that the first appropriate name which is given no one has a right to alter.

Having thus expressed my thoughts on nomenclature, I earnestly recommend this important subject to the consideration of every well-wisher of natural history in general, and of ornithology in particular. It would seem, indeed, that the neglect hitherto shown to the subject has been in proportion to its importance; for scientific nomenclature has been hitherto left to the caprice of the pedantic, and vernacular nomenclature has been abandoned to the mercy of the ignorant. It has been remarked (and every one who has observed the signs of the times must agree in the remark), that "the time must finally arrive, when a complete and thorough alteration will take place throughout zoological nomenclature:" and it is not only the privilege, but also the duty, of every naturalist to hasten the arrival of this time, which, now that a principle is discovered, cannot be far distant.

Sudbury Hall, April 20. 1836.

ART. II. *Notes on the Habits of the Dovecot Pigeon.* By CHARLES WATERTON, Esq.

" ASPICIS ut veniant ad candida tecta columbæ,
Accipiat nullas, sordida turris aves." OVID. *Tris.*

See, to the whitewashed cot what doves have flown!
While, that unwhitewashed, not a bird will own.

By this it appears, that the old Romans paid considerable attention to the raising of pigeons.

Our common dovecot pigeon is only a half-reclaimed bird; not being sufficiently domesticated to be deemed private property in the strictest sense of the word. Thus, I may raise any quantity of these pigeons; but, if they should forsake my dovecot, and retire to that of my neighbour, I cannot claim them. However, in order that dovecot pigeons may not fall into the hands of those who contribute nothing to their support, the legislature has enacted a fine of forty shillings to be paid by him who has been convicted of having shot a dovecot pigeon.

This act, till of late years, was of great use to the farmer; for it enabled him to raise this useful bird in vast abundance: but now the times are changed. The owners of dovecots have to complain, not only of bargemen, who shoot their pigeons along the whole line of the canals whenever an opportunity offers, but also of a plundering set of land vagabonds, who attack the dovecots in the dead of the night, and sometimes actually rob them of their last remaining bird. The origin of this novel species of depredation can be clearly traced to the modern amusement, known by the name of a pigeon-shooting match. A purveyor is usually engaged by the members. He offers a tempting price to poachers and and other loose characters, and they agree to supply him with any quantity of dovecot pigeons to be ready for the day on which the cruel exhibition is to take place. Generally, under the covert of a dark night, these hired thieves go to the place where they have previously seen a ladder, and carry it off to the devoted dovecot, upon the outside of which they mount, and with great caution fix a net to the glover, or aperture, on the top of the building. After they have effected this, they descend from the roof, and immediately force the door to get at the pigeons. Should, however, their original survey of the dovecot, prior to their mounting on it, have shown them that the door is strong enough to resist their attempts to break it open, they take the precaution to leave a man on the roof, where he seizes the pigeons as soon as they

become entangled in the net. In the mean time, his associates below tap sufficiently loud at the door of the dovecot to cause the pigeons to start from their roost and try to escape. Thus the hopes of the farmer are utterly destroyed, and a supply of birds is procured for the shooting matches in a manner not over and above creditable to civilised society. It remains with the members of the club to decide, whether it be honourable or just in them to encourage these midnight depredators. They must be aware that all the pigeons which they buy are old ones; and that old ones are never offered for sale by the owners of dovecots. The dovecots in this neighbourhood have been robbed repeatedly; and it is well known that the pigeons which have been stolen from them have fallen at shooting matches near forty miles distant.

No farm-yard can be considered complete without a well-stocked dovecot, the contents of which make the owner a most ample return, and repay him abundantly for the depredations which the pigeons are wont to make upon his ripening corn. He commands a supply of delicious young birds for his table; and he has the tillage from the dovecot, which is of vast advantage to his barley land. Moreover, the pigeons render him an essential service, by consuming millions of seeds which fall in the autumn, and which, if allowed to remain on the ground, would rise up the following year, in all the rank exuberance of weed, and choke the wholesome plant.

A dovecot ought to be well lighted; and it should be white-washed once every year. The tillage which it produces may be removed early in November, and again at the end of February. The young of the dovecot pigeon, like all others of the columbine order, are reared in a nest lined by their own dung; which, if left in the hole after the birds are gone, is apt to harbour vermin. Wherefore, cleanliness dictates its early removal.

No dovecot can possibly thrive if rats have found an entrance into it. These cruel and audacious plunderers will destroy every young pigeon within their reach. Oust them you must, and preclude their return, be the cost ever so great; otherwise, disappointment will most assuredly be your lot.

The barn-owl and the starling are harmless unoffending visitors to the dovecot: they repair to it merely for shelter, or for a breeding-place; so that I always like to see them enter mine. It is a lofty and a spacious building; and last season it furnished seventy-three dozens of young pigeons. The walls were made with flues, by the judicious use of which

we had a very early supply for the table; but, through some neglect on the part of the attendant, a fire took place, which threatened destruction to the surrounding buildings. In consequence of this, the flues were no longer heated, and they have continued in disuse since that time. Though owls, and hawks, and crows, and magpies, are allowed an unmolested range in the vicinity of this dovecot, still it is acknowledged to be one of the most productive in the county.

There is a peculiarity in the habits of the dovecot pigeon, which ought not to pass unnoticed. Though this bird will often perch on trees in the daytime, it has never been known to roost on them during the night. Neither will it pass the night in the open air, except in cases of the greatest emergency. I have an aged elm here, of gigantic size, to which both the dovecot pigeon and the wild ring-pigeon will frequently resort. It is amusing to watch the peculiar habits of these two different species of birds. They seem to come to the tree solely for their own convenience, and not with any intention to enjoy each other's company; and they appear to be as devoid of mutual signs of courtesy, as are our own countrymen when seated in a foreign diligence. I am positive that there will never be a union betwixt the dovecot pigeon and the ring-dove. A long series of observations, which I have been enabled to make, tends to convince me more and more of the impossibility.

The dovecot pigeons, like the rest of the genus, are remarkable for retiring to their roost at an early hour, and for leaving it late in the morning: thus fulfilling only half of Poor Richard's maxim of,

> "Early to bed, and early to rise,
> Makes a man healthy, wealthy, and wise."

These pigeons never lay more than two eggs at one sitting. Indeed, I should be most surprised were it satisfactorily proved that any pigeon ever sits on three eggs.

Nothing can surpass the attachment of these birds to the cot of their choice. Provided you do not absolutely molest them by the repeated discharge of fire-arms, they can scarcely be driven from it. You may unroof their habitation; and, though you leave it in that dismantled state for weeks together, still the pigeons will not forsake it. At their early hour of roosting, they will approach within three or four yards of the workmen, and then take shelter in the holes of the roofless walls, where they remain for the night.

Much might be written by the ornithologist on the intimacy which would exist betwixt man and the feathered tribes, if

man would condescend to cultivate it. Were I "close pent up in the social chimney corner," on some dismal winter's evening, with an attentive "Eugenius" by my side, I would show him the cause of shyness which exists betwixt the birds and us; and, amongst other things, I would prove to him that no bird ever anticipates the return of man to the vicinity of its nest, by the supposed act of removing its "young to new quarters." The pretended discovery of this reasoning quality in birds may be just the thing to raise the writer in the estimation of the editor of the *American Quarterly;* but it won't go down here in England.

Our ancestors generally built their dovecots in an open field, apart from the farm-yard; fearing, probably, that the noise and bustle occasioned by the rustic votaries of good Mother Eleusina might interrupt the process of incubation, were the dovecots placed in the midst of the buildings dedicated to husbandry.

Birds very soon get accustomed to the sounds of civilised life, be they ever so loud, except those which proceed from the discharge of a gun; and even those, in some few cases of extreme hunger, will not deter a famished wild bird from approaching the place where nutriment can be found. How unconcernedly the daw sits on the lofty steeple, while the merry chimes are going! and with what confidence the rooks will attend their nests on trees in the heart of a town, even on the busy market day! The report of fire-arms is terrible to birds; and, indeed, it ought never to be heard in places in which you wish to encourage the presence of animated nature. Where the discharge of fire-arms is strictly prohibited, you will find that the shyest species of birds will soon forget their wariness, and assume habits which persecution prevents them from putting in practice. Thus, the cautious heron will take up its abode in the immediate vicinity of your mansion; the barn-owl will hunt for mice under the blazing sun of noon, even in the very meadow where the hay-makers are at work; and the wigeons will mix, in conscious security, with the geese, as they pluck the sweet herbage on your verdant lawn; where the hares may be seen all day long, now lying on their sides to enjoy the warmth of the sun, and now engaged in sportive chace, unbroken-in-upon by enemies, whose sole endeavour is to take their lives.

Walton Hall, Yorkshire, April 12. 1836.

ART. III. *Facts on the Measure of the Length of Life of a Species of Parrot; with Suggestions for ascertaining the Average Period of Existence of the whole Animal Creation; and an Anecdote on a Parrot.* By Mr. W. H. WHITE.

I CALLED upon a friend on May 8. 1836; and, instead of being met, in the usual way, with pleasant smiles and cheerful faces, I perceived a general cast of sorrow in every countenance. I was almost fearful of inquiring the cause: however, I soon perceived that the universal gloom was occasioned by the death of "Old Jokko," a favourite parrot, which is stated to have been in the family 82 years! Jokko appeared to have died of old age, as his plumage had lost the brilliancy of its colours; and, besides, it was very thin and ragged. How Old Jokko was when he first became an inmate of the family, I could not learn; but this much of his history I obtained from his fair attendant, who acted the part of chief mourner: "Jokko could talk when grandpa' first brought him home." If from this piece of information we may infer, that Jokko learnt to talk at as early an age as his young mistress, we cannot reckon him at more than 85 years old: but I strongly suspect him to have been much older, as he was extremely weak and infirm.

This appears to be an extraordinary age for a bird to live to in a state of captivity, considering, too, the great difference of climate from that in which he was bred: and yet I have been told there is now living in London a parrot which has been in the same family upwards of 100 years; but it is very feeble, and shows every characteristic of extreme age. If the thread of life has been carried to so great an extent in captivity, may we not reasonably conclude that it is still further extended in its natural state?

I am not aware of any work on the extent of the length of the life of different species of animals, or, indeed, of any such work ever having been attempted; and yet I am persuaded such a work would be highly useful during the present rapid march of scientific inquiry. Now, if each contributor to this Magazine were to send an account of such cases of old age (no matter of what kind; whether beast, bird, fish, insect, or reptile), as either came within the limit of his own observation, or such as are furnished him upon unquestionable authority, I am certain a very short space of time would bring to one focus a great number of valuable facts, that would otherwise, most probably, never find their way into the archives of science: not because they (many of them, at least) might not be recorded by the observer at the time, but for the want of a

convenient channel through which to send them down to posterity. This channel is open in this Magazine; through which may the streams of science continue to flow on, still fertilising as they flow!

The royal Psalmist has set down the average period of the life of man at "threescore years and ten." But why should we limit our knowledge to the duration of the life of ma alone, when

> "To all has Nature given a bound precise,
> Of being and perfection; and promulged
> To every varying rank her varying laws"?

Mr. Waterton, your very valuable correspondent, and the experienced naturalist, has not given us any account of the length of the life of those species of birds whose biography he has memorialised through the pages of this Magazine; which omission, I doubt not, has arisen from the great difficulty there is in following any particular species of bird (or, indeed, any animal, how familiar soever one may be with its species), from the time of its infancy till old age puts a period to its existence.

I believe the natural duration of life in some of our domesticated animals has been ascertained with tolerable accuracy. The horse is said to live about 30 years; the ox about the same period; the sheep about 20 years; the hog about 20 years.* Of the last three species, the ox, the sheep, and the hog, so few are allowed to reach even maturity, that I think the natural duration of their lives is still involved in some uncertainty. Naturalists, I believe, affirm, that the longer any animal is in arriving at maturity, the longer is its period of existence; and, on the contrary, the sooner any animal arrives at perfection, the sooner its course is finished.

If this maxim holds good (and, upon a broad scale, it appears very probable), I think, by ascertaining the time any animal is in attaining its perfection, the period it endures in full maturity, and the precise time of its beginning to decline, a tolerably accurate estimate might be formed of the length of the life of many species, of which we at present know nothing. This might, in some degree, hold good in some of the larger species of animals: but we must not take our examples from animals in a state of confinement; they would mislead our judgment, as many of them, from the privation of liberty, from the artificial nature of their diet, the impurity of the

* The Rev. G. White, in his *Natural History of Selborne*, mentions a sow that produced young till she was fifteen years of age; and then she was fatted for bacon.

atmosphere in which many are doomed to spin out their lives, the diseases to which they are subject, and many other liabilities, often carry them off the stage ere they arrive at maturity. Many, too, even of our most familiar creatures, when they come to be subservient to man, die of old age even in youth! fully demonstrating that scriptural truth, "The tender mercies of the wicked are cruel."

The difficulty of finding out the length of the days of the insect and the finny tribes will, I fear, increase almost to impossibility. Still, I feel persuaded much valuable information might be obtained, if observers would faithfully record instances as they occur, and from time to time bring them to one central point.

As I commenced this notice with a brief account of the death of a parrot, I will close it with an anecdote of one now living, in Bow Churchyard, in the City of London. This bird, which is a female, and has been in the family several years, has not yet, like most females of another race of bipeds, learned to talk; and I am told, what is to me still more strange, that the female parrot cannot learn to talk: but, perhaps, to make up for the want of speech, she may "think the more."

This parrot is very fond of picking a bone (not of contention), and displayed more than ordinary sagacity in contriving means to get at one which the servant, who has a great delight in trying the sagacity of the animal creation, put between the wires of the cage and the food-can. Poll tried every manœuvre to obtain the dainty morsel for a considerable time, but to no effect; she therefore desisted from the attempt, took her station in the swing, and appeared to have relinquished all hope. After the lapse of a few minutes, Poll descended from the swing, and approached the place where the bone was laid: she very deliberately took the can out of its place, and put it down on the opposite side of the cage, and then picked her bone in perfect harmony. When the repast was over, Poll placed the bone where she found it, and, to the surprise of the servant and others who witnessed the fact, put the can also in its proper place. One might almost be induced to ask the question, Was that act the result of instinct or reason?

Old Kent Road, May 14. 1836.

[A certain individual carrion crow (*Córvus Corône Lin.*) is mentioned in p. 315., as if known to be upwards of sixteen years old.

In Young's *Ainsworth's Latin Dictionary*, the word *cornix*

has the English meaning, crow or rook, ascribed to it, as one of its meanings; and *cervus* has that of, a hart or stag, and other meanings. Stackhouse, in his Latin preface to his edition (Oxon. 1813) of Theophrastus's *History of Plants*, in Greek, has stated, that Theophrastus, who attained to a greater age than 100 years, has deplored the shortness of human life, and has remarked, that a longer life is given the *cornix* and the *cervus* than to man.

On the Incarcerated Toad, on which information by Mr. Bree is given in p. 316., Mr. Bree has, since the date of giving that information, supplied the following additional matter, which may be here introduced, one thinks, without violence:— "These incarcerated toads, I believe, usually die soon after their release from imprisonment: in the present instance, the reptile had been much injured about the head by the act of breaking the stone, which led to its discovery: it died the day after I saw it, or the same night. How long had the animal been enclosed? I could not help looking at it with a sort of veneration or feeling of respect, regarding it as by far the most ancient living being I had ever beheld." — *W. T. Bree. Allesley Rectory, May* 21. 1836.

On the death of Lady Penrhyn, in 1816, six of her horses had pensions assigned them; each 45*l.* a year. Five of them died at the respective ages of 28, 29, and 31 years. The last died lately, at the age of 34 years; the executors having paid for the pension of this one horse 810*l.* Is this kindness, or cruelty? (*The Bury and Norwich Post*, April 30. 1834.)]

ART. IV. *A Notice of the Discovery of the Skeletons of Swifts and Starlings in the Tower of the Church at Oswestry, Shropshire.* By the Rev. T. SALWAY.

THINKING that many of your readers may feel interested in the discovery of a great number of skeletons of swifts and starlings (principally the former) in the church tower here, a short time since, I have taken the liberty of sending you a brief notice of it. In putting up a new clock in the church tower, a short time ago, it became necessary to cut out a decayed portion of the pilaster of the frame of the face of the clock. The pilaster did not accurately fit the face of the wall, so that there was room between for the birds in question to find an entrance; and this is the case all round the frame, so that the birds are constantly in the habit of resorting to it for building. When the decayed portion was cut out, a small chamber was laid open between the pilaster and the other

timbers of the woodwork, 20 in. in length, 7 in. in depth, and 7 in. in width; containing, therefore, rather more than half a square foot. In this chamber the workman discovered a considerable number of the skeletons of swifts and starlings. He took out as many as fifty-seven; but, as he did not remove the rubbish with any degree of care, or clear it quite out to the bottom, there were probably more in the cavity than the positive number. He did not find them in the chinks of the old wall, but in the hollow cavity, above described, between the wall and the frame of the clock, mixed up indiscriminately with a quantity of mortar rubbish that had fallen into the cavity, and with loose bits of straw and feathers. The skeletons appeared to be those of different years, as some had the feathers on in a tolerably perfect state; others were partially clothed with them; but the majority had none at all. Being confined to the house at the time by illness, I did not become aware of the fact till some weeks afterwards; when only four of the specimens taken out could be found, and which are now in my possession; all the rest having been lost. These four specimens, which are skeletons of swifts, appear, as far as I am able to judge, to be those of full-grown birds; and I understand, that all who saw the rest of the skeletons considered them to be those of old birds. As the frame of the clock is very large, and the birds have ingress in several places, I have no doubt, had the whole frame been removed, instead of the small portion above mentioned, a vast number of other specimens would have been discovered, as swifts have always been in the habit of resorting to it for building.

There would be nothing, perhaps, particularly interesting in the above discovery, if it could be supposed that the skeletons were those of young birds, which had perished in the nest, and been thrown out into the cavity underneath; and in birds of this class there is, perhaps, some difficulty in distinguishing correctly between the skeletons of old and young birds. But, as swifts are stated never to have more than two young ones, the great number found in so small a space (for far the greater number of specimens, as I understand, were those of swifts) leads, I think, to the conclusion, that many of them, at least, must have been those of old birds. One way (though, perhaps, not a very scientific one) of ascertaining the point would be, to shoot a swift, and, after the flesh had been completely decomposed by a natural process, to compare the skeleton accurately with those found. If, however, the skeletons above mentioned are those of old birds, then, as they had free egress as well as ingress to the place, the only solution of the fact seems to be, that the birds, remaining, from some

cause or other, beyond their usual period of migration, had become torpid, and perished. [VIII. 513.]

Vicarage House, Oswestry, May 20. 1836.

ART. V. *A Notice of the Fact of the Capture of an Individual of the Grey-headed Yellow Wagtail* (*Motacílla neglécta* Gould), *at Stoke Nayland, Suffolk.* By J. D. HOY, Esq.

ON May 2. 1836, I shot a fine adult male of the grey-headed yellow wagtail (*Motacílla neglécta Gould*) in this parish: it was following the plough, in company with several of the pied species; in which situation, at this season, the yellow spring wagtail, common to this country, is often met with. Mr. H. Doubleday of Epping, I believe, has in his possession a specimen of the *Motacílla neglécta*, shot by himself at Walton, on the coast of Essex, in the autumn [on Oct. 3. 1834: see in VIII. 617.]: but, after the autumnal moult, it so much resembles our common yellow wagtail, that they are not easily distinguished; but the bird now occurring in its full nuptial garb, will place it on our list of occasional visitants beyond a doubt. I think that it is highly probable that it may often be found on our south-eastern coasts, during the time of its vernal migration, and also in autumn; more particularly should strong easterly gales prevail about the former time, as has been the case this season. It would certainly, in most instances, pass unnoticed, from its similarity to our common yellow wagtail. Its notes, also, are very similar.

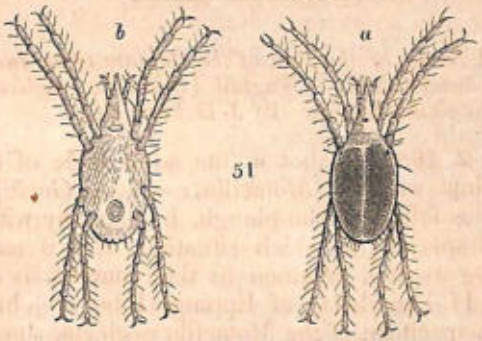
It is somewhat strange, that the *Motacílla flàva* of British authors does not appear to be known to Continental writers on natural history; while it seems pretty evident the bird must visit us from southern climates.

Stoke Nayland, Suffolk, May 12. 1836.

[At a meeting of the Wernerian Society, Edinburgh, on Jan. 9. 1836, Sir Patrick Walker read a notice regarding the occurrence of *Motacílla neglécta Gould*, on the banks of the Water of Leith. (*Magazine of Zoology and Botany*, p. 111.) There is added in a note, in the same page, it is not stated whom by, a remark in which is the statement that "this is the second time that *M.* neglécta has been recorded occurring near Edinburgh."]

ART. VI. *Illustrations in British Zoology.* By GEORGE JOHNSTON, M.D., Fellow of the Royal College of Surgeons of Edinburgh.

A'CARUS BA'STERI. (fig. 51.)



a, the dorsal aspect; *b*, the ventral aspect.

I HAVE too slight an acquaintance with the *Acáridæ* to become the historian of any one amongst them; but it may be allowed me to direct attention to a species of which I can find no notice or description beyond what is so short and vague, that there must be doubts respecting its applicability. In my examinations of sea-weeds and animals — pursued now for many years, with an annual increase in their interest, although amid constant interruptions, which, though they have not cured this "inborn obliquity of taste," may, perhaps, in some degree, excuse the superficialness of my inquiries, and palliate the blunders which have hence originated — in these examinations there has many a time crossed me a little mite, of no very prepossessing appearance, indeed, but to which, from the peculiarity of its habitats, I have now and then said, "What doest thou here? Verily, not many of thy congeners are inhabitants of the waters, and fewer still, methinks, choose the salt brine of the ocean for their dwelling:" and then I have allowed him to pass away with my soliloquy, until a recent perusal of Dugès's *Mémoires "sur les Acariens"* has induced me to become better acquainted with this sea-born species.

I remember that, in some volume of the *Philosophical Transactions* (and it would be most unreasonable for any reader of the Magazine to call on a provincial apothecary to quote the volume or the page of so great a book); I remember, that Dr. Job Baster therein figures (I am certain he does not describe) two marine mites; one with long legs, like a plalangoid spider, and one with legs of moderate proportions. The

latter, which is rudely drawn, may be identical with ours, which is very prettily limned; and on this presumption I have taken the liberty of honouring the Dutchman and the mite by making the one the patronymic of the other: nor do I imagine that his manes will be offended with the compliment; for, surely, a man is not less elevated above his peers, in transmigrating into an acarus, than in passing into a mouse, or ewe maggot, or a snail, or even a star-fish!

The *Acarus Basteri* is not a microscopic species: it is fully two or three times larger than the cheese-mite, equalling in this respect an average-sized A'pion; a comparison which your entomological readers will well comprehend *; and the mite, moreover, has a general resemblance to the said little beetle, but more depressed on the back. The following is as good a description of it as I am able to make:—

Body oval, narrowed in front, angulated at the shoulders, naked, of a reddish-brown, or cinereous, or blackish colour, with a light mesial line; the head, front, margin, and legs colourless; a black spot (eye?) on each side above the shoulder, and a less distinct one on the posterior part of the rostrum. *Head* rostrate, acute, porrect: at the base of the beak there is a pair of large triarticulated *palpi* reaching beyond the apex of the beak, and armed with a strong movable claw; the basilar joint short, the second elongate: mouth inferior, apparently without maxillæ. *Legs* eight, gressorial, two pairs directed forward and two backwards, longer than the body, hispid, six-jointed, didactyle; anterior pairs shorter than the posterior, the first originating in the margin, rather stouter, but almost imperceptibly so, than the second, whose origin is a little behind, and also lateral; there is a wide interval between the second and third pairs, while the fourth are again approximated to the third: the two basilar joints short, third elongate, fourth small, fifth as long as the third, and longer than the sixth; the claws strong, hooked, and sharp: anus terminal.

This acarus lives amongst corallines and Confervæ, between

[* In I. 160. are generic and specific characters and figures, all in detail and from Curt. *Brit. Ent.*, of the A'pion diffórmis; and the remark, that "The type of this genus is the *Curculio frumentarius Linn.*, the corn weevil."

A'pion flávipes. Wm. Gardiner, jun., Dundee, Forfarshire, sent to us, under date of May 19. 1835, specimens, taken shortly previous, on *Mercurialis* perénnis *L.*, of what Mr. Westwood afterwards identified as A'pion flávipes, and of which he remarked, that it is usually found on clover, the larvæ feeding on the heads. Mr. Gardiner did not state that the individuals he took were eating of the *Mercurialis*; but one may suppose that it is likely that they were.]

tide marks, and is of frequent occurrence. It creeps with ease and tolerable quickness, and never leaves the water voluntarily, though it can live a day at least out of it; and, unlike most marine insects, it is not killed by immersion in fresh water. It is much infested with infusory animalcules.

There is no genus characterised by Dugès to which the *A. Bástéri* can be conveniently referred; but it would be very imprudent on my part to propose the establishment of another for its reception. The species is probably synonymous with the *A'carus zostèræ* of Turt. *Gmel.*, iii. 705.; who does not quote the authority on which it is introduced into the *System of Nature*, though the habitat "seas of Norway" leads to the conjecture that Müller is the individual from whom he has borrowed his jejune description.

GO'RDIUS AQUA'TICUS. (*fig.* 52.)

52



So much has been said in this Magazine [p. 241—243., and the other places there indicated] of the G. aquáticus, and so very few of those who have written about it seem to know the animal, that I am tempted to give a figure, and some short account, of the veritable worm; which, though common enough, is less so than the Filària, frequently mistaken for it, and to which, so far as I can remember, all the notices scattered through the volumes of the Magazine truly appertain.

Synonymes. — Górdius pállidus; cauda capiteque nigris *Linn.*, Suec. 363.; G. aquáticus *Lin.*, Turt., iv. 57.; Turt. Brit. Faun., 270.; Stew. Elem., ii. 353.; Lam. Anim. s. Vert., iii. 220.; Flem. Phil. Zool., ii. 605; Cuv. Reg. Anim., iii. 217.; Baird in Hist. Berw. Nat. Club, p. 23.

Hab. — Slowly running and stagnant waters, in summer.

Desc. — The body is from 6 to 10 in. long, of the thickness of a hog's bristle, exactly filiform, rigid and incompressible, smooth, of a uniform blackish or yellowish brown colour, sometimes paler on the ventral surface, and the tips always a shade darker. The head is obtusely conical, with a simple circular terminal pore for a mouth, from which a sort of membrane can be forced by pressure. The skin is smooth, minutely areolar, as is very evident when it is partially dried, and marked with a few obscure circular plaits, perhaps produced by the process of drying. Within an inch of the tail, there

is a small space, which is roughened on the sides with very minute granules. The tail is bifid, the processes short, equal, and obtuse. The anus is apparently not terminal, but placed a little above. The interior of the body is occupied by a milk-white and comparatively large intestine, which runs from one extremity to the other. When cut through within an inch of the head, no fluid escapes; but, when a like portion was cut off from the tail, a milky and somewhat oily liquor oozed out. The intestine seems to be annular, for its sides have a crenulated appearance under the magnifier.

This singular worm is in perpetual motion and change; and its wrigglings have a sort of painful character, which suggest involuntarily a comparison of it to "the worm that never dieth." Although observed very often during several days, it was never seen at rest for a single moment, but was ever bending its long hair-like body into larger and smaller curves, now moving rapidly across the plate, and now twisting and contorting itself into circles and curves. The undivided end, though the contrary has been asserted *, is evidently the head; and this part is often pushed forward and out of the water; which, however, the worm never leaves. When a portion from the anterior end was cut off, the detached portion very soon lost every sign of life. A portion from the tail gave evidence of remaining irritability for a longer time, but still did not live long; the main part, however, continuing to move on as before; and, as it did so for at least 48 hours, it may be that life would not have been shortened by these mutilations.

The synonymes and descriptions of this worm are exceedingly confused; for many authors have not distinguished it it from the Filària; a worm very like the Górdius, and sometimes found in the same places, though its proper habitat is in the intestines of beetles and other insects. Thus, Müller has described the Filària for his Gòrdius sèta, and has given the G. aquáticus as a variety of this; and from the fact, that few authors have noticed the bifid tail, we may infer that they generally have had the Filària in view.

The Górdius, we are told by certain authors, perforates clay to give a passage to springs and water! By others it is said to kill fishes; and, to man, to be so far noxious, that its bite occasions inflammation, which may be cured, it is kindly added, with opium! Such is a specimen of the fancies which disfigure the history of worms, and which are still to be found in works of a scientific pretension, where we expect to find

* Dr. Turton describes the tail as a mouth, which, he says, is "small, horizontal, with equal obtuse jaws."

nothing but the deductions of observation. The stories of the rustic naturalist are, however, not only allowable, but amusing. The country people of Smöland believe that the bite of the Górdius causes the whitlow, and they give to the worm and the disease the same name: acting on this belief, they cure the disease by making an incision into the part with a knife, which must have been previously used in cutting the worm itself into pieces. Our own country people are convinced that the Górdius is merely a horse-hair animated by being steeped in water; and, if you hesitate to believe the story, they will tell you, as I have been told repeatedly, that they have, often in their boyish days, performed the experiment with success, having been witnesses to the fact of the hair growing into the living worm. [VIII. 108.] Stanihurst, in his account of Ireland, adduces it as an example of animals "ingendred without seed," — "and chieflie by the secret influence and instillation of the celestial planets, as the sunne and such other; as, if you put the haire of an horse taille in mire, puddle, or in a dunghill, for a certain space, it will turne to a iittle thin spralling worme, *which I have often seene and experimented.*" (p. 19.)

Linnæus tells us, that the rustics of Smöland say, that all the pieces of the worm of this kind that have been divided into many, on being kept immersed in water, will each grow into a perfect body. On this slender authority, apparently, other less cautious naturalists have stated this as a fact: but the circumstances observed by us in our experiments would appear to militate against its truth. — *Berwick upon Tweed, May* 28.

[I. 223. The story of Kircher's snake-making (I. 223.) brings to my mind a trick which was played by a schoolfellow, who had discovered some specimens of a Górdius in a butt of rain-water, and used to sell them in bottles to his companions as animated horse hairs. Many a time has some travelling stallion been stopped, and his tail robbed; for no other would answer. The hairs were committed to the tub, according to his advice, but with the same success as accompanied the experiments of Redi (II. 223). — *Lansdown Guilding St. Vincent, May* 1. 1830.]

ART. VII. *An Advocation of the Prosecution of Meteorology; and Considerations on Lunar Halo, viewed as a Prognostic of Weather.* By J. G. TATEM, Esq.

I SEND you some observations [given below] on the lunar halo as the harbinger of rain, and, generally, on meteorology.

These were written before your May number reached me; and I am pleased to find your correspondent Mr. White urging [p. 251.] attention to the subject of the science on the part of your correspondents and the public. The formation of a society [p. 251. 305.], or the revival of the one established some years since, would further this object. — *High Wycombe, Bucks. May* 3. 1836.

Within the last few years meteorology has made considerable progress; a greater number of persons have directed their attention to the subject, and their communications have been more favourably received by the public: but meteorology may be considered as yet in its infancy, and it has many difficulties to contend with. Several of the phenomena which are the subjects of it are too transient in their duration, and too silent in their progress, to attract the notice of any but attentive observers: the modification of clouds, the accumulation of vapours, the extraordinary appearances occasioned by refraction, with many others, are of these descriptions; and it is only during the raging of the tempest, the fall of meteors, or such brilliant displays of aurora borealis as that observed in November, 1835, that all classes hear, see, and are impressed by, the wonders of creation as exhibited in the heavens. It has been objected to the study of meteorology, that it leads to no permanent or beneficial results; and that all the prognostics recorded are uncertain as to their events: but the forms of clouds, the actions of animals, and the flight of birds, were the signs by which the ancient naturalists judged of the changes about to take place in the weather; and succeeding observations have, in many instances, proved the correctness of their opinions. The introduction of instruments, the invention of modern times, has altered the mode of ascertaining variations in the state of the atmosphere; the Torricellian tube has enabled the husbandman to pursue his labours more successfully, by its indicating impending rain or returning sunshine; while the marine barometer is the monitor that warns the seaman of the approaching storm: and seldom has he to repent if he avails himself of the admonition; but natural objects still claim the attention of meteorologists; and,

Among the Prognostics indicative of Rain, perhaps no one is so certain as the Lunar Halo; and to this I shall confine my present communication.

Your correspondent Mr. W. H. White (VIII. 501.) has favoured us with his opinions, founded on observations con-

tinued for "a period of more than ten years;" and concludes, "that both solar and lunar haloes are heralds of succeeding changes of weather, from dry to moist." My own experience confirms Mr. White's opinion: out of 33 lunar haloes, recorded in my journal, only 6 were not followed by rain; and on the other occasions, the rain that fell was in many instances very heavy, and of long continuance. Of these 33 haloes, 15 occurred in the winter quarter, comprising the months November, December, and January; and 10 more appeared in the spring quarter, consisting of the months February, March, and April. Four times the planet Jupiter was seen within the halo; and, on one occasion, shone with peculiar brightness, the area within the circle being remarkably clear. Lord Bacon, in his *History of the Winds*, says, "If an entire circle enclose a planet, or any of the greater stars, it foreshows wind." Again, he says, "If a circle, or halo, appear about the moon, it signifies rain rather than wind, unless the moon stands directly within that circle; for then it signifies both. Circles about the moon always foreshow wind on that side where they break; also, a notable shining in some parts of the circle signifies wind from that part where the shining is." As far as my observations have extended, during the last nineteen years, lunar haloes, when well defined, and when the space within the halo is clear, are followed by wind; but when the circle is indistinct, and the area thick and misty, rain always succeeds; and the quantity of rain may in some degree be anticipated by observing the greater or less degree of density of the mist surrounding the moon. Foster, in his *Researches about Atmospheric Phenomena*, expresses his opinion, that lunar haloes are the "most certain signs of rain." Your widely circulated Magazine may be rendered the means of proving the reliance which may be placed on the lunar halo as the harbinger of rain, if your correspondents will communicate their observations, and thereby assist in removing one of the objections raised against the usefulness of the study of meterology.

High Wycombe, Bucks, April 30. 1836.

[A communication in express recommendation of the institution of a society of meteorologists has since been received from Mr. Tatem.]

ART. VIII. *A supporting of the Propositions that have been offered for instituting an Association of Meteorologists in Britain; and a Notice of certain Means necessary, and Objects proper, to such an Association.* By W. R. BIRT, Esq., Author of *Tables of the Wind*, noticed in p. 224. 280.

I HAVE read with great pleasure the suggestions inserted in p. 305, 306., for the establishment of a meteorological society, having for its object the institution of stations in Great Britain, &c., where observations may be made which are statedly to be compared. Such a society will, if properly conducted, considerably contribute to the advancement of meteorology; and, if my feeble efforts can be of any service in assisting in the organising, or otherwise promoting the interests, of such a society, I shall most gladly devote them to its service.

I have long considered, that the establishments of meteorological observatories in various parts of the world would be found of immense utility. An apartment fitted up with barometers, thermometers, hygrometers, and other meteorological instruments, having a good chronometer, for the purpose of noting exactly the time of every important phenomenon, and furnished with a circular opening in the roof, for ascertaining the direction of the aerial currents, would, perhaps, form tolerably good means as the kinds of instruments required. The circular opening I should propose to be graduated; N.W. being 0°, N.E. 90°, S.E. 180°, and so on; and that from every fifth degree a metallic point should project, that the observer may readily ascertain where a particular portion of a cloud commences its transit across the opening. The observer should stand immediately under the centre of this opening, in order that he may ascertain the true direction of the aerial currents. Another object would also be attained with the assistance of the clock; namely, the velocity of the current, which would be ascertained by the time occupied by the cloud's transit of the opening. Observatories of this kind should be placed in such situations that phenomena in every branch of natural history connected with meteorology could be observed: for instance, the opening and closing of flowers, the budding of trees, flowering of plants, migration of birds, appearance and disappearance of insects [p. 314, 315.], &c.; many of these depending on the state of the weather. In order that the upper and lower currents may be carefully observed, the observatories should be erected on elevated points. As an instance of one of the most suitable stations for an observatory of this kind near London, I should refer to Shooter's Hill, Kent.

I hope that a meteorological society may be formed; and wish it, if formed, every possible success.

109. *York Street, Whitechapel, London, June* 3. 1836.

[The United Service Society (see next Number), which has members in many parts of the world, and some local committees in Britain and abroad, might, one would think, render itself a very efficient agent towards the promotion of man's progress in meteorology. The conductors of the Society have taken cognisance of this subject to the following extent:—"It is proposed to keep a meteorological journal at the museum, for which purpose necessary instruments will be provided, and the results noted." This notice is in the Council's Fifth Annual Report, 1836.]

ART. IX. *Considerations opposed to Mr. White's Theory of the Principles upon which Clouds are suspended.* (p. 246—251.) By W. W. C.

THERE appears to be considerable obscurity in the part where Mr. White gives us his own ideas upon the subject. He observes, that "a much larger portion of aqueous vapour, it must be recollected, is held in an elastic form near the surface of the earth, than in the more elevated regions of the clouds. In high regions, even on the summits of high mountains, atmospheric pressure opposes very little check to the natural tendency of water to assume an aeriform state; consequently [?], the higher we ascend in the atmosphere, the quantity of moisture which is held in solution goes on diminishing, until we arrive at the precise altitude beyond which the effect of diminished pressure predominates, and the aqueous vapour goes on increasing." I really do not see that Mr. White is warranted in drawing any such conclusions from his premises. What does "the effect of diminished pressure predominate" over? Dr. Dalton has proved, that evaporation, and suspension of vapour in air, are owing, not to any solvent power that the atmosphere possesses, but solely to its temperature, inasmuch as the same quantity of vapour rises *in vacuo*. In fact, the atmosphere, as Mr. White has correctly remarked, retards evaporation by its pressure. Mr. White observes, the quantity of moisture diminishes the higher we ascend in the atmosphere; owing, doubtless, in a great measure to the diminution of temperature. What, then, does he mean by the aqueous vapour going on increasing? Mr. White supposes that "it not unfrequently occurs, that

the watery globules, in their descent, meet with a stratum of air of that density which is just equivalent to the weight of the vesicular vapour and the contained atmospheric air together. At this point they will remain suspended till such time as the air contained within the different vesicles becomes of equal density with the surrounding atmosphere." So far, so good; but, as the parietes of these vesicles are elastic, what is to prevent them from being reduced almost immediately to the temperature of the surrounding strata, then contracting, and gradually, I may say rapidly, becoming too heavy for the air to sustain?

If I might hazard a conjecture, I should say, that the clouds, so long as they exist as clouds, are always of a higher temperature than the medium that supports them; and, for this reason, these masses of aqueous vapour possess the power of absorbing heat, although the air in which they float scarcely can be said so to do: they may, therefore, maintain their temperature by absorbing caloric from the sun's rays during the daytime, and by receiving radiated caloric from the earth during the night. Perhaps, then, a combination of Howard's theory with Mr. White's may explain the matter: the similar electricity of each vesicle may cause repulsion of the surrounding ones; and the superior temperature of the clouds will give them superior lightness.

Birmingham, May 25. 1836.

ART. X. *Views on the Modes of Formation, and a Notice of the Characteristics, of the Kinds of Cloud, Cumulus and Cirrus, and certain Varieties of these.* By W. R. BIRT, Esq., Author of *Tabulæ Anemologicæ, or Tables of the Wind*, noticed in p. 224. 280.

I OBSERVE in Mr. White's interesting discussion on the principles on which clouds are suspended (p 247—251.), that Mr. White considers the cumulus to be formed from the cirrus, in consequence of the ascending portions of the aqueous vapour exceeding the evaporation from the upper surface of the stratum of air that holds the vapour in solution. This, he conceives, causes the cirrus gradually to descend to the earth, and, at the same time, proportionably to increase its bulk, so as to form cumulus.

During the course of my observations (now extending over a period of four years, and which have been taken daily), I have arrived at the conclusion, that the cirrus and cumulus

are two distinct kinds of cloud, depending on two distinct agents for their formation. I have not, in any instance, seen the cumulus result from any modification of cirrus, which is mostly confined to the higher regions of the atmosphere; I have, however, on some occasions, observed this cloud in the region of the cumulus, which is generally noticed in that stratum of the atmosphere situated immediately above the vapour plane. When both the cirrus and cumulus are traced from their earliest stages, a most decided difference is perceptible: all the varieties of cirrus commence as "thin white lines, or threads, pencilled on the azure sky;" and they preserve this form until cirro-stratus is produced, as is frequently observed. Throughout the whole group of cirro-stratus, the fibrous, or thread-like, character can be well traced; and in no instance have I observed the least approximation in the cirrus or cirro-stratus to heap. The commencement of the cumulus is decidedly hairy-form, without the slightest tendency to present a thread-like appearance: the best comparison I can give is the appearance presented by steam escaping from a steam-pipe, or smoke issuing from a high narrow chimney: in both cases an expansion takes place upon the escape of the vapour, which gives rise to a hairy-form appearance, similar to that which is observed in the commencement of the cumulus. Throughout the whole of the four stages of the lower, or foul weather, cumulus, and the corresponding stages of the upper, or fair weather, cumulus, this hairy-form appearance is distinctly traced; and, as the thread-like appearance is not exhibited by any modification of the cumulus, nor the heaped appearance by any modification of the cirrus, I think the phenomena sufficient to mark these clouds (the cirrus and cumulus) as perfectly distinct, and depending on different agents for their production.

But, while the cirrus and cumulus are, under all circumstances, entirely distinct, and in no instance have they been observed to result from each other (I speak from personal observation), there are two varieties that are frequently seen to interchange, one being resolved into the other. I do not, however consider this change to depend on the augmentation of the masses which cause them to descend into a lower region: the groups I allude to are cirro-stratus and cirro-cumulus. The cirro-stratus, as before observed, results, in many instances, from the cirrus; and the cirro-cumulus, though not resulting from the cumulus, appears to be rather connected with it; for the largest masses of cirro-cumulus appear to possess the same characters as the third stage of the upper, or fair weather, cumulus; with this exception, that the masses

of cirro-cumulus are approximated in groups, while those of cumulus are isolated. Indeed, when the masses of cumuli just mentioned have a tendency to approach each other, they gradually form the variety of cirro-cumulus above noticed; and I have observed several of the larger masses of this modification of cumulus separate into the larger masses of cirro-cumulus; the connexion, therefore, between these modifications may be thus expressed: cirrus, cirro-stratus, cirro-cumulus, cumulus.

In many instances, the cirro-stratus is formed from cirrus: not by a conversion of the cirrus into this kind of cloud, but merely by an augmentation of the fibres composing cirrus. It is also produced immediately from cirro-cumulus; the small roundish masses of the latter cloud changing into the fibres that characterise cirro-stratus: this process being the reverse of the resolution of cirro-stratus into cirro-cumulus, which is frequently observed to take place. In the latter case, the cirro-cumulus is produced by a conversion of the fibres of the cirro-stratus into the well-defined masses of cirro-cumulus. This conversion has been observed at all altitudes, and when the clouds have exhibited every possible degree of size: the cirro-stratus previously possessing a fibrous structure with a longitudinal arrangement, these conversions have taken place, in many instances, very rapidly.

The connexion between cirro-cumulus and cumulus has been explained above.

From the whole of my observations, it appears to me, that cirro-stratus and cirro-cumulus are the only modifications of cloud that interchange (and this phenomenon is confined to certain varieties); that cirro-stratus is produced, in some instances, by an augmentation of the fibres composing cirrus; and cirro-cumulus, on some occasions, by an approximation to each other, and an increase in bulk of the masses of a certain variety of cumulus. I do not remember having observed cirrus result from cirro-stratus, nor cumulus from cirro-cumulus. On some occasions, I have seen certain varieties of cirro-stratus skirted with cirrus; but I have not seen the former cloud resolve into cirrus, as it often does into cirro-cumulus.

The polarisation of clouds forms an interesting feature in their natural history: by polarisation I mean the direction, or stretching from one point of the horizon to the opposite (s.w. to N.E., for instance), of the groups of cirrus, cirro-stratus, and cirro-cumulus, which are the modifications most commonly polarised. Their polarisation occurs in all directions, and appears to be entirely unconnected with their motion,

which is observed to take place at all angles with their polarisation. The direction of their motion and polarisation has, however, a considerable influence on the coming weather. When the two coincide in certain varieties of cirrus, the character of the cloud remains unchanged during a considerable time; but, when they are at right angles to each other, the fibres inosculate, and cirro-stratus results. It may be remarked, that all the varieties of cirro-stratus which are resolved into cirro-cumulus possess polarisation; and the same polarisation is observed after the resolution has taken place that was noticed previously. This, with the entire change of the masses of cirro-stratus into groups of cirro-cumulus, indicates, I imagine, the existence of an agent acting in a manner different from that mentioned by Mr. White; namely, "the excess of the ascending vapour over the evaporation." To trace out this agent is, certainly, an interesting occupation for meteorologists; and it is to be hoped that more attention will be paid, not only to the changes going on in the atmosphere as measured by instruments, but, also, as indicated by clouds and other meteors. Probably a series of careful electrical observations, made with especial reference to such changes as are above described, would be found of great utility.

109. *York Street, Whitechapel, June* 1. 1836.

P. S. I enclose a few extracts from my journal, which I think calculated to elucidate the foregoing remarks.

May 3. 1833.—It is very frequently noticed, that varieties of cirro-stratus pass into cirro-cumulus. The latter modification has three or four distinct modes of formation: it is sometimes formed on a clear blue sky, as very minute roundish masses; at other times it is found to result immediately from cirrus; and, on some occasions, it is seen proceeding from masses of cirro-stratus, until the latter modification is entirely lost in the resulting cirro-cumuli. The cirro-stratus may be divided into three groups; namely, those that extend over the whole atmosphere; those that appear as bundles of fibres, sometimes of very large dimensions, and at others very small, the fibres in each case having a longitudinal arrangement; and those that appear similar to the smaller bundles, but, with the fibres, instead of being arranged longitudinally, arranged transversely. It is the second group only, possessing the longitudinal arrangement, that are resolved into cirro-cumulus. When this takes place, it appears as if some internal motion existed in the mass, by which the fibres were destroyed and the small roundish masses produced. About one P. M. of this day, numerous masses of this group of

cirro-stratus were observed, which rapidly separated into very minute and beautiful masses of cirro-cumulus. There are four distinct sizes of cirro-cumulus, which, for the sake of distinctness, I have ventured to name secundus, tertius, quartus, and quintus; secundus being the largest, and quintus the smallest. The minute masses just spoken of are specimens of the variety quintus. These rapidly augmented in size, until they formed well-marked specimens of quartus. At this time, several well-marked and beautiful, but very thin, specimens of about the same size were observed, which exhibited most decidedly a hairy-form structure. The whole of these masses continued to increase in size, until tertius was produced. On this occasion, three distinct gradations were observed, independently of the size; namely, the beautiful thin hairy-form masses, the spherical masses, and some clouds that in their general appearance were thin, but, instead of exhibiting the hairy-form structure above noticed, presented a somewhat nebulous appearance, but were well defined. The formation of all these clouds from the longitudinal variety of cirro-stratus was well traced. While these phenomena were occurring, some well-marked specimens of quintus were seen forming on a clear blue sky, and rapidly augmenting in size, until the third series (tertius) was attained. It was remarked that, while the masses were augmenting in size, each retained its relative position with respect to those surrounding it; so that when a nucleus was formed, that nucleus, which at first was very near the surrounding nuclei, retained its relative position with respect to them, although, as the mass increased in size, its centre was farther removed from the centres of the others. This process continued during the afternoon, which was windy. The motion of the cirro-strati and cirro-cumuli was S. W.

May 30. 1833.—About noon, I noticed the inferior position of crinis fibratus, which is a modification of cirrus, and is generally observed in the higher regions of the atmosphere. Some well-marked specimens were seen distinctly projected on a fine blue sky, which was quite destitute of any nebulosity. These specimens appeared between two ranges of cumulus, the varieties prevalent in fine weather: the fibrati appeared to penetrate some of the specimens. The general arrangement of the fibrati indicated a polarisation S.W. and N.E.; and they were moving from the N.W. As they approached the zenith, they assumed the character of mares' tails, the points being drawn out towards the N.W. The colour of these clouds was beautifully white, and their outlines sharp and well defined. The upper specimens of cumulus were moving with an easterly

motion, very slightly inclined to the N.E., while the motion of the lower range was due E. Upon comparing these motions with that of the fibrati, and taking into consideration the position of the fibrati, it appears probable that their motion was not occasioned by wind. (?) As some of the specimens of fibratus approached the S. E., they presented the appearance of a brush, the head of which was bounded by curvilinear fibres, and directed to the S. E., while the portion towards the N. W. was drawn out into fine points, which diverged from each other. It is worthy of remark, that the velocity of these specimens was the same as the usual velocity of the varieties of cirrus, which is much slower than the usual velocity of cumulus. Whatever agent contributed to the formation of these clouds, it is evident that it caused them to move forward against the wind; the motion of the fibrati and cumuli being nearly opposite in direction, and the fibres of the former being driven back by the current against which they were advancing. A very clear afternoon and evening followed: a few specimens of cirrus were noticed, varieties which had not occurred previously to the exhibition of fibratus.

The mares' tails are usually regarded as an indication of wind. I find in my journal the following remarks: — "May 29., 2 P. M. Little wind." At this time the cumulus usually seen in foul weather, with a superior sheet of cloud, was observed. "May 30. 1 and 2 P. M., Sunshine with wind. May 31., 1 and 2 P. M. Same, with the extended variety of cirro-stratus and fibrus filiformis, a modification of cirrus." These, with the usual occurrence of wind after displays of the aurora, appear to connect these clouds with electricity. It is remarkable, that the phenomena of wind should have been observed at the time of the observation of crinis fibratus, the day before, at the same time, and the day after, also at the same time.

June 15. 1833. — In the evening of this day, cirro-cumulus was observed. The modifications noticed were, quintus, quartus, and tertius: they were seen forming on a fine blue sky, and gradually augmenting in size, as on May 3. At this time, crinis fibratus was very prevalent, and was observed both above and below the cirro-cumuli: the inferior specimens were very well defined (similar to those of May 30.), and drawn out into fine hairy-form points. I particularly remarked, that the motions of the superior and inferior specimens were identical, and that the motion of the cirro-cumuli crossed their path at an acute angle. The cirro-cumuli, which had been prevalent during the whole day, were moving W. by S.;

their motion during the preceding parts of the day was as follows: — 8 A. M., W. by N.; 10½ A. M., W.; 1 P. M., S.W., cirrus fibratus at 5½, and during the evening, was moving W. by N.

ART. XI. *A Lecture on the Mineralogy [and the Geology] of Nova Scotia.* By Mr. TITUS SMITH, delivered on March 5. 1834, before the Halifax Mechanics' Institute, and printed by order of the Institute. [Communicated to this Magazine by R. G.]

SPECIMENS.

IN describing these specimens the term "rolled" is applied to worn fragments of which there is no mass near to the place in which they are found, and there are several of which I have seen no mass in the province. Those specimens whose locality is not named, are from the township of Halifax.

Slate 1. Mica slate, rolled piece, not common.
Slate 2. Ironstone slate, with oolite (supposed coral gravel) projecting.
Slate 3. The same with the oolite decayed.
Slate 4. Alum slate.
Slate 5. Ironstone with crystals of hornblende.
Slate 6. Ironstone containing pyrites.
Slate 7. Hard calcareous slate containing pyrites. Not burning to lime.
Slate 8. Calcareous slate containing pyrites. Burning to lime.
Slate 9. Slate without pyrites, containing veins of limestone. Preston.
Slate 10. Calcareous slate, containing garnets. Burning to lime.
Slate 11. Siliceous slate.
Slate 12. From under peat, showing the cavities where pyrites had been.
Slate 13. Ironstone slate contiguous to the common slate.
Slate 14. Siliceous, with herborisations.
Hornblende 1. Rolled piece. Shubenacadie.
Hornblende 2. Approaching to whinstone, large rolled pieces. Preston.
Hornblende 3. In granular quartz, large rolled piece. Preston.
Hornblende 4. Mixed with quartz, large rolled stone. Preston.
Quartz 1. Greasy quartz.
Quartz 2. Crystallised quartz.
Quartz 3. Quartz passing into jasper.
Quartz 4. Quartz with iron ore.
Quartz 5. Amethystine and crystallised quartz. From the granite district.
Quartz 6. Quartz and slate.
Quartz 7. Whinstone veined with quartz.
Iron 1. Ore formed mostly within thirty years, from decomposed vitriol dropping from a slate rock, near the head of the North-west Arm.
Iron 2. Red ironstone, partly crystallised, rolled piece. Hammond Plains.
Iron 3. Magnetic iron ore, rolled piece. Shubenacadie.
Iron 4. Herborisations of red oxide of iron, in the same kind of sandstone with iron 2., rolled piece. Shubenacadie.
Felspar 1. Common.
Felspar 2. Semitransparent and opaque felspar mixed.
Felspar 3. A fragment of pellucid felspar containing shorl.
Shorl 1. From the line where the ironstone and granite unite.

Shorl 2. From south side of a granite island worn by the sea.

Co. Conglomerates cemented by quartz, lime, or a mixture of one or both with oxide or carbonate of iron. Masses of most kinds in the province.

Co. 1. Conglomerate passing into jasper porphyry.

Co. 2. Common conglomerate composed of slaty soil cemented by iron ore, little differing from bog ore, and formed from the vitriol of the slate. This is called common because large masses of it occur in such abundance in slaty districts. Properly speaking, this is not a conglomerate; but, as most of the others have been formed by the petrifaction of large masses of heterogeneous materials literally rolled together, this could not properly be classed apart from similar rocks because its materials were not brought together in the same way.

Co. 3. Composed of grains of quartz in concentric layers.

Basalt. From its glittering fracture, it is probable that it has been formerly in a state of fusion: very rare; always in rolled pieces of small size. A good stone for touch-stones.

Po. Porphyries and porphyroids. Scattered all over the province in small fragments. Most plentifully in clayey soils.

Po. 1. Porphyry containing spherical pebbles.

Po. 2. Porphyry with basis of siliceous slate. Shubenacadie.

Transition stones.

Tr. 1. Ironstone slate near the line of granite.

Tr. 2. Fragment of a rolled piece of ironstone embedded in granite.

Tr. 3. Whinstone porphyroid adjoining granite.

Tr. 4. Fine-grained granite, abounding with mica, embedded in common granite in rounded and angular pieces.

Tr. 5. Granite stained with oxide of iron, resting on ironstone.

Limestone 1. Fetid. North end of Great Shubenacadie Lake, in loose pieces; but there is probably a large mass near, as it is near to gypsum; but, the soil being deep, the rocks are not visible

Lime 2. Porous limestone, rolled stone. The nearest mass that I have seen of this species is on the west side of Margaret's Bay, in granite. It appears to be about 100 yards in breadth, and is the only instance that I have met with of a large mass or vein of any other stone in granite. On the eastern shore of the bay, some limestone appears opposite to this, and a few fragments are thrown by the sea on Lawrencetown beach. Limestone resembling this may be found beyond Ardoise Hill; but the fetid limestone is most common there.

Lime 3. A fragment of marble, susceptible of a fine polish. North end of great Shubenacadie Lake.

Lime 4. Granular limestone, composed of oolite resembling that in ironstone slate. By heating it, the cementing part assumes a different colour, and shows the oval grains.

Carbonate of iron. Where small brooks run from swamps of peat earth over a soil that contains any vitriol, they usually deposit this substance for a distance of thirty or forty yards below the swamp, and sometimes much farther. Many persons have mistaken it for coal or iron ore. It appears to be a part of the carbonaceous and extractive matter of the peat dissolved in water; which, uniting with the oxide of iron in the vitriol that it meets with, precipitates with it, and also generally gives a similar coat to the stones it passes. It contains very variable proportions of iron; for some specimens, when dried, will float, and burn without flame. Others are heavier, and incombustible till red-hot. There are some fertile soils half covered with broken whinstone, which has a worm-eaten appearance. This stone contains limestone gravel diffused through it, which is decomposed where it is exposed to the air. A brook running from a swamp with water

of a brown colour will, upon passing this whinstone, deposit a considerable quantity of this carbonate, and become perfectly clear.

It appears that a certain portion of vitriol is useful in freeing water from the peat, as that is in separating the vitriol; for on granite barrens, where there is generally no vitriolic mineral, the water is invariably brown; and upon the granite islands, where there is very little soil except turf, it is nearly black, and seems to be poisonous to cows and sheep. So far below where a brook issues from a swamp as this substance is deposited the water has a fertilising quality, producing fiorin grass, and crow-foot; but when it has deposited all the carbonaceous matter, the herbage changes to the common plants of moist barren soils. As whinstone soils generally hold but a small quantity of vitriol, the water from swamps retains a portion of this substance for a greater distance in running upon them, and may be often profitably employed as a manure for grass, by turning the brook along the side of a hill. On a rusty slate soil, the vitriol will so quickly change it to a stony substance, and precipitate it, that it is there of little value.

This substance has been used as a paint. It is a very dark brown. To prepare it for a paint, it ought to be heated red-hot in a covered crucible, or other vessel that will bear the fire; then ground, and mixed with water, which should be allowed to stand for a few seconds, that the sand may fall; from which it should be poured off into another vessel; and, when it has all subsided, the water may be carefully drained off. It will then, when dried, be in a proper state to grind with oil. (The box which contains the specimens is stained with it.) Agate. Lawrencetown beach.

Flints. Fl. 1. A fragment of a piece of transparent quartz encrusted with flint, from Mr. G. White, Cornwallis.

Fl. 2. Flint and chalcedony from Mr. Scot's farm, Ballynan River, being part of a stone of more than 1 cwt.

Fl. 3. Clements farm, Ballynan, about nine miles north of Shubenacadie. In both places found near fetid limestone.

Fl. 4. Rolled piece; twenty miles up Windsor Road. Properly jasper.

Crystal. Fragment of; granite hills north of Preston.

Marl. Clements farm, Ballynan River. It is a mixture of decayed freshwater snail-shells, and the white earth commonly found at the bottom of peat earth, that is under cold spring water. It appears to be a valuable manure.

Garnets, separated from a portion of slate 10, that had fallen to dust by exposure to the air.

L. W. The two specimens with this mark are pieces of a West India limestone. One of them is manifestly the soil of the sea shore petrified by water dripping from limestone. The condition of the shells proves that they were inhabited by living animals at no very remote period, and that the petrifaction is of recent formation. The other (a fragment of the same stone) differs little from the steatities, which, by cementing together fragments of quartz, forms the burr millstone. Could not these millstones be made by arranging fragments of quartz within hoops, in situations where they would be exposed to the drip of water which strains from the fissures of shivered limestone, and partially excluding the air? For water usually dissolves a portion of most kinds of limestone that contain but a small portion of other earths; and this water generally forms petrifactions when it falls into caverns from which the external air is partly excluded.

Lapis ollaris. A rolled stone containing specks of soap-stone.

Fragments of selenite from slate.

Micaceous and semicrystallised iron ore from Cobequid. This last approaches to plumbago, and would probably make pencils.

In forming a collection of fossils, designed rather to throw some light upon the mineralogy of this country, than as a cabinet of curiosities, I have thought it best to commence with our most common rocks. They are undoubtedly the most ancient, and probably form the basis upon which the others rest. In learning something of their relative situations, and of the materials which compose their external parts, we shall necessarily acquire some geological knowledge, and may also learn some things that will be of use to us. In giving the reasons for which these specimens have been collected, I have found it necessary to state, not only what I have seen, but also what I have thought: to state the consequences that seemed to me to follow from the facts I had observed. I am sensible, that some of these opinions will appear strange to many persons, who, being in the habit of employing their minds in more profitable speculations, have paid little attention to this subject. I have adduced several facts to show the probability of these opinions, but do not expect they will strike the minds of others with the same degree of evidence that they do my own; for a multitude of slight proofs, derived from facts observed during many years' attention to a favourite study, will leave an impression on the mind which is not easily conveyed to others.

In a society like the Mechanics' Institute, designed for diffusing useful knowledge, our stores must necessarily, and ought to, be drawn principally from the treasures already accumulated in Europe; but, if there is any subject upon which we can add something to the common stock, and repay a little for the much we receive, it is, perhaps, natural history; for we here possess the advantage of viewing a part of the earth more in its natural state than any country which has been long possessed by a civilised race.

Geologists generally appear to be divided into two parties, one of which supposes that the large masses of rock were formed by the agency of fire; while their opponents maintain that they were crystallised from a fluid which held them in solution. That there are in this province rocks which have been formed in both these ways, there is no doubt; but it appears to me that the greater part of the large masses which compose the basis of this province have acquired their present form in a somewhat different manner. He that dares to believe the evidence of his own senses, in opposition to such authority as can be adduced in support of the common theories, has no right to expect that his opinions shall be regarded any farther than he supports them with sufficient evidence. It is certain that, in the great volume of nature,

there are records, not written by the hands of man, which throw some light upon the geological history of remote periods, and give us some knowledge of the operations of the Former of all things. If these records are obscure, their authority is undoubted. To decipher them has afforded the writer much pleasure in many a lonely and wearisome walk: for it is only by attending to the work that we can learn the design of the workman; and it is with a view of throwing some light on this subject that a part of these specimens have been collected.

Nova Scotia may be considered as a low portion of a mountain range, a large proportion of it being a solid rock covered with a shallow soil mixed with broken stone. Of this rock the greater part is granite. It composes most of the highest, steepest, and most abrupt and irregular hills in the province. It is divided into three distinct masses; one of which forms the basis of the greater part of the township of Halifax, commencing near the mouth of the North-west Arm, and passing about two miles west of the Dutch Village, continues, upon an average, within five miles of the Windsor road on the south-west side, and, swelling into lofty hills on the south of the townships of Windsor, Falmouth, and Horton, extends, under the name of the South Mountain, beyond Annapolis; then crossing Sissiboo River, and in some places approaching the sea, in others at eight or ten miles distance from it, bends to the left round the great barren plain of whinstone, which forms the centre of the south-west part of the province, and ends a considerable distance on this side of Shelburne. The second, the least, but the most naked and mountainous, commencing near the north end of Lake Major, in Preston, passes by the head of Chizzetcook harbour, and, crossing the Musquodoboit, ends a few miles beyond it upon the elevated plain of broken whinstone; which, skirting the granite ridge on the north side nearly its whole length, extends beyond it between Musquodoboit and the sea shore, almost to St. Mary's. The third, commencing a little east of Parrsborough, stretches across to within five miles of the Gulf shore at Tatmagouche, and, forming the high land between Cobiquid and Pictou, extends as far as Antigonish River; from whence, though the hills continue, the rocks change to greywacke and coarse limestone.

Besides these three large masses, there are some other small portions of granite; but they are of inconsiderble extent. In some parts of the province, very good land covers a rock of this kind; but a large proportion of the hills are nearly or quite naked. Upon these lie scattered innumerable blocks of

granite, varying from 5 ft. to 40 ft. in diameter, and resting frequently upon a few small rolled stones. They are also always found in abundance upon hills of other kinds of rock, which are near to and south of masses of granite; and a few, some of which are large, are found at a great distance, but always rounded, or in the form called rolled stones. The granite hills always show abundance of irregular fissures; nor is it easy to find a place where a line could be stretched 100 ft. without crossing a crack. Besides these open fissures, there are many seams which appear like fissures united, the small ones with quartz, those that are 3 in. or 4 in. broad, with felspar. Rarely a fine-grained variety will be found extending for a mile or two, which separates, where it is exposed to the air, into pieces of a good form and size for building-stones. Within ten or fifteen miles of Shelburne, there are some ledges composed of layers 6 in. or 8 in. thick, which stand vertically, and are separated from each other by clefts about 2 in. broad, filled with scales of mica. Granite varies very much in the size of its grains, and in the colour and quantity of mica it contains. There are also large masses which have their felspar stained with red or yellow oxide of iron. This variety is not fit for building-stone, as it is subject to decay when exposed to the air.

Whinstone (trap) is, next to granite, the most abundant rock. As it generally alternates with slate, except upon the great elevated plains above mentioned, it is necessary in describing its locality also to give that of slate. Some idea of the proportion which these rocks bear to each other may be obtained from the following extract from the journal of a walk of 580 miles in that part of the province which is south-west of the road from Halifax to Windsor. In travelling this distance, I passed 350 miles of granite, 173 of whinstone, eleven of whinstone and greywacke, and fory-seven of slate. As the slate always runs in a direction a little north of east, and south of west, and I travelled in every direction, this, although the best approximation that I can give, will be an imperfect representation of the proportions of slate and whin. To this it should be added, that I travelled little within ten miles of the sea shore, where slate would have been found in a greater proportion.

The whinstone is generally of a light blue within, and of a greyish white on the surface: its fracture *invariably* splintery. It is deprived of its iron, and partially decomposed, by lying under peat earth or the turf of woods, and forms those beds of light dusty sand which are frequent on the shores of lakes. This sand shows no particles of quartz, is easily rubbed into

fine powder, and fuses at a heat little exceeding that required to melt brass. In a few places, the whinstone is cleft into layers, which have a vertical position, and east and west direction, like slate. Many portions of it have separated in straight lines, leaving pieces with one, two, or more plain surfaces; and, in a few instances, all the surfaces are plain, and the pieces have six faces, which are sometimes nearly square, but far more frequently trapezoidal. It may be observed, that the stones which have one plain surface can frequently be broken by the hammer at right angles with, but never in a line parallel to, the plain surface, although they sometimes break in that direction when exposed to fire. Consequently, a stone which has the form of a cube, or parallelopipedon, is spoiled for a building-stone by attempting to break it in the middle, as it is sure to separate in a diagonal direction. It is not easy to find a block of whinstone 3 ft. in diameter which does not contain a number of fragments (for the most part of an angular form), which are distinguishable by a different shade of blue, a coarser or finer grain, and a different direction of their fracture. In many instances these fragments compose the greater part of the stone.

As every variety of our whinstone shivers to pieces when exposed to fire, and the blocks which are exposed to the air all show a disposition to separate, sometimes in straight lines, but far more frequently into irregular fragments, I conceive that the greater part of the masses of this rock were, at some former period, broken pieces thrown together, without order, with their interstices filled by the sand which it forms as it decays (a state in which it may be found in many places under peat and turf), and that, by a recrystallisation of the sand, they became again solid rocks; which, being composed (with the exception of the part newly formed) of fragments, whose natural lines of fracture were in many different directions, would be incapable of breaking in any uniform manner, either under the hammer, or when exposed to fire or frost. Although the fact is well known to those who are constantly employed in quarrying stone, it may be useful to some persons to know, that building-stone can be most easily procured from whinstone, in those situations where the greatest proportion of stones with what are called smooth faces are found. Whinstone (that which has a regular fracture not excepted) frequently contains rolled pieces of blue limestone, which, when first broken, cannot be distinguished from the whin in which it is embedded, except by its fracture, which is rather cubicogranular than splintery: but, after a few days' exposure to the atmosphere, it becomes brown, and

finally changes to a black rotten stone, that soon crumbles into sand, leaving, as it decays, those semi-oval and hemispherical cavities which may be often observed on the surface of our trap rocks. Rolled and worn pieces of soft slate are also sometimes found embedded in whinstone, which also sometimes holds a very small quantity of pyrites, almost always crystallised in those regular forms to which the term of marcasites has been applied.

Where hills of whinstone are nearly bare, perpendicular ledges may often be observed, running in an easterly and westerly direction, and facing the south. Upon ascending the ledge, there is either a level or a gentle descent extending northerly for, perhaps, a hundred yards, when we meet with another; and in this manner they continue often for a quarter of a mile or farther.

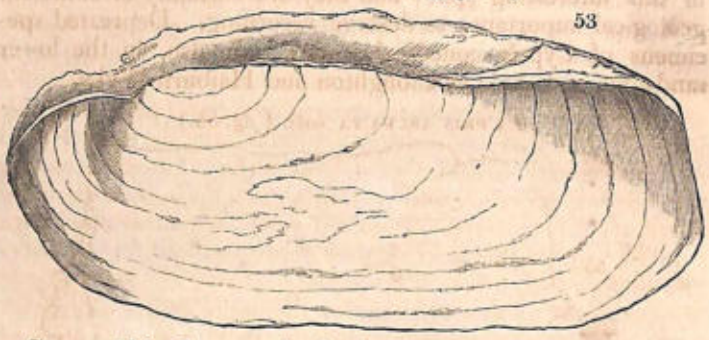
In describing the situation of the whin which alternates with slate, it is necessary to observe, that there is a strip of land on the shore of the Bay of Fundy, commencing near St. Mary's Bay, and extending to Cobiquid, varying from five to twenty miles in breadth, which has a deep soil, with but little stone on the surface, and which generally rests upon rocks that I have not yet mentioned. With the exception of this strip of ground, and the granite and whinstone districts already noticed, nearly the whole of the land south-west of a line from the middle of the township of Rawdon, to the middle of the great Shubenacadie Lake, and from thence to Lawrencetown, and the greater part of the land within ten miles of the shore from Lawrencetown to Manchester, rests upon a rock which is alternately slate and whinstone. The surface of ground that rests upon slate is usually covered with broken whinstone for half a mile southward from the line of junction of a band of it with whinstone. Where either of these kinds of rock lies south of a mass of granite, the surface stones, for a considerable distance, are granite. When the soil is removed from these rocks, the slate frequently, and the whinstone in some places, appear to have a smooth surface, marked with lines which seem to have been formed by the attrition of some hard substance moving in a north and south direction. Some of these lines are near an inch in depth, others only slight scratches. Mr. Whiteman, whose business has given him many opportunities of observing them, informs me, that he has sometimes observed them upon granite, and that he has always found them to bear nearly a north and south direction in every part of the province.

(To be continued.)

ART. XII. *Description and Figures of* U'nio distórtus Bean, *and* Cỳpris concéntrica Bean, *from the Upper Sandstone and Shale of Scarborough; and* Cỳpris arcuàta Bean, *from the Coal Formation of Newcastle.* By WILLIAM BEAN, Esq.

U'NIO DISTO'RTUS *mihi.* (*fig.* 53.)

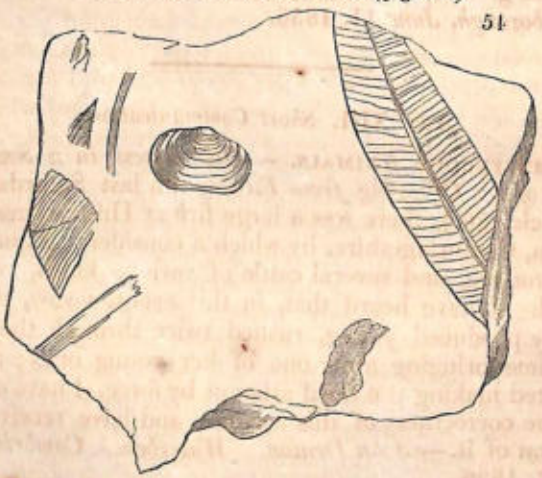
53



SHELL 2½ in. long, and 5 in. broad, transversely undulated or imbricated, brown, glossy, and rounded at both ends; hinge line nearly straight, with the beaks near the anterior extremity. From Gristhorpe Bay, in the upper sandstone and shale of Phillips, where depressed and distorted casts of this shell occur very plentifully at the top of the rich bed of oolitic plants in the above named locality.

CY'PRIS CONCE'NTRICA *mihi.* (*fig.* 54.)

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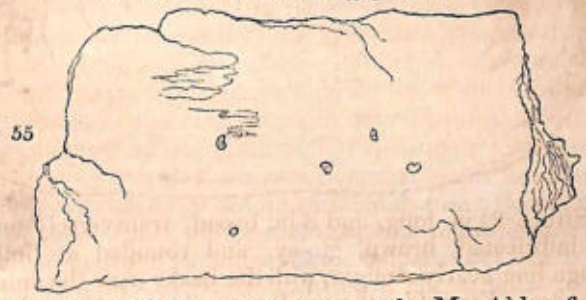


Shell oval, convex, one end a little broader than the other, strongly wrinkled transversely, and covered with minute concentric striæ; the hinge line is prominent; and this species has more the appearance of a bivalve shell than any of its congeners. Colour pale brown. Length nearly four lines.

Breadth six lines. The monarch of this tribe, from the same place as the last, where it occurs sparingly in every part of the sandstone and shale that contains vegetable remains.

Only these two species of shells have yet been discovered in this interesting spot; and they are certainly of sufficient geological importance to deserve recording. Depressed specimens of Cỳpris concéntrica are found, also, in the lower sandstone and shale at Cloughton and Haiburn Wyke.

CY'PRIS ARCUA'TA *mihi.* (*fig.* 55.)



Another species of this genus, sent to us by Mr. Alder, from the coal formation of Newcastle. It is less than the Cỳpris fàba of *Mineral Conchology*, smooth, brown, glossy, and distinctly reniform, with a slight depression in the middle of the front margin.

Scarborough, June 11. 1836.

ART. XIII. *Short Communications.*

MAMMIFEROUS ANIMALS. — *Devotedness in a Sow to the Rescue of her Offspring from Fire.* — On last Saturday [Feb. 19. or else 26.], there was a large fire at Hillrow, near Haddenham, Cambridgeshire, by which a considerable quantity of farm produce, and several cattle of various kinds, were destroyed. I have heard that, in this event, a sow, that had recently produced young, rushed twice through the flames, each time bringing away one of her young ones; and was prevented making the third attempt by force. I have enquired as to the correctness of this account, and have received confirmation of it. — *John Denson. Waterbeach, Cambridgeshire, Feb.* 27. 1836.

BIRDS. — *Seeming Proof of Reasoning in an Individual of the Domestic Cock.* — One of these birds, about two years old, belonging to my neighbour, whose premises are separated from mine by a range of stables, &c., regularly pays me a visit at the breakfast and dinner hours. I do not keep any poultry

myself. He flies on the top of the stables, and watches our motions through the window during breakfast, generally between 8 and 9 o'clock; and, as soon as the meal is ended, he descends into my yard to partake of the crumbs, with which my children take great delight in feeding him. After he has picked his, sometimes, "scanty meal," he amuses himself for an hour or so, and then returns to his own premises, but pays us another visit at dinner-time. If, at any time, he is not so punctual as usual, great anxiety is manifested by my family, and, I must confess, by myself too, for his welfare. After dinner, we have sometimes supplied him with a bountiful meal, which may, perhaps, be a strong inducement for him to continue his visits. All this is the effect of instinct; but his conduct, within the last ten days, appears to be the result of forethought. On an ample meal being placed before him, he has manifested great anxiety for some of his fair companions to partake of it with him: this he has strongly shown by taking up pieces in his mouth, calling with loud anxiety, breaking the pieces into smaller portions, and laying them down again; then pacing to and fro, as if in the expectation of the arrival of some of his companions; renewing the dividing of the larger pieces into smaller, and calling with increased anxiety. On two occasions, he has left his meal untouched, so far as regards eating any portion of it himself, returned to his own premises, and brought a hen with him to share in his good fortune. On the first occasion, the hen only accompanied him to the top of the stable; but, on the second, she descended and partook of the meal with him, which seemed to give him very great pleasure: but, whether it was the same hen that accompanied him the second time, I cannot positively say. — *W. H. White. London, Nov.* 10. 1834.

[*The Blackbird, an Instance of its Mimicking a Nightingale in its Song.*] — Are British birds given to the imitation of each other? One morning last week [the date, as to time, of the communication, is May 22. 1836.], at about two o'clock, I was awaked by the singing of what I at first thought was a nightingale among the trees, close by the house. On going to the window, I found it was a blackbird, but, evidently, in the act of mimicking a nightingale, which was warbling away most melodiously in an orchard at a short distance below my garden. It was no despicable attempt either; and, if it should have the effect of enticing the nightingale nearer my abode, which, it seems to me, was the blackbird's intention, I will forgive the impudence of my black friend, and readily overlook sundry peccadilloes in the fruit line, which have been, at divers times, laid to his charge. Did you ever happen to hear of a similar mock-bravura case? — *S. Taylor.*

Whittington, near Stoke Ferry, Norfolk, May 22. 1836. [In IV. 433. is an account of a blackbird, in a wild state, being observed to crow like the domestic cock. In VIII. 572. is an account of an instance of a similar case: in this account, "Lindsiltown" should be "Lindsietown." In V. 427. is an account of a wild blackcap heard singing so like the nightingale as to be at first taken for it. Notices of the mocking powers of the sedge bird (*Currùca salicària Fleming*) are in V. 653, 654.; VII. 486, 487.]

ART. XIV. *Queries and Answers.*

THE Great Bat (*Vespertílio Nóctula* Turt., V. *altívolans* White). — Has a female of this species ever been seen by any of your correspondents? as the existence of the kind, as a distinct species, seems doubtful [unless the occurrence of both sexes of it be known]. I have lately, at different times, had five specimens, all males, perfectly agreeing with Gilbert White's description, who seems to doubt whether those he saw "may not be the male part of the more known species." (*Letter* 46.) The history of British Cheiróptera appears involved in obscurity, owing, doubtless, in part, to their scarcity, and the difficulty of procuring them; from which it is to be hoped it will soon arise by the exertions of naturalists of the present day. — *T. Franklin, jun. Walsall, May* 21. 1836.

[Perhaps our correspondent has not seen the account of the British species of bat in Jenyns's *Manual of British Vertebrate Animals.* In our VIII. 570. is a notice by O. of his observing an individual of the *V.* altívolans *White*, between Parndon and Harlow Mills, apparently in Essex.]

To what Properties of Nature is it owing, that the Stones in Buildings, formed originally of the frailest Materials, gradually become indurated, by Exposure to the Atmosphere and Age, and stand the Wear and Tear of Time and Weather every bit as well as, in some Instances much better, than the hardest and most compact Limestones and Granite? — I was particularly struck with this fact the other day, while rambling over Bodjam Castle, in Sussex; one of the finest old ruins, and in the most perfect state of preservation, by the way, of any in Great Britain. This castle is built of sandrock, furnished by some quarries in the vicinity, which is remarkably soft, shivering to pieces with the blow of a hammer. The building, however, more than five centuries old, has suffered but little from the ravages of the weather, and appears to have been impervious to the rains and frost, those powerful mechanical agents in the decomposition and disintegration of rocks. The different degrees of

hardness of the stones according to age, though evidently all the same variety of sandrock, are clearly discernible in the various repairs which have, from time to time, been made; the newer pieces of stone cracking and crumbling when struck with a hammer, the older remarkably firm. The mortar, also, in the most ancient part of the building, as I have observed, indeed, in many of the old castles in Wales, is as compact and hard as any stone I ever met with. Sir Humphrey Davy, in his last and interesting little work, *Consolations in Travel; or, the last Days of a Philosopher*, observes (p. 119.), that some of the largest and most magnificent ruins in Rome, such as the triumphal arches and the Colosseum, owe their duration to the travertino of which they are built; originally "formed by a variable source of the most perishable materials," having hardened by time. This travertino is procured from the Velino, near Terni, a cascade containing calcareous matter brought down by the Apennines, dissolved by carbonic acid gas, which "deposits marble, which crystallises, even in the midst of its thundering descent and foam, in the bed in which it falls." (*Id.*, p. 113.)

A paper, by one of your travelling correspondents, stating the materials which some of the most remarkable monuments of ancient and modern times are built with; and particulars as to how they have stood the weathering, as it is generally termed; mentioning, at the same time, the mean temperature of the climate, quantity of rain falling per annum, prevalent winds, and the like; would be highly interesting to your geological readers. — *W. Perceval Hunter. Sandgate, July* 10. 1835.

The Isle of Sheppey, Facts and Questions, on the Geological Conditions of. — In a ride round the Isle of Sheppey, last week, I collected and purchased a great variety of fossil fruits and berries, part of a fossil lobster, some crabs, a large nautilus; and very nearly succeeded in procuring a tortoise, which, unfortunately, had been sold only a few hours before my arrival, of a woman collecting iron pyrites on the beach. My gratification at possessing what appeared to me a most interesting and durable collection of fossils was, however, materially diminished on paying a visit, on my return to Sandgate, to Mr. Hills's beautiful collection, at Lympne, in greensand and gault fossils, as extensive as any in the kingdom. Several specimens in his cases have fallen to pieces; and he assured me it was more or less the case with every thing from Sheppey, owing to the immense quantities of iron pyrites contained in the fossils. He recommended me to wash mine well over with turpentine and lamp oil: but even this, he said, was not sufficient. [See in VI. 480.]

Can any of your Correspondents recommend something more

efficient to prevent the Decomposition of these interesting Fossils? — Will they also have the kindness to give me some information respecting

The Nature of the Trees and Plants to which these numerous Fruits and Berries are supposed to have belonged? — No less than 700 specimens of different fruits and ligneous seed vessels, according to Conybeare (*Outlines of Geology of England and Wales*, p. 29.), none of which agree with any now known, have been procured by Mr. Crowe of Faversham; but of what nature these plants were, none of the works I possess on geology give any intelligence; save that Lyell mentions (*Principles of Geology*, vol. iv. p. 159.), that some of them resemble the cocoa-nut, and other spices of tropical regions; and we may naturally infer, from the bones of the crocodiles, the turtles, and large Naútili found in the London clay, of which the Isle of Sheppey is composed, that they must have resembled some of the genera now inhabiting warm climates. Before dropping my pen, I have two more queries to put respecting this island.

What is done with the immense Quantities of Pyrites collected by the Women and Children on the Beach, which is shipped off, they told me, to London? — Before visiting the Isle of Sheppey, I had always imagined iron pyrites to be a substance wholly useless.

*Whence is the green-coloured calcareous Spar, sometimes more than a Quarter of an Inch thick, so commonly found on splitting open the ovate-shaped Nodules, or Septaria * as they are more properly called, of the hard blue-coloured argillaceous Limestone (from which, when ground down into Powder, that excellent Material for Building and Stucco, called Parker's Cement, is made), found in the London Clay of Sheppey, derived?*

Before leaving the Isle of Sheppey, I cannot refrain from directing the attention of your readers to a statement in Lyell's celebrated *Principles of Geology*, which appears to me, with all due deference to so high an authority, very greatly exaggerated. "The church at Minster, now near the coast, is said to have been in the middle of the island fifty years ago; and it has been conjectured that, at the present rate of destruction, the whole isle will be annihilated in about half a century." (Vol. i. p. 407.) Now, I was at Minster only a week ago; and I beg to assure your readers, that it is still a good mile and a quarter from the sea; so that, supposing Mr. Lyell's measurement of this island (which he states to be about six miles long by four in breadth) to be exact, this part has lost

* Septaria (derivation: *septa*, enclosures), flattened balls of stone, which, on being split, are seen to be separated in their interior in irregular masses.

very little more than half a mile since the time specified; a vast quantity certainly, but nothing equal to what is insinuated in the text. As to the last statement, it appears to me so extraordinary, and was so heartily laughed at by all the inhabitants of the island to whom I mentioned it, that I cannot help thinking it must be a misprint, or, at all events, a slip of the pen. The cliffs on the north are from 60 ft. to 80 ft. high; and rising ground (richly cultivated land, producing most excellent wheat, and tolerably good hops), extends to near the centre of the island; so that, even allowing fifty acres to have been lost, as stated by Mr. Lyell, within the last twenty years, some part of the island, I should imagine, will be yet standing at the end of the next century, nearly four times the period assigned by Mr. Lyell for its total annihilation. Such, at least, appeared to me to be the prevalent impression of the inhabitants, as well as of several other persons who have visited the island, among them two geologists, to whom I have subsequently mentioned it. — *Wm. Perceval Hunter. Sandgate, July* 10. 1835. [Mr. Hunter subsequently added as follows.] The cliffs are certainly falling rapidly away. In some places, their decay is accelerated by landsprings which eat into the clay, and occasion landslips. The woman of whom I purchased my fossil nautilus was about to leave her house, and a small garden adjoining the cliff, as she no longer considered it a safe place of abode. She informed me that, during her younger days, some twenty or thirty years ago, at a house not far from the cliff, where she was stopping for a few days, the inmates were awakened early one morning, after a very tempestuous night, with the disagreeable intelligence, that the garden adjoining their habitation, which was about seven or eight rods from the extreme edge of the cliff, containing a fine crop of peas, beans, gooseberry bushes, and a few old apple trees, had disappeared; having, in the course of the night, been carried off by a landslip, and hurled down into the stormy sea below. The house itself was tottering to its foundation; and the occupiers quitted it in trembling precipitation. Such incidents are far from rare on the north-east of these crumbling cliffs. — *Sandgate, July* 28. 1835.

ART. XV. *Retrospective Criticism.*

DR. TURTON, in his "Origines Zoologicæ" in this Magazine (VII. 407.), *observes, that "the descent of the Holy Ghost upon the Redeemer, at his Baptism, was in the form of a Dove."* (Matt. iii. 16.) — This, I am aware, is a very usual mode

of interpreting the words of the Evangelist, "*katabainon hōsei peristeran*," "descending like a dove;" or, "as it were, a dove;" and hence the figure of a dove is usually employed as an emblematical representation of the Holy Spirit. But it is, I conceive, an error to suppose that the Holy Spirit assumed the form or shape of a dove, although the expression in the English version will bear that sense. St. Luke (iii. 22.), indeed, says, He "descended in a bodily shape, like a dove" "*sōmatikō eidei hōsei peristeran.*" All that the evangelists assert is, that the Holy Spirit assumed on this occasion a visible bodily shape, and in that shape (whatever it was) descended in like manner as a dove is often seen to hover and descend in the air. The comparison to a dove relates not to the appearance or bodily form, but merely to the mode or manner of descent. The figure of a dove introduced into pictures, &c., to represent the Holy Spirit, and adopted originally from an erroneous interpretation of the sacred text, has probably mainly contributed to propagate the vulgar notion that the Holy Spirit assumed the bodily shape of a dove. — *W. T. Bree. Allesley Rectory, Sept.* 9. 1834.

REVIEWS.

Art. I. *Notices of Works in Natural History.*

Ensor E.: Natural Theology: the Arguments of Paley, Brougham, and the Bridgewater Treatises on this Subject examined: also the Doctrines of Brougham and the Immaterialists respecting the Soul. 8vo, 59 pages. 1836. This has been printed [by R. Taylor, London] for the Author's Friends, but may be reprinted by any one.

The author's purpose is to show the untenableness of some of the conclusions that have been drawn on the ends and objects for which natural things are as they are; and his mode of pursuing his purpose is mainly by instancing the inconsistency of some of the conclusions with facts, and with one another, when compared. The author's work, one thinks, is worth the best attention of every naturalist whose object in the studying of nature is the acquisition of instruction on the question of his "being's use and end;" although the manner in which the work may subserve to this object is, one judges, rather by showing him conclusions that are disputable, than by supplying him, in substitution, with those that are not.

It may be that portions of the work will be reprinted in future Numbers of this Magazine.

Jardine, Sir *W.*, Bart.; *Selby*, *P. J.*; and *Johnston*, *G.*, M.D.; conductors: The Magazine of Zoology and Botany. No. 1. June, 1836; 8vo, 112 pages, and 3 woodcuts in these, 2 plates of figures, most of them coloured. *3s. 6d.*

An abstract of the prospectus is given in our p. 278, 279. That, and the following account of the contents of No. 1., will be sufficient to enable the considerate reader to discern the character of the work.

"Some Remarks on the Study of Zoology, and on the present State of the Science. By the Rev. Leonard Jenyns, M.A., F.L.S., F.Z.S., &c." This contribution occupies 31 pages. It includes much instructive information on the principles of modern zoology, and indications of the anticipations that may be entertained of the science, under the prospect of the continuous application of these principles.

"On the Disunion of contiguous Layers in the Wood of exogenous Trees. By Rev. J. S. Henslow, M.A., Professor of Botany in the University of Cambridge." 3 and odd pages, including 2 woodcuts. Instances have been met with of the case of the occurrence of intervals between the concentric layers of wood in a tree, and inferences have been argued from the case relatively to theories of the manner in which the concentric layers are formed. Professor Henslow has described, and inferred on, an instance that he had met with.

"The Natural History of the British Entomostraca. By Wm. Baird, Surgeon." 6 and odd pages. This is the author's beginning of his treatise on the subject; and is a succinct history of the progress of naturalists' knowledge of the Entomostraca as to number of kinds, systematic relations, and habits. The author purposes to give, in a future number, various interesting details "under the history of each genus."

"Notices of British Fungi. By Rev. M. J. Berkeley, M.A." [Author of Part II., on *Fungi*, of Vol. V. of the *English Flora*.] 8 pages. The author has proposed to supply, from time to time, detailed descriptions and figures of such as are newly discovered, or are of any peculiar interest; and notices of newly discovered localities of the rarer species, and any additional information on such as are already recorded. In this contribution, 37 species are noticed or described. There are to be three plates of figures illustrative of certain of them: one plate, supplied, bears figures, most of them coloured, of 4 species, and details of them.

"Contributions to the Ichthyology of the Firth of Forth.

By R. Parnell, M.D. No. 1." More than 6 pages. The white bait (*Clùpea álba Yarrell*), the sprat, or garvie herring, (*C. Spráttus*), and the herring (*C. Haréngus*), are the species elucidated; and this is done in detail: as to personal characteristics, by description and a coloured figure of each species; as to habits, by description.

"The Honey Bee Community. Length of Life allotted to its different Members. By Edward Bevan, M.D." About 5 pages. The conclusions are, that the average length of the drone's life is about four months; that of the working bee's, about six months; and that of the queen's, about four years.

"On the genus Paradoxornis. By J. Gould, F.L.S., &c." More than a page. An Asiatic species of bird of remarkable form, described, and figured in a woodcut. Mr. Gould has preferred not to offer an opinion on its place in the natural system.

"The Natural History of British Zoophytes. By George Johnston, M.D., Fellow of the Royal College of Surgeons of Edinburgh. 1. History of Zoophytology." More than 17 pages. To be continued. Dr. Johnston's Descriptive Catalogue of the Recent Zoophytes found on the coast of North Durham, published, 1832, in the *Transactions of the Natural History Society of Northumberland, Durham, and Newcastle upon Tyne*, and noticed in our V. 702.; his announcement of his intention of publishing a work on the natural history of the zoophytes of Britain (VI. 267.); and his elucidation of some species in this Magazine (V. 43. 163. 631.; VI. 497.; VII. 491. 638.; VIII. 59. 81. 83.); bespeak his proficiency in this subject considered relatively to its difficulty, and the limited original examination that has been applied to the creatures which are the themes of it.

"Reviews and Critical Analysis." 21 pages. 11 pages and extra are given to a review of the *Iconographia della Fauna Italica* di Carlo Luciano Bonaparte, Principe di Musignano; from which interesting matter on Mammàlia and serpents is elicited.

"Intelligence: zoological, botanical, miscellaneous." 8 pages and extra. Under these heads are notices of the nature of the "Short Communications" of this Magazine.

"Proceedings of Societies." "Obituary." More than 3 pages.

No. 2. is to be published on August 1. It is proposed to include in it the first of a series of papers illustrative of the British Díptera: of the genera, by description and woodcuts; of the species, by description and by notices of localities. The

lending of specimens, and the communicating of notices of localities, are invited.

The Back Woods of Canada; being Letters from the Wife of an Emigrant Officer, illustrative of the Domestic Economy of British America.

This little volume has been published under the auspices of the Society for the Diffusion of Useful Knowledge, and contains much valuable information for those who, from choice or necessity, are seeking to exchange the unprofitable labours of the old country for the severe but more promising of those of the new. To use the words of the Introduction, speaking of the authoress, "Truth has been conscientiously her object in the work; for it were cruel to write in flattering terms, calculated to deceive emigrants into the belief that the land to which they are transferring their families, their capital, and their hopes, is a land flowing with milk and honey, where comforts and affluence may be obtained with little exertion. She prefers honestly representing facts in their real and true light, that the female part of the emigrant's family may be enabled to look them firmly in the face; to find a remedy in female ingenuity and expediency for some difficulties; and, by being properly prepared, encounter the rest with that high-spirited cheerfulness of which well-educated females often give extraordinary proofs." (p. 2.) And no one more so than the fair writer of the work before us. Who can rise from the perusal of the narrative of all the perils she encountered in the forest, perils and difficulties which might have appalled a stouter heart, without sentiments of admiration and respect? And yet there is not a particle of boasting from first to last: all is true to nature; and you feel as certain of the correctness of every particular as if you had seen them with your own eyes. For this, indeed, our personal knowledge of the authoress, of her high talents and respectability, is ample guarantee; and most sincerely do we wish her and hers that success to which they have proved themselves so well entitled.

A few extracts must complete our brief notice; and these we shall select from passages bearing more immediately on the natural history of Canada. On their way thither, there are many scenes described, which every lover of nature will enter into with peculiar gusto. Take the following as an instance: —

"The waters of the Otanabee are so clear and free from impurity, that you distinctly see every stone, pebble, or shell, at the bottom. Here and there an opening in the forest reveals some tributary stream, working its

way beneath the gigantic trees that meet above it. The silence of the stream is unbroken but by the sudden rush of the wild duck, disturbed from its retreat among the shrubby willows that, in some parts, fringe the left bank; or the shrill cry of the kingfisher, as it darts across the water. The steamboat put in for a supply of firewood at a clearing about half way from Peterborough; and I gladly availed myself of the opportunity of indulging my inclination for gathering some of the splendid cardinal flowers [Lobèl*ia* cardinàlis] that grew among the stones by the river's brink. Here, too, I plucked as sweet a rose as ever graced an English garden. I also found, among the grass of the meadow land, spearmint, and, nearer to the bank, peppermint. There was a bush resembling our hawthorn; which, on examination, proved to be the cockspur hawthorn, with fruit as large as cherries, pulpy, and of a pleasant tartness, not much unlike to tamarinds. The thorns of this tree were of formidable length and strength. I should think it might be introduced with great advantage to form live fences: the fruit, too, would prove by no means contemptible as a preserve." (p. 71.)

Among the plants met with around their settlement are enumerated the following: — A variety of shrubby asters of every tint of blue, purple, and pearly white; a lilac Monárd*a*, most delightfully aromatic; the white gnaphalium, or everlasting flower; roses of several kinds; a little plant like our box, but trailing, and with leaves of a deep copper red; lichens and *F*úngi in abundance; strawberries of many varieties; orange lily; phlox, or purple lychnidea; the mocassin flower, or lady's slipper; lilies of the valley; Lobèl*ia* cardinàlis, &c., "I am," says our authoress, "half inclined to be angry when I admire the beauty of the Canadian flowers, to be constantly reminded that they are scentless, and, therefore, scarcely worthy of attention: as if the eye could not be charmed by beauty of form, and harmony of colours, independent of the sense of smelling being gratified." However, she enumerates many exceptions to the censure which has been cast on the land of her new abode, that "the flowers are without perfume, and the birds without song," and, in particular, the milkweed, a plant the flowers of which are alike remarkable for beauty of colour and richness of scent.

The following may be at once novel and interesting to many of our English readers: —

"As the day was particularly fine, I often quitted the waggon, and walked on with my husband for a mile or so . . . . We soon lost sight entirely of the river, and struck into the deep solitude of the forest, where not a sound disturbed the almost awful stillness that reigned around us. Scarcely a leaf or bough was in motion, excepting, at intervals, we caught the sound of the breeze stirring the lofty heads of the pine trees, and wakening a hoarse and mournful cadence. This, with the tapping of the red-headed and grey woodpeckers on the trunks of the decaying trees, or the shrill whistling cry of the little striped squirrel, called by the natives 'chitmunk,' was every sound that broke the stillness of the wild. Nor was I less surprised at the absence of animal life. With the exception of the aforesaid chitmunk, no living thing crossed our path during our long day's journey in the woods . . . . In these vast solitudes, one would naturally

be led to imagine, that the absence of man would have allowed nature's wild denizens to have abounded free and unmolested; but the contrary seems to be the case. Almost all wild animals are more abundant in the cleared districts than in the bush. Man's industry supplies their wants at an easier rate than seeking a scanty subsistence in the forest. . . . .

" I was disappointed in the forest trees; having pictured to myself hoary giants almost primeval with the country itself; as greatly exceeding in majesty of form the trees of my native isles, as the vast lakes and mighty rivers of Canada exceed the lochs and streams of Great Britain.

" There is a want of picturesque beauty in the woods. The young growth of timber alone has any pretension to elegance of form, unless I except the hemlocks [*Abies canadénsis*], which are extremely light and graceful, and of a lovely refreshing tint of green. Even when winter has stripped the forest, it is still beautiful and verdant. The young beeches, too, are pretty enough; but you miss that fantastic bowery shade that is so delightful in our parks and woodlands at home.

" There is no appearance of venerable antiquity in the Canadian woods. There are no ancient spreading oaks, that might be called the patriarchs of the forest. A premature decay seems to be their doom. They are uprooted by the storm, and sink in their first maturity, to give place to a new generation, that is ready to fill their places." (p. 112.)

With an extract or two illustrative of atmospherical and other phenomena, we must, reluctantly, conclude our notice.

A hurricane. " Not a breeze ruffled the waters, not a leaf moved. This perfect stagnation of the air was suddenly changed by a hurricane of wind and snow that came on without any previous warning. I was standing near a group of tall pines that had been left in the middle of the clearing, collecting some beautiful crimson lichens, S—— not being many paces distant, with his oxen drawing firewood. Suddenly we heard a distant hollow rushing sound that momentarily increased, the air around us being yet perfectly calm. I looked up, and beheld the clouds, hitherto so motionless, moving with amazing rapidity in several different directions. A dense gloom overspread the heavens. S——, who had been busily engaged with the cattle, had not noticed my being so near; and now called on me to use all the speed I could to gain the house, or an open part of the clearing, distant from the pine trees. Instinctively, I turned towards the house, while the thundering shock of trees, falling in all directions at the edge of the forest, the rending of the branches from the pines I had just quitted, and the rush of the whirlwind sweeping down the lake, made me sensible of the danger with which I had been threatened.

" The scattered boughs of the pines darkened the air as they whirled above me: then came the blinding snow-storm; but I could behold the progress of the tempest in safety, having gained the threshold of our house.

" The driver of the oxen had thrown himself on the ground, while the poor beasts held down their meek heads, patiently abiding the pelting of the pitiless storm! S——, my husband, and the rest of the household, collected in a group, watched with anxiety the wild havoc of the warring elements. Not a leaf remained on the trees when the hurricane was over: they were bare and desolate." (p. 127.)

A Canadian winter. " What a different winter this has been to what I had anticipated! The snows of December were continually thawing: On the 1st of January not a flake was to be seen on our clearing, though it lingered in the bush. The warmth of the sun was so great on the 1st and 2d days of the new year, that it was hardly possible to endure a cloak,

or even shawl, out of doors; and within, the fire was quite too much for us. The weather remained pretty open till the latter part of the month, when the cold set in severely enough, and continued so during February. The 1st of March was the coldest day and night I ever experienced in my life: the mercury was down to 25° in the house; abroad it was much lower. The sensation of cold early in the morning was very painful; producing an involuntary shuddering, and an almost convulsive feeling in the chest and stomach. Our breaths were congealed in hoarfrost on the sheets and blankets. Every thing we touched, of metal, seemed to freeze our fingers. This excessive degree of cold lasted only three days; and then a gradual amelioration of temperature was felt. During this very cold weather, I was surprised by the frequent recurrence of a phenomenon that, I suppose, was of an electrical nature. When the frosts were most intense, I noticed that, when I undressed, my clothes, which are, at this cold season, chiefly of woollen cloth, or lined with flannel, gave out, when moved, a succession of sounds like the crackling and snapping of fire, and, in the absence of a candle, emitted sparks of a pale whitish-blue light, similar to the flashes produced by cutting loaf-sugar in the dark, or stroking the back of a black cat: the same effect was also produced when I combed and brushed my hair." (p. 151.)

We would fain continue our quotations; but time and space fail us. We can only, therefore, refer the reader to the work itself; the perusal of which will, we are quite sure, bear us out in all we have said in its favour. We have, as we premised we should, confined our extracts to passages bearing on natural history: but we should do great injustice to the fair authoress did we thence infer that they form the only, or even the chief, merit of her book. Her hints to emigrants are always judicious, and, of course, valuable. In short, such a spirit of content and fortitude, under all the trials she had to struggle with (and they were neither few nor small), is very rarely met with, even among those on whom greater physical powers of endurance have been constitutionally bestowed. With one "case in point," we conclude our remarks. When near the end of their pilgrimage through the forest, the waggon which had conveyed them and their luggage was suffered to depart, a little prematurely, we think, as it was soon evident the travellers had lost their way, and night was fast approaching. But our fair friend must tell the tale, as she has told it to her mother.

"It was dark, save that the stars came forth with more than usual brilliancy, when we suddenly emerged from the depth of the gloomy forest to the shores of a beautiful little lake, that gleamed the more brightly from the contrast of the dark masses of foliage that hung over it, and the towering pine woods that girt its banks. Here, seated on a huge block of limestone, which was covered with a soft cushion of moss, beneath the shade of the cedars that skirt the lake, surrounded with trunks, boxes, and packages of various descriptions, which the driver had hastily thrown from the waggon, sat your child, in anxious expectation of some answering voice to my husband's long and repeated hallo. But when the echo of his voice died away, we heard only the gurgling of the waters at the head of the rapids, and the distant and hoarse murmur of a waterfall some half mile

below them. We could see no sign of any habitation, no gleam of light from the shore to cheer us. In vain we strained our ears, for the plash of the oar, or welcome sound of the human voice, or bark of some household dog, that might assure us we were not doomed to pass the night in the lone wood. We began now to apprehend we had really lost the way. To attempt returning through the deepening darkness of the forest in search of any one to guide us, was quite out of the question; the road being so ill defined, that we should soon have been lost in the mazes of the woods. The last sound of the waggon wheels had died away in the distance: to have overtaken it would have been impossible. Bidding me remain quietly where I was, my husband forced his way through the tangled underwood along the bank, in hope of discovering some sign of the house we sought, which we had every reason to suppose must be near, though probably hidden, by the dense mass of trees, from our sight. As I sat in the wood in silence and in darkness, my thoughts gradually wandered back across the Atlantic to my dear mother and to my old home; and I thought what would have been your feelings could you, at that moment, have beheld me as I sat on the cold mossy stone in the profound stillness of that vast leafy wilderness; thousands of miles from all those holy ties of kindred and early associations, that make home, in all countries, a hallowed spot. It was a moment to press upon my mind the importance of the step I had taken, in voluntarily sharing the lot of the emigrant; in leaving the land of my birth, to which, in all probability, I might never again return. Great as was the sacrifice, even at that moment, strange as was my situation, I felt no painful regret or fearful misgiving depress my mind. A holy and tranquil peace came down upon me, soothing and softening my spirits into a calmness that seemed as unruffled as was the bosom of the water that lay stretched out before my feet. My reverie was broken by the light plash of a paddle; and a bright line of light showed a canoe dancing over the lake. In a few minutes, a well-known and friendly voice greeted me as the little bark was moored among the cedars at my feet. My husband having gained a projecting angle of the shore, had discovered the welcome blaze of the wood fire in the log-house, and, after some difficulty, had succeeded in rousing the attention of its inhabitants. Our coming that day had long been given up; and our first call had been mistaken for the sound of the ox-bells in the wood: this had caused the delay which had so embarrassed us." (p. 117.) — *S. T.*

Wood, Neville: The Ornithologist's Text-Book; being Reviews of Ornithological Works; with an Appendix, containing Discussions on various Topics of Interest. 12mo, 235 pages. London, J. W. Parker, West Strand, 1836.

"The present volume will, we hope, and, indeed, anticipate, prove a useful guide to the [unproficient] ornithologist in the choice of his books. That it is not so complete as might be wished, especially as regards the less important [of the] works of the Continental writers, we freely admit; but we think that no British work of importance is omitted."

The author has treated of the works in the order of time, as far as he has been able, consistently with treating of different editions together, and, in some instances, of different works by the same author. He has begun with Willughby's *Ornithology*, published in 1678.

In works of such kind as Mudie's *Feathered Tribes of the British Islands*, Selby's *Illustrations of British Ornithology*, and Montagu's *Ornithological Dictionary*, "we have frequently given long extracts, which are certainly far better calculated to convey an idea of the spirit of the author than a dry abstract review."

"We have endeavoured to conduct the whole with perfect impartiality."

There is a mistake in the notice of the *Magazine of Natural History*, p. 49, 50.: each number of it includes 56 pages, not 50 only; and there is not any mention of the engravings.

The reviews occupy 119 pages; the treatises on the following subjects the remainder, except the index, preface, &c.

Synopses of the systems of arrangement of Willughby, Linnæus, Brisson, Latham, Lacépède, Dumeril, Mëyer, Illiger, Temminck, Cuvier, Blainville, Vieillot, Vigors, Latreille; Lherminier, his developement of Blainville's; Lesson, Fleming. The synopses are treated of in the order of time.

Hints for a new and complete work on general ornithology.

A notice of the prospect of the institution of a new magazine of natural history, and remarks and suggestions relative.

A notice of the habits of the ivy wren, that is, the brown wren: extracted from the author's work on the British songsters, as a specimen of that work.

On the English nomenclature of birds. The author argues for the expediency of devising English names for applying to the species and genera of birds, and to be of parallel power in distinctiveness with the names in use in catholic ornithology. The kind of thing proposed for birds has been for years adopted, theoretically, in botany, subject to the stipulation that, where the Latin or Greek word is not conveniently translatable, it is adopted as an English one; see Don's *Hortus Cantabrigiensis*, any of the editions; or Loudon's *Hortus Britannicus*, or Sweet's *Hortus Britannicus*: but it is little used practically. The work is dedicated to Dr. Latham.

Wood, Neville, author of the Ornithologist's Text-Book: British Song Birds; being Popular Descriptions and Anecdotes of the Choristers of the Groves. 8vo, 418 pages. London, J. W. Parker, West Strand, 1836.

A work that no practical naturalist would like to be without. The author has stated, that it is "the result of many years' close observation and investigation in the fields;" and that, though "it cannot be denied that much of the information has been included elsewhere," yet "no one fact is herein stated which has not been observed with" his "own eyes,

except where other authorities are referred to; which is, in every case, done openly and fully." The author's work includes some original communications from "Edward Blyth, J. D. Salmon, Esq.; Dr. Charles, Liverpool; J. D. Weston, Esq.; Dr. John Latham, Rev. W. T. Bree, Dr. Shirley Palmer, Edwin Lees, Esq.; William D. Burchell, Esq.; Dr. Nicholas C. Percival; and many others."

Henslow, Rev. J. S., M.A., F.L.S., &c.: The Principles of Descriptive and Physiological Botany. Small 8vo, 328 pages, including 168 woodcuts. London, 1836. 6*s*. It forms vol. 75. of Lardner's *Cabinet Cyclopædia*.

This is an introduction to descriptive and physiological botany, of real interest and value, from the author's having done justice to his subject, by including the numerous and comprehensive principles that belong to it in modern botany; and from the agreeable and able manner in which he has stated and elucidated them. There is, too, in this introduction matter on subjects that are, so far as one remembers, peculiar to it as compared with other British introductions; as that on colours, and that on fossil botany.

ART. II. *Literary Notices.*

THE Naturalist: illustrative of the animal, vegetable, and mineral kingdoms; with highly finished coloured engravings, and with woodcuts; and to be continued monthly; is to be published, the first number early in August; and is to be conducted by B. Maund, F.L.S., and W. Holl, F.G.S., assisted by several eminent scientific men.

The Transactions of the Zoological Society of London. The first part of the second volume, which is the fifth part in all, will very shortly be ready for publication. (*Zoological Society's Report*, April 29. 1836.)

Fishing Anecdotes, with Hints for Anglers, by Edward Jesse, Esq., author of *Gleanings in Natural History*, it is stated, are to be very shortly published by J. V. Voorst.

The Botanist: to combine all interesting points of botany with popular and practical information; and to be conducted by Mr. Maund, the author of the *Botanic Garden*, and in which Professor Henslow has engaged; is to be published in Numbers: No. 1. on August 1.

THE MAGAZINE

OF

NATURAL HISTORY.

AUGUST, 1836.

ORIGINAL COMMUNICATIONS.

ART. I. *Observations on the various seasonal and other external Changes which regularly take place in Birds, more particularly in those which occur in Britain; with Remarks on their great Importance in indicating the true Affinities of Species; and upon the Natural System of Arrangement.* By EDWARD BLYTH, Esq.

NUMEROUS as are the writers in this department of zoology; assiduously as the study of birds is cultivated in all parts of the civilised world; and talented as are many of the naturalists and close observers who devote their more particular attention to this branch; it still appears to me, that the numerous and very diversified regular changes of plumage and general external appearance, observable in this interesting subclass of animals, have been hitherto very greatly and strangely overlooked, and that, in consequence, the many valuable physiological inferences deducible from their investigation have been quite lost to the purposes of science and of classification.

It is true that many naturalists have in so far attended to the mutations of plumage which some particular species undergo, as that they are able at once to recognise them in every livery they assume; but the exact ages, and seasons, of moulting; the precise nature of the general, or only partial, change that is undergone, and the various accordances and dissimilarities observable between the changes of distinct species; the endless characters of agreement and difference, so important in pointing out affinities, in showing what apparently similar races could never be brought to hybridise together; would seem to have been passed over as unworthy of notice, as undeserving of a particular investigation.

The subject is both extensive and complicated, and involves a number of other recondite enquiries. I could have wished that some naturalist better qualified than myself had taken it

in hand. For my own part, I have little time for practical observation; but, having long been in the habit of keeping a number of birds (chiefly the smaller kinds which occur in Britain) in a state of captivity, I have thus enjoyed some very favourable opportunities for making myself fully acquainted with the various changes that a great number of species undergo, both seasonally, and in their progress from youth to maturity and old age; and I have neglected no opportunity of studying those of other races, which circumstances may have variously chanced to place in my way.

It is to be remarked, then, that some species of birds (as, for example, the larks and starlings, the crows, the woodpeckers, and various others) moult the whole of their immature, or nestling, plumage the first year, including the wing and tail primaries; while a very few (as the bearded pinnock, Calamóphilus biármicus, and rose mufflin *, Mecistùra ròsea) shed the primary feathers of the tail the first season, but not those of the wing: numerous other races (as all the modifications of the fringillidous and thrush types) moult their clothing plumage very soon after leaving the nest, and retain the primaries till the second autumn; the Falcónidæ, again, and some others, undergo no change whatever until that period. All those which I have as yet mentioned change their feathers only once in the year, towards the close of summer, immediately on the cessation of the duties towards their progeny: but there are various other tribes (as the wagtails and pipits, *Mo*tacillìnæ, and most of the aquatic races) which regularly undergo another general moulting in the spring; though in no instance, that I am aware of, are the primary wing feathers shed more than once in the year: those of the tail, however, in some rare instances, are; and the different coverts, together with the secondary and tertiary wing feathers, in most, if not all, double-moulting birds, are changed twice. In some migrative species (as the cuckoo, and most of the swallows), the young of the year do not change their plumage until the winter months; whereas the old birds moult in autumn; and in other birds, again (as in various ducks [VIII. 544, 545.]), two general changes of feather take place within the short period of about four months. Very many other similar diversities, of a more or less subordinate character, might be enumerated, if enough have not been already mentioned to show that a wide field for observation is here open to the practical ornithologist.

In like manner may analogous diversities be observed

* Pàrus caudàtus *Linnæus.*

throughout the mammiferous subclass of vertebrate animals; thus, the squirrels and the shrews renew their covering twice in the year, and the rats and rabbits but once. The common squirrel's seasonal changes have never, that I am aware of, been remarked by any naturalist, though it is so common an inhabitant of our island: its summer coat is very different from that of winter, the fur being much coarser, more shining, and of a bright rufous colour; while the ornamental tufts to the ears are wholly wanting: these grow in autumn, while the animal is renovating its coat, and continue usually till about the beginning of July, the time varying somewhat in different individuals. Their winter fur, besides being of a much finer quality and texture, is considerably longer, thicker and more glossy, and quite of a different hue from that of summer, inclining to greyish brown. The first young ones, too, which are produced very early in the season, push forth the winter garb, which, I believe, they then retain throughout the summer; whereas the second race of young ones, which, for the most part, make their appearance about midsummer, are first clad in the summer dress, which is exchanged, before they have become half grown, for that of winter. It is not improbable, also, that diversities of a like kind may obtain in the renewal of the scales of fishes.

What the definite purpose effected by very many of these peculiar and dissimilar changes may be, I confess myself utterly unable to say; nor can I suggest even a plausible hypothesis upon the subject. Why, for example, should the pipits (*Anthus*) shed their plumage twice in the year, and the larks (*Alauda*) but once? And why, also, should the latter change all their nestling primaries at the first moult, while the former retain theirs until the third (including the vernal) general renovation of plumage? It is easy enough to say, with Mr. Mudie, that, in the wagtails, and certain other species, the colours of the summer and winter dresses are each, in so far as they differ, more peculiarly adapted to the particular season of the year; but this is merely a concomitancy: in other words, this adaptation is not the purpose of the change; for we find that, in certain species which regularly moult twice in the year (as the tree pipit), the summer and winter plumage hardly differ; whilst, on the other hand, as complete an adaptation of colour to season is effected in others (as the stone chat, and most of the *Fringillidæ*), which moult in autumn only, by the wearing off of the extreme tips of the feathers; these in winter having covered and concealed another, and, in many instances, a very diverse, colour beneath. By what reason can we ever hope to account for

the curious fact, that the common drake, and also the pin-tailed and other teals, should moult their whole clothing plumage (including the tail) in summer, and then again in autumn? As Mr. Waterton has well remarked on the subject, "All speculation on the part of the ornithologist is utterly confounded; for there is not the smallest clue afforded him, by which he might be enabled to trace out the cause of the strange phenomenon. To Him alone, who has ordained the ostrich to remain on the earth, and allowed the bat to soar through the etherial vault of heaven, is known why the drake, for a very short period of the year, should be so completely clothed in the raiment of the female, that it requires a very keen and penetrating eye to distinguish them." [VIII. 544.]

In one point of view, however, at least, a knowledge of these changes is of considerable practical use to the naturalist; for they not unfrequently point out at once, in doubtful cases, the most appropriate situation of a genus in a system, and thus assist him very greatly in his endeavours to fabricate a sound system of classification. Instances of this I shall not here advance, as it is necessary to say something first of what meaning I attach to that most hackneyed of all phrases, "natural system," concerning which it is more than probable that my views may very considerably, and perhaps essentially, differ, from those of many who may perchance honour them with a perusal.

Under this phrase, then, two very distinct kinds of relation are ordinarily blended together and confounded; viz. the adaptive relation of every organised production to the conditions under which it was appointed to exist, and the physiological relation subsisting between different species of more or less similar organisation. These may be aptly designated the *adaptive system*, and the *physiological system*; the system of relative adaptation between the earth, its productions, and its inhabitants, and the system of agreements and differences between the organisation of distinct races.

To illustrate the former of these is, perhaps, superfluous: it is the system by which alone the existence of one species is necessary to that of another, and which binds each race to its locality; where the presence of each is alike necessary to preserve the equilibrium of organic being around; and, when circumstances have changed, and the necessity for its agency no longer remains, a whole race perishes, and the fragments of a skeleton in the solid rock perhaps alone proclaim that such had ever existed. It is the grand and beautiful, the sublime and comprehensive, system which pervades the universe, of which the sun and planets are but a portion, and

which, to return to ornithology, is so well exemplified in the adaptation of the ptarmigan to the mountain top, and the mountain top to the habits of the ptarmigan; which suits the ostrich to the arid desert, the woodpecker to the forest, and the petrel to "the far sea wave." It is the majestic and admirable system by which all nature works so beautifully together, and to which all that our external senses reveal appertains. It is the system which, exquisite and intensely interesting in all its minutest details, is, if possible, even more so in its complicated relations; by which, by the *unity of design* pervading which, all is demonstrable to be the workmanship of One omnipotent and all-foreseeing Providence, under the beneficent dispensation of whom nought that ever exists or occurs stands isolated and alone, but all conduce and work admirably together for the benefit of the whole; by whose all-wise decree it is ordained, that, while the lofty and sterile mountain peak *attracts* the clouds, which in winter, in consequence, precipitate themselves upon it in the form of snow, it should thus *cause* itself to become clad in the hue of all others the most calculated to prevent its internal temperature from being farther reduced, and itself from thereby becoming an increased source of cold by radiation to all around; while, at the same time, the concretion of snow itself, instead of deluging the country round with superfluous moisture, is thus retained for a time upon the heights, not only to shelter the more tender organised productions of the mountain from severer cold, but also to furnish, by the action of the summer sun, a due supply of water, when needed, to the fountains and rills which irrigate and fertilise the more level country; there having done its part, to flow on to the mighty reservoirs of the ocean, again to arise in clouds, and to fulfil again its appointed rounds, with perpetual never ceasing energy, while the world endures.

"Look round our world; behold the chain of love
Combining all below and all above.
See plastic Nature working to this end;
The single atoms each to other tend,
Attract, attracted to, the next in place
Form'd and impell'd its neighbour to embrace.
See matter next, with various life endued,
Press to one centre still, the general good.
See dying vegetables life sustain,
See life dissolving vegetate again:
All forms that perish other forms supply:
(By turns we catch the vital breath and die,)
Like bubbles on the sea of matter borne,
They rise, they break, and to that sea return.
Nothing is foreign: parts relate to whole;
One all-extending all-preserving Soul

Connects each being, greatest with the least;
Made beast in aid of man, and man of beast *;
All served, all serving; nothing stands alone:
The chain holds on, and, where it ends, unknown."
POPE's *Essay on Man*, Epistle iii.

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* I am unwilling to allow even this harmless line to pass muster without indulging in a few remarks on the distinctness of the human race from all other parts of the animal creation; a distinctness too little borne in mind by many naturalists. Man alone, of all the countless wonders of creation, though clad in a material frame, the functions of which are necessarily identical with those of other animals, is no part of the mere reciprocal system of nature; as they are. He alone is bound to no particular locality, but inhabits alike the mountain and the plain, and *by contrivance* is enabled to endure the fervid heats of tropical climes, and the withering blasts of a polar winter; traverses in all directions the wide extent of the pathless ocean, interchanges purposely the productions of distant lands, and accommodates the respective soils for their reception. He alone degenerates in climates which supply his every natural want; and placed as nature formed him, in the richest soil, is a being out of his element, unable, by the mere unassisted use of his own organs, to maintain his existence as a species. He alone studies the complicated laws of matter, that he may wield them at his will. He alone possesses a power of indefinite self-improvement, and can so communicate his attainments that each generation shall rise in knowledge above the last. He alone has the sense to sow, that he may reap; and, alone, intentionally, and from observation and reflection, opposes obstacles to the course of events in their natural progression; reduces whole countries to an artificial state; and systematically increases vastly their capability of yielding sustenance for him, and for those creatures he has taken under his protection. Other races disappear before him, whose existence is at all opposed to his interests, and those alone remain (but oh! how altered from their former condition!) which minister to his wants and comforts. All other beings are mere creatures of locality, whose agency tends to perpetuate the surrounding system of which they are members; but wherever man appears, with his faculties at all developed, the aspect of the surface becomes changed; forests yield to his persevering labours; the marshes are drained, and converted into fertile lands: the very climate accordingly changes under his influence, and oftentimes to the extinction of some of the indigenous products of the soil. Does not, then, all this intimate that the human race is no part of the mere mundane system, that its agency tends rather to supersede, and is opposed to, that of the rest of organic nature? that a time must come, should nought intervene of what in physics we can take no cognizance, when the human race, having peopled all lands, shall have increased beyond the means of subsistence? But alas! who can dive into futurity? The same awful Being who first awakened man into existence, in common with the meanest atom, who appointed his destiny upon earth to be so diverse from that of his other creatures, who endowed him alone with a capacity to reflect upon his Maker's goodness and power, may (I make no appeal here to revelation, writing only in the spirit of natural theology) close his non-conforming career, as a species, upon earth, in a manner different from the extinction of other species which yields to the progressive changes of the surface. No naturalist can doubt that this beautiful world existed, and was clad in verdure, and inhabited, for countless ages before man became its denizen; and there are no memorials to indicate

In this sense of the phrase only we trace what may be esteemed a suitable meaning to the term "natural system:" this is the only system by which the wonders of creation are *naturally* arranged; this alone is the system which nature everywhere presents for our contemplation: but, admire it as we may, still this is not the system by which an extensive knowledge of *species* can be acquired, or which can be studied elsewhere than in the wilds.

Every species of organism, as must be obvious to all examining thinking persons, is framed upon a greater or smaller series of successively subordinate typical plans, upon each of which is organised a variety of different species, perfectly unconnected and distinct from each other, however some may resemble, even to minutiæ, and which exhibit each typical or subtypical structure more or less modified, and, in the extremes, generally more or less *approximating* towards the extreme modifications of other plans of organisation, in direct relation to the endless diversifications of the surface of the earth, to variety of climate, or to peculiar modes of procuring sustenance.

Thus far, I believe, all systematists agree.

I must venture, however, to differ from the majority of them, in opposing the prevalent notion, that the extreme modifications of diverse types blend and inosculate by direct *affinity;* contending that, however closely these may apparently resemble, the most similar modifications of diverse types are not, in a physiological sense, more nearly related to each other than are the more characteristic examples of the same.

To this conclusion I was originally led by reflection on various interesting phenomena connected with the changes of plumage which take place in birds; having observed that, however importantly, to suit peculiarity in the mode of life, the general structure of very aberrant forms may be modified, so as to render it even doubtful upon which fundamental type they are organised, there are, notwithstanding, certain constant characters, of less importance to the existence and welfare of

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that an analogous being ever previously existed. Man alone is a creature by himself; the only being whose agency is at all opposed to the mutual and reciprocal system of adaptations prevalent around him. He did not always exist here, and there is no reason to suppose that he always will. All conduces rather to intimate that he is but a sojourner for a short time. In his vanity, he is apt to imagine that all were made for him! and presumptiously enquires *of what use* could have been the creation without him! Yet how ardently does he labour to exterminate every portion of that creation, which he deems to be in the least injurious to his own interests!

the species, by which every typical standard may be easily traced to its ultimate ramifications; some of the most valuable of these characters, in the feathered race, being afforded by peculiarities in the mode of moulting. To illustrate this, I may cursorily adduce the various finch-like Stúrnidæ (Aglaíus, Mólothrus, Dolíchonyx, &c.); extreme modifications of the Córvus type; as are also, however unlike they unquestionably appear, the genera Alaúda, and even Ammódramus. All these, I have ascertained either from direct observation, or from competent sources, shed the nestling primaries the first season, which is not the case with any modification of the fringillidous type, or of the dentirostral. If other characters be wanting, which point alike to the same conclusion, I may mention the constant presence of a craw, or enlargement of the œsophagus, in all the Fringíllidæ, and its invariable absence in all, even the most aberrant, modifications of the Córvus type; all the latter, too, preserve the ambulatory mode of progression, which, in perfection, is not observable in any Fringíllidæ, not even Plectróphanes. Again, other characters of distinction between these two equivalent divisions are sufficiently visible in the general aspect of the bill, even where the extremes approximate: all the Fringíllidæ, for instance (to which I would restrict the appellation Coniróstres), possess what may be strictly defined a *bruising*, or *compressing*, instrument; whereas the general character of the same organ in the other division is rather what may be aptly termed a *thrusting* one, intermediate in its structure between those of the Fringíllidæ and Dentiróstres; in which last group the bill is modified into either a *snapping*, *holding*, or *tugging* instrument, as the case may be: sometimes all three, as in Vireo.

However, to return to the proposition I was just advancing, that, *physiologically* speaking, there are no combinations of distinct types, no intermediate organisms, save those between a central type and its ultimate ramifications: the general structure may be intermediate, and, consequently, the situation a species holds in the *adaptive system*, the office which it may have to perform in the general economy of the universe; but the latter does not constitute *affinity*; neither, strictly speaking, is it *analogy*; therefore I must distinguish it by another term, *approximation*.

As I shall have occasion to make use of these words frequently, as I proceed, it will be necessary, before advancing further, to define the precise meaning which I attach to them, however much this may appear digressing from the subject more immediately in hand.

First, then, let us consider *affinity*, which, according to the views I hold, is inseparably connected with the doctrine of *types*.

All organised matter is, of course, intrinsically allied in its nature, as contradistinguished from that which is not organised; this, therefore, is the first, or, as some would rather say, the last, the ultimate, the slightest possible, degree of *affinity*. Next, we have a grand primary distribution of all organic matter into the animal and vegetable kingdoms *; a division too obvious to be for a moment called in question, and universally allowed; admitted even, inconsistently enough, by those who hold that every natural assemblage of species, great or small, forms part of some quinary circle. Now, I cannot but observe here, in passing, that, to any unbiassed person, I should think that a due consideration of this first *binary* distribution must at once carry conviction to the mind, must be at once a most unanswerable argument against all *quinary* or similar doctrines; the which, of course, if based upon sound theory, would not only be found to hold good, but would be most obviously indicated by these primary and comprehensive assemblages of every created species. But, to return: here we have the animal type, and the vegetable type, diverse in structure, distinct even in chemical composition, insomuch that the *kingdom* to which any dubious production appertains may be decided by chemical analysis, even in a fossil, should but a very few particles of its primitive substance have been preserved. Say not, that the kingdoms blend at their ultimate extremities; for there are no better grounds for this supposition than those which led many, for a time, to advocate the spontaneous generation of Infusòria; extreme minuteness alone setting the limit to a definite partition. We must therefore admit, that there is a degree of physiological *affinity* between the most dissimilar animals, and also between the most dissimilar plants, which no animal or vegetable can possibly have for each other: species from the two kingdoms, however these may undoubtedly *approximate* at the extreme boundaries, *can* have no higher degree of *affinity* for each other than what they possess in common, as opposed to all unorganised matter; what further relations they may show are, therefore, totally distinct from *affinity*.

Leaving plants, we now enter upon the primary divisions of the animal creation, the separate leading types, the dis-

* The *mineral kingdom* is a superfluous epithet, too vague to have any meaning beyond a negative one. Chemically speaking, it, indeed, comprises both the others. The proper distinction is, of course, between *organised* and *not organised*.

tinct plans, upon one or other of which all animals are organised, and which cannot, any more than the last, be confounded, in any instance, one with another, however in particular cases these too may *approximate:* of which presently. Every vertebrate animal is, therefore, allied to every other vertebrate animal by what, to specify by numbers, may be expressed as three degrees of *affinity;* whereas it is physiologically related to every member of the Annulòsa, and other invertebrate classes, by only two degrees, its affinity with plants being reckoned as one; the proportions of these numbers towards each other pretty accurately denoting the value of these degrees; two being double one, three exceeding by half two, &c. Animals of the same subclass, as different mammifers, or birds, or reptiles, are, of course, related to each other by four degrees of *affinity;* those of the same order by five, and so on; the number of these several degrees increasing in proportion to the number of subordinate successive types upon which different species are alike organised, and of which, successively, they are modifications, not *combinations* of different ones, in the last case any more than in the first. Every modification of every successive type is thus rudimentally different from the most approximate modifications of every other equivalent type, or superior type, to which it does not appertain; and this is the same conclusion to which I have been irresistibly led from consideration of various phenomena connected with the changes of plumage which take place in birds. As every species is perfectly and essentially distinct and separate from every other species, so, except in a retrograde direction, are the successive typical and subtypical plans upon which they are severally organised, however similar the latter may in some instances be, as are also the former. It is unnecessary to enter here upon any remarks on *hybrids*, as further elucidatory of the precise nature of *affinity:* it is well known that these can only be produced within a certain physiological range, and that their degree of fertility (paired with individuals of pure blood) is in proportion to the degree of *affinity* between the parent species.

By the term *approximation*, I must be understood to signify those modifications of particular types, which, adapted to intermediate modes of life, very commonly more or less resemble (in consequence of this adaptation) species which are organised on other and different types. I have already had occasion to mention certain extreme modifications of the corvine or omnivorous type of perching birds, which are close *approximations* towards the fringillidous type (as Aglaïus and other finch-like Stúrnidæ, Ammódramus, and Alaúda); the

true *affinities*, however, of all which are at once shown by a reference to their moulting. The hag, the lamprey, and the pride, are, thus, extreme *approximations* of the general vertebrate type of organisation towards the class Mollúsca. The Ornithorýnchus, among mammifers, *approximates* very remarkably towards birds; but it exhibits less *analogy* with them, collectively, than many rodent species do. The prong-horned antelope is an *approximation* in its genus towards the *C*ervidæ; but its *affinity* to the latter is not greater than in other antelopes. The frigate bird is an *approximation* towards the eagles; yet no one would consider it as organised upon the falcon type: so the *P*térocles is an *approximation* towards the pigeons, and the Nicobar pigeon towards the *G*allínidæ; each being at once referable to its particular type, though in certain *adaptive* relations they are intermediate. The pipit genus is a most striking *approximation* of a very marked type (subordinate to the dentirostral) towards the larks; but its moultings at once intimate its true position in the system, however its general aspect might, at first sight, render this doubtful. It is by no means nearly allied by *affinity* to *A*lauda; and I will unhesitatingly venture to assert, that by no art could they be induced to unite to the production of a hybrid.

Analogy, in the most definite signification of the term, is well exemplified in the close resemblance between the mouth of the swift, and those of the larger high-flying insectivorous bats (*V*espertílio). It is exhibited wherever species that are modifications of diverse types are organised to perform nearly the same part in the general economy of nature; which latter by no means necessarily implies *approximation*; as may be illustrated by adducing the vultures among birds, and the dog kind among quadrupeds, or certain of the *S*phíngidæ from amongst insects, as compared to the *T*rochílidæ of the feathered race. It is well exemplified by the deadly spring of the cats, as compared with that of the crushing serpents, and as somewhat contradistinguished from that of the saltatory spiders; all the energy of the body being, in the former cases, remarkably concentrated in a single spring, from which exhaustion follows, while in the latter case it is not. It is curiously shown by a fact related by Sir W. Jardine, of the European howler or eagle-owl (*B*ùbo europæ`us), in which the *analogy* of that genus to the cat family is even more strikingly indicated than by the very remarkable general resemblance in their external aspect. "This bird," observes Sir William, "evinces a great antipathy to dogs, and will perceive one at a considerable distance; nor is it possible to distract its atten-

tion so long as the animal remains in sight. When first perceived, "the feathers are raised," &c., exactly as a cat raises her fur at sight of her natural enemy; though, in either case, it is difficult to say why they should be inimical. No doubt, however, the purpose, the reason for this antipathy, is the same in both instances, and it is for the naturalist to endeavour to find it out. The common pipit, a modification of the dentirostral type; and the Lapland snowfleck, one of the conirostral (as here limited); are in so far related to each other by *analogy*, as that they are both *approximations* towards the lark genus, an extreme modification of the omnivorous or corvine type; they are therefore related to each other by a certain analogy; to Alaúda, by *approximation;* and to all the members of their respective separate groups, by an additional degree of *affinity* to what subsists between either of them and the others. *Affinity* and *analogy*, of course, coexist, as all organisms are, at least, related by what I have termed the first degree of the former; but the extent of the former does not necessarily affect that of the latter: vultures and dogs, for instance, are allied by three degrees of *affinity;* while the carrion beetles (Carábidæ) are related to either by only two degrees: yet the *analogy* is as great in the one instance as in the other. Pure *analogy* may subsist with very trifling *approximation;* as is shown by the already cited case of the cats and serpents, or as may be exemplified by a hundred similar instances of corresponding groups existing in major divisions of diverse structure, in which, however marked the *analogy*, however similar the office they were destined to perform, the degree of *approximation* is in many instances quite imperceptible.

Affinity, *approximation*, and *analogy*, may therefore be collectively defined as pertaining to the *physiological* relations subsisting between different species, as opposed to their *adaptive* relations; of which latter they are wholly independent: that is to say, different species, nearly allied by either of these physiological relations, exhibit no mutual, no relative adaptation towards each other's habits and structure; such as we observe in the huge claws of the anteater (Myrmecóphaga), evidently furnished in direct relation to the habits of a particular group of insects, the mounds of which they are obviously intended to scrape open, while the tongue is as expressly modified to collect the aroused inhabitants, upon which alone the creature is fitted to feed, and upon the supply of which, therefore, as an existing species, its being altogether depends. *Adaptive* relations are, in general, even more obvious and striking in groups which are *physiologically* the most widely

removed; as may be exemplified by adducing the bill of the crossbill, modified in direct relation to the seminiferous cones of the Coníferæ; or the recurved bills of certain humming birds, to the bent tubes of the corollas of particular Bignoniàceæ, &c. *Physiological* relations are all resolvable into mere *resemblance;* because every species is essentially distinct and separate from every other species; otherwise it would not be a *species*, but a *variety*. The most similar species, therefore, are only *allied* to each other in consequence of the close resemblance of their general organisation; the degree of *affinity* being greater or less, according to the extent of that resemblance (according to the degree of their physiological, not their mere apparent, similitude); in short, according as they are more or less framed upon the same general or typical plan; which plans not only regulate the minutiæ of structure in those species which are organised upon them, but, to a very considerable extent, even their colours and markings.

Of course, the observation here very naturally suggests itself, that, if the colours and markings of species have a definite use (which, in some instances, is sufficiently obvious even to our comprehension), then, we might reasonably expect to find that resemblance which is found to subsist between those of species whose habits are almost the same.

True; but, then, there are many trivialities observable in the marking of allied species, which can only be explained upon the principle that they are modifications of some particular general or typical plan, of markings, as well as of structure. Such is the pale line along the head of the newly discovered Dalmatian, *Régulus modéstus Gould*, in place of the bright-coloured coronal feathers of its different congeners; which is exactly analogous to the curious fact, that the apparent rudiments of dentition exist in the gums of the fœtal toothless whales; sufficiently intimating that these latter animals are modifications merely of some general typical plan, of which one of the leading characters is to be furnished with teeth. So, also, might be adduced the tiny, soft, deflected spine situate at the bend of the wing of the common gallinule, in like manner indicating that this species, also, is framed upon some particular plan of structure, the more characteristic examples of which have spurred wings, as we find to be the case in the allied genus *Párra*. In all the species organised upon any given type, we may always look for some trivial resemblances of this kind; we may always expect to find some traces of any particular structure or markings, which are observable in those typical forms of which the others are but modifications; the probability of this, of course, increasing

with the number of degrees of *affinity;* and it is not unusual, too, to find colours or markings, which, in typical forms are scarcely discernible, developed, as it were, in particular modifications of those forms, to a considerable extent: yet, in the most approximate modifications of diverse subtypes of one general type, we only find such trivial resemblances of this kind as may be directly traced up to the typical standard from which they both diverge; whatever other marks of similitude these may show being obviously analogous adaptations, rather, to similarities of habit, unaccompanied by those trivial resemblances which imply physiological proximity. Thus, however closely, both in form and colouring, our common grey flycatcher (Muscícapa *Grísola*) may *approximate* to some of the smaller Tyránnulæ of North America, the mottled character of its nestling garb at once indicates that it is not framed on exactly the same series of successive types; in a word, that its relation towards these tyrannules must be considered as one of *approximation*, rather than of direct *affinity*. It would be easy, in like manner, to illustrate the preceding several positions; but the limits of the present disquisition will not permit of it.

It only now remains for me to apply the various facts which I have been endeavouring to establish; after which I shall commence a minute detail of observations on the moulting of birds. That our systems of classification should be founded on the true *affinities* of species, rather than upon any arbitrary characters, is now, I believe, admitted on all hands to be the desideratum; and the true *principle* on which alone this can be effected is, as it appears to me, sufficiently obvious; though, from our present very imperfect acquaintance with existing species, it must necessarily be a long while yet before our arrangements can be considered at all final, if, indeed, we can ever hope them to assume that character.

The true physiological system is evidently one of irregular and indefinite *radiation*, and of reiterate divergence and ramification from a varying number of successively subordinate typical plans; often modified in the extremes, till the general aspect has become entirely changed, but still retaining, to the very ultimate limits, certain fixed and constant distinctive characters, by which the true affinities of species may be always known; the modifications of each successive type being always in direct relation to particular localities, or to peculiar modes of procuring sustenance; in short, to the particular circumstances under which a species was appointed to exist in the locality which it indigenously inhabits, where alone its presence forms part of the grand system of the uni-

verse, and tends to preserve the balance of organic being, and, removed whence (as is somewhere well remarked by Mudie), a plant or animal is little else than a "disjointed fragment."

Systematists, with few exceptions, err most grossly in imagining that allied species have been created in direct reference to each other (as members of a sort of cabinet system of even proportions) rather than to the localities they indigenously frequent, to the office each was ordained to fulfil in the universal, or *adaptive*, system. One would have supposed that the various facts which geology has brought to light would have sufficed to undeceive them in this particular. It cannot be too often repeated, that, upon whatever plan a species may be organised, its true relation (the reason for its existence at all) is solely connected with its indigenous locality: else, why should so many thousand species have ceased to be, the particular circumstances under which they were appointed to live no longer requiring their presence? To expect, indeed, for a single moment, that, in any isolated class or division of organisms, a perfect system of another kind could obtain, harmonising in all points, and true in the detail to any *particular number*, appears to me (even supposing that none of the species were now extinct, and that we knew all that are at present existing), *primâ facie*, a manifest illusion. Species are distributed over the earth, wherever the most scanty means of subsistence for them are to be found; and their organisation is always beautifully and wonderfully adapted for obtaining it under whatever circumstances it may exist: just, therefore, as the surface varies, so do its productions and its inhabitants; and there is no locality, or, apparently, even vegetable production, so peculiar, but species are found upon it especially organised to find their subsistence chiefly or wholly there. The very underground lake has its own peculiar inhabitants; for the wondrous Pròteus there revels in regions of everlasting night: of course happy in its existence as the bird that cleaves the free air, or as the lion that exults in his conquering prowess. Ponder this well; and it is clear, that upon these grounds alone all *quinary* imaginings must at once fall to the ground.

The more deeply, indeed, I consider the quinary theory (now advocated by so many talented naturalists) in all its bearings, the less consistent does it appear to me with reason and common sense; the more thoroughly am I convinced of its utter fancifulness and misleading tendency. Nothing in this world is without its particular and definite *use*, which observation, in time, generally contrives to discover: but what

utility could there be, what *purpose* could be effected, by separate and distinct races of beings, created obviously in direct relation to particular localities, being distributed into even groups of a limited number, like the celebrated groves of Blenheim, "nodding at each other?" If the quinary system be universal, as some would have, pervading all creation, how is it that the stars and planets do not revolve in groups of five? Or why even do not animals mostly produce their young by fives, or multiples of five? The absurdity is, indeed, too great to be dwelt on. If we examine, too, the writings of even the most eminent advocates of this strange theory, we continually meet (as might be expected) with divisions apparently made for mere dividing sake, that the requisite number of groups might be filled up; and, on the other hand, with examples equally glaring of the most dissimilar forms being brought under one general head, that the same particular number should not be exceeded. Thus, in Mr. Selby's in many respects very valuable and useful "*British Ornithology*," while the closely allied linnets and siskins are placed in *separate subfamilies*, between the *types* of which no supergeneric character of the least importance can be descried, we find the buntings actually arranged in a subfamily of which the larks are typical; and, in another division, of like value, among his Sylviadæ, four genera (*P*àrus, *Ac*céntor, Setóphaga, and Calamóphilus) grouped together, which have hardly a single character in unison that is not common to the whole Dentiróstres, and which, certainly, are but very distantly allied. To adduce additional instances must be superflous: a system which can admit of such very arbitrary arrangements can have but a faint title indeed to be designated the "only natural one."

It is unnecessary now any longer to detain the attention of the reader by further prefatory observations; nor would it be worth while here to offer any remarks on the progress of plumification, the which might be better introduced as occasion may require; but I shall forthwith proceed to point out what I conceive to be of very great importance towards the classification of birds according to their true affinities, the different changes of plumage and appearance to which various groups of them are subject, confining myself, for the most part, to those upon which I can speak quite positively, from having myself had opportunities of witnessing them. On this enquiry there is, indeed, hardly any guide to go by, but direct personal observation; for though, in the books the greater number of these changes of appearance in the feathered race have been often mentioned, it is seldom that the precise

manner in which they are brought about is stated; and the term "vernal moult" has been, in general, so very vaguely applied (sometimes indicating an actual shedding and renovation of the feathers themselves, and sometimes merely the seasonal wearing off of their winter edgings), that I have thought it best to decline altogether availing myself of their assistance. I may just premise, however, before commencing, that, independently of moulting, there are two principal modes by which a great alteration in the appearance of the feathers of birds is, in some cases, gradually brought about; namely, a direct change of colour in the feathers themselves, and the gradual shedding, in spring (as has already been spoken of), of their extreme tips, which are frequently of a different and more dingy colour than that part of the feather which becomes exposed to view when these have disappeared. A familiar and beautiful illustration of both these changes is furnished by the breast plumage of a male of the common, or song, linnet (*Linària cannábina*). The coloured portion of these feathers, in winter, is of a brownish red; and they are tipped with deciduous dusky edgings. In the spring, the latter gradually wear off, and the dark maroon changes to a bright crimson.* The same plumage which the ptarmigan acquires in autumn becomes, in winter, white, and in spring gradually re-assumes somewhat its former colour, but a still deeper one. † Variations in general appearance, however, induced by a change of colour in the feathers themselves, are of comparatively rather unusual occurrence.

(*To be continued.*)

ART. II. *Notes on the Habits of the Stormcock, or Mistletoe Thrush.* By CHARLES WATERTON, Esq.

"Te, dulcis conjux, te solo in littore secum,
Te, veniente die, te, decedente, canebat."

For thee, sweet mate, for thee he pour'd his lay,
At early dawn, and at the close of day.

IT is a pleasing and ingenious way to account for the song in birds, by supposing that it is given to them by Nature, in order that they may enliven the female during the lonely task of incubation. At that interesting season of the year, one

* Curiously enough, however, the song linnet's changes of tint do not, to the slightest extent, ever take place in captivity.

† Inspection of a considerable number of ptarmigans, at different seasons, induces me to dissent from the general opinion, that the time of moulting in these birds is confined to no particular period.

might really imagine that the song of the male is absolutely uxorious; and, in truth, it may be, for aught I know to the contrary. No cow ever chewed her cud more deliberately than I have weighed this matter in my own mind; and, after all, I am not one jot the wiser. My speculations in April have all been shivered to atoms in November, and I am left in the midst of uncertainty. To-day, I hear a male bird singing close to the bush where his female is on her nest; and five months hence I shall hear a male bird sing, in apparent ecstasy, when the chilling season of the year peremptorily forbids the female to make any preparations for the nursery. Baffled at every point, I sometimes peevishly ask myself, Why should nature have made a provision in the male blackbird, in order that he may soothe his incubating female, and have denied that provision to my favourite the carrion crow? And then I answer my own question, by whispering to myself, that the she carrion may possibly experience wonderful delight in listening to the hoarse croaking of her partner; just as the old Scotchwoman did when she used to gaze at the carbuncle on her husband's nose. In a word, I know nothing, absolutely nothing, about the song in birds. The raven will whistle you a tune so true and pleasing, that you feel quite enchanted with his performance; whilst his congener, the carrion crow, notwithstanding all your pains to instruct him, will remain as unmusical as Paddy's fiddle, which was dumb for want of catgut. We listen with delight to the many species of male birds which make the groves resound with their melody; and we cannot imagine why the females so seldom venture an attempt at song; for we know that with us both ladies and gentlemen are full of fine sounds. Wherever a Braham is heard, there is sure to be a Billington not far off.

However, should it be the case, in ornithology, that Nature has ordered the male to sing his female to repose, there are some exceptions to the supposed general rule. I may adduce the stormcock by way of example; for he warbles nearly the year throughout. I have often heard him pour forth his wild and plaintive notes in the months of August, October, November, and December; and in every following month, until the sun has entered into Cancer, at which period, he seems to unstring his lyre for a few weeks. Towards the close of December, his song is particularly charming; and it becomes more frequent as the new year advances. I remember well (indeed, I noted down the circumstance), that, on December 21. 1827, his carol was remarkably attractive. He warbled incessantly from the top of a lofty elm, just as the poor from a neighbouring village were receiving corn under it, in me-

mory of St. Thomas the Apostle. In the olden time, it was a common practice throughout the land to distribute corn to the needy on the day in which the festival of this glorious saint is kept. At present, the good dole seems fast approaching to its latter end. Probably in a few years more it will fall a victim to the times, and be trodden underfoot in the modern march of intellect.

This bird, though usually known by the name of the mistletoe thrush in many parts of England, is invariably called the stormcock by all the lower orders in our neighbourhood: not that it delights in storms more than in fine weather, but that Nature has taught it to pour forth its melody at a time of the year when the bleak winds of winter roar through the leafless trees. Should, however, a few days of calm and warmth succeed to the chilling blast, then the stormcock is heard to sing, if anything, more sweetly than before.

The stormcock is a decided inhabitant of trees, except sometimes when in quest of food; for at that time he may be seen on the ground, and in berry-bearing shrubs. But in shrubs I have never been able to find his nest, which is generally placed either in the forked branches of the forest trees, or in those of the larger fruit trees, sometimes very high up, and sometimes within 5 ft. of the ground. The outside of the nest is composed of dried grass, to which is added a little green moss; whilst the inside contains a lining of dried grass alone, on which the female commonly lays five eggs, speckled over with chocolate-coloured spots of a lighter and a darker shade on a greyish-green ground.

During the period of the breeding season, the habits of the stormcock undergo a noted change. At other times of the year, except in cherry time, and when the seeds of the different species of the service tree are ripe, this bird carefully avoids the haunts of man; but no sooner does the time arrive in which it has to make its nest, than it draws near to our habitations with the utmost confidence, and forms its nest in places the most exposed to our view. There both male and female protect their charge with matchless courage. On the approach of an enemy, you immediately hear their singular cry, which somewhat resembles the sound produced by striking the teeth of a comb smartly with your finger; and you see the parent birds dashing incessantly at the crow, the cat, or the magpie, until they clear the coast. This year, there is a stormcock's nest within fifteen yards of the place where the masons are at work. Our tame magpie, which is allowed its freedom, and the use of its wings, seized the female, some days ago, and brought her close to the masons. The male bird

instantly came up, and rescued his mate, by fighting the magpie until he made it let go its hold. "Causa viæ conjux." It was to save his female that he advanced so undauntedly into the midst of his mortal enemies: nothing else could have induced him to face the danger. I fancy that I hear him say, —

——— "Si fata negant veniam pro conjuge, certum est,
Nolle redire mihi: letho gaudete duorum."

If you won't give my poor dear up to me, here I stay: you may kill us both. This loving couple retired triumphant to their nest; but the female lost half of her tail in the fray.

The stormcock surpasses all other thrushes in size, and is decidedly the largest songster of the European birds. He remains with us the whole of the year; and he is one of three birds which charm us with their melody during the dreary months of winter, when the throstle and the lark are silent, and all the migratory birds have left us to sojourn in warmer climates. On this account I prize him doubly. He appears to be gregarious in the months of August and September. I have occasionally counted from forty to fifty of these birds in a flock; and I suspect that they are sometimes mistaken for an early arrival of fieldfares by those who pay attention to the migration of birds.

The stormcock is remarkably fond of the berries of the mountain ash. He who loves to see this pretty songster near his dwelling, would do well to plant a number of mountain ashes in the midst of his pleasure-grounds: they are of quick growth, and they soon produce an abundance of berries.

Whilst the fruit of these trees affords a delicious autumnal repast to the stormcock, the branches which bear the berries are well known to be an effectual preservative against the devilish spells of witchcraft. In the village of Walton I have two small tenants; the name of one is James Simpson, that of the other Sally Holloway; and Sally's house stands a little before the house of Simpson. Some three months ago, I overtook Simpson on the turnpike road, and I asked him if his cow were getting better, for his son had told me she had fallen sick. "She 's coming on surprisingly, Sir, quoth he. The last time that the cow-doctor came to see her, 'Jem,' said he to me, looking earnestly at old Sally's house, 'Jem,' said he, 'mind and keep your cow-house door shut before the sun goes down, otherwise I won't answer what may happen to the cow!' 'Ay, ay, my lad,' said I, 'I understand your meaning: but I am up to the old slut, and I defy her to do me any harm now.'" "And what has old Sally been doing to you, James?"

said I. "Why, Sir," replied he, "we all know too well what she can do. She has long owed me a grudge; and my cow which was in very good health, fell sick immediately after Sally had been seen to look in at the door of the cow-house, just as night was coming on. The cow grew worse and worse; and so I went and cut a bundle of wiggin (mountain ash), and I nailed the branches all up and down the cow-house; and, Sir, you may see them there if you will take the trouble to step in. I am a match for old Sally now, and she can't do me any more harm, so long as the wiggin branches hang in the place where I have nailed them. My poor cow will get well in spite of her." Alas! thought I to myself, as the deluded man was finishing his story, how much there is yet to be done in our part of the country by the schoolmaster of the nineteenth century!

Walton Hall, May 21. 1836.

ART. III. *Facts on the Habits and personal Characteristics of the Crossbill* (*Lóxia curviróstra* Temm.). By the Rev. F. O. MORRIS, B.A.

CROSSBILLS have made their appearance, this winter [1835-36.], in the neighbourhood of Doncaster; and, as their visits are so "few and far between," and their movements so very uncertain; and, as I believe that they are but very partially distributed over the country, even when they do come, the few observations that I have been able to make upon them may not be unacceptable to some of your readers.

They had appeared in most of the fir plantations in this neighbourhood, and many specimens had been brought to Mr. Reid of this town for preservation; but, though I had seen many in a dead state, and had repeatedly looked for living ones in my walks, I was not so fortunate as to meet with any until January 25. 1836. I had heard, about a week before this date, that a flock had been seen at Kirk Sandal, about five miles from here, and some individuals of them shot, which, indeed, I had seen myself; and on Jan. 25. I set out in quest of the living ones, and proceeded to the hospitable house of George Martin, Esq. He was out shooting when I arrived there, and gave me one of the birds I had come in search of, which he had just killed. He therefore knew exactly where to find them, and soon conducted me to the place. In a few minutes I had the great pleasure of hearing the note of this unusual visitant, which I had never heard before, having never previously been near the bird alive. I

heard them before I saw them; and I soon, by the hearing of them, discovering where they were, proceeded up to the trees they were upon, to make what observations I could on them.

They were in a flock of about thirty, dispersed on a few of the larch trees, and all near together: those on the same trees in very close companionship indeed. They seemed entirely occupied in getting at their food, which consists, as every one knows, of the seeds of the larch, that is, in the winter season; for in the summer they do much mischief, as we are informed, by pecking out the seed of the apple and other fruits. Having, probably, been but little ever disturbed in the recesses of their native forests, they were at first exceedingly tame. Mr. Martin informed me that, when he first observed them, they allowed him to fire at them several times, and to load his gun after each shot, without their leaving the tree they were upon, though some of their number were killed each time: so little accustomed did they appear to the sight of a gun, and so little acquainted with its murderous use. The morning that I saw them, however, they evidently had become a little more wary, though still more tame than any other wild birds I had ever seen before. The fir plantation occupied three sides of an oblong; and the only remove they made after each shot was from one end to the other, backwards and forwards, as they were driven. In about eight shots we succeeded in procuring eighteen specimens, and might have obtained more had we wished it, though they obviously were becoming more shy. The sexes appeared to be in about equal numbers, as we found nine of each among the slain. No two specimens of each are certainly exactly similar, though there is not so much difference between them as I had been led to imagine. The colours of some of each kind are brighter than those of others; and this is chiefly seen in the male birds, which vary, also, considerably in size — more, I think, than do the females; and in some of the males there is much more orange colour, mixed in a party-coloured way with the red over the tail, than in others. It will not be necessary for me to enter into more particulars respecting the plumage of the crossbill, which has been so often described already; except that I may mention, that the female, in general appearance, is very much like the female greenfinch; but it is a little larger in size. I have forgotten to mention in the right place, when speaking of their note, that it is much more similar to that of the brown linnet (only louder, and, therefore, more attractive of the attention; otherwise one might, perhaps, think it the note of the linnet), than that of the greenfinch

as stated by Selby. Neither do I think so much of the difference he mentions between their note when sitting and when flying. They fly in a kind of semi-wheeling way, "exceedingly much" as the linnets do. It was rather a singular coincidence, that the bills of the number which we procured were *alternately* crossed to the right or the left; that is, nine of the eighteen had the under bill crossing the upper to the right, and nine to the left; so that it appears that no regular order is preserved in this part of their organisation, and that it is not fixed by any law of nature (VII. 58.). To descend from the head to the feet, which are exceedingly strong, and the legs placed very far backward indeed, there is very great power in the muscles and tendons by which they are worked, so that the bird can sway its body into almost any position, such as the situation of its food may require for its getting at it. The birds seem almost as if their feet were ingrafted into the branch, so firmly fixed do they appear, bending their bodies at the same time upwards or downwards, in fact, in any direction, and in every attitude. When the bird is dead, the feet are contracted in a very forcible manner, requiring some strength to bend them, and bent as if grasping the branch to which they were before so *attached*: "the ruling passion strong in death." Having now, however, nothing to oppose their contraction, they show how very strong their muscles must be, as they cause the toes to cross, or interlay, one another in a very remarkable manner, such as I never observed in any other bird.

I have just now read over their natural history, as given by that excellent ornithologist, Mr. Selby; but, in one or two particulars, I think his account of them is erroneous. Those which he describes as having procured in the month of June, he supposes to have been engaged in the work of incubation in the *winter* months; because the breasts of the females were denuded of feathers at the time he procured them, namely, in June; and Willughby, he says, describes their song, which is pleasant, as heard only during the *winter* months, or season of incubation. Now, about this time (January and February), they are in *flocks*, instead of *pairs*; and the latter case would obtain were they even building or about to build; and they have not even yet found their voice of song, which always is the prelude to their pairing, but are only heard to utter a monotonous chirping note. Besides, how many of our native birds there are which lay their eggs, and hatch them, soon enough to have their breasts denuded of feathers from that cause, quite as early as the month of June, and often much earlier! The crossbill may breed rather

earlier than most other birds; but, I am inclined to think, not quite, and not even nearly, so early as seems hitherto to have been imagined.

The general appearance of the crossbill is rather clumsy and uncouth, and the head large and heavy. The flesh is exceedingly good eating, something like game to the taste, as I learnt by having one cooked which was too much shot to be worth preserving. The craws of all my specimens were filled with the seeds of the Scotch pine [*Pìnus sylvéstris L.*] or larch [*Làrix europæ`a Dec.*], and nothing else. They are better off this cold weather than most other birds, as their food is always in plenty, and not dependent on the vicissitudes of the weather.

Doncaster, February, 1836.

[In VII. 54—56., and previous places there indicated; in VII. 58.; and in IX. 202.; is information on the crossbill.]

ART. IV. *Notes on the Habits of the Black Snake* (*Coluber constrictor*). By G. ORD, Esq. Extracted from a Letter addressed to C. Waterton, Esq.

"BLACK SNAKES," says [Mr. R. C.] Taylor [VIII. 541.], "are called racers, from their occasionally chasing men with great ferocity. They move with astonishing swiftness; the eye can scarcely follow their rapid passage." Flights of imagination are admissible in poetry and romance, but not in natural history. When the black snake is first startled, he moves swiftly for a few feet, by a sudden spring, as it were: his speed afterwards is by no means extraordinary, inasmuch as a boy of ten years old could outrun him. With respect to man, he is entirely harmless; for, should he bite you, his little teeth occasion only a slight scratch. Recollect, he has no fangs. When you first lay hands upon him, he will seize you with his mouth, apparently in great anger; but his choler is of short duration: in the space of five minutes he will be as gentle as a pet kitten, and you may put him either into your bosom or your pocket with the utmost security. Of all our serpents, this species is, perhaps, the most useful to our farmers, in consequence of the immense numbers of mice which it devours, particularly field and meadow mice. One black snake in a barn would drive all the rats and mice from the premises. Explain all these things to our stupid farmers, and they would laugh in your face. "What!" they would say, "tell us of the utility of snakes! Do we not know that

they frequently *chase people with great ferocity*; that their bite has been often fatal; that they sometimes coil themselves around the limbs of persons, so that it becomes necessary to cut them loose? Is it not notorious that they *suck the cows?*" I once pleaded with a farmer for the life of a poor black snake that he had pinned to the earth with a stick. "I make it a rule to kill every snake that I meet with," replied the barbarian: "d—n them, I hate from the bottom of my soul the whole race." I wish from the bottom of *my* soul that that prince of mischief and ugliness, Old Nick, had not taken it into his head to assume the appearance of a snake when he undertook to tempt our lovely but frail mother Eve: much of the prejudice against snakes, I am persuaded, has arisen from this circumstance. My dear friend, I have, from my boyhood, been in the habit of roaming on foot in various parts of our country; I have explored forests, swamps, and morasses for hundreds of miles; and nave beheld hundreds of black snakes in a state of nature; but never, in one instance, did I see them practise the reputed art of fascination; never did I see them chase a human being; never did I see them suck a cow; and never did I know them do the least injury, with the exception of an insignificant scratch, to any one.

Buckingham, Pennsylvania, January 9. 1836.

ART. V. *A Catalogue of the Species of Rayed Animals found in Ireland, as selected from the Papers of the late J. Templeton, Esq., of Cranmore, with Notices of Localities, and with some Descriptions and Illustrations.* By ROBERT TEMPLETON, Esq.

(*Continued from* p. 305.)

RADIA'TA.

PO'LYPI.

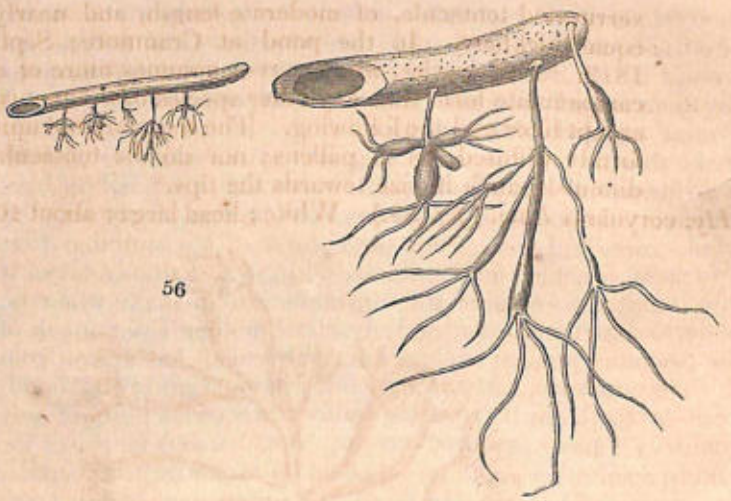
GE'LATINEUX *Cuv.*

Hydra Linn.

brúnnea. (*fig.* 56.) Deep brown, with from 4 to 6 slender, tapering, brown tentacula, scarcely exceeding the length of the body; the peduncle nearly transparent. Found adhering to the stems of *P*otamogèton nàtans in the Lagan canal; June, 1805.

In *H.* fúsca of Trembley the tentacula are "longíssimis álbis," which clearly distinguishes it from the above. *

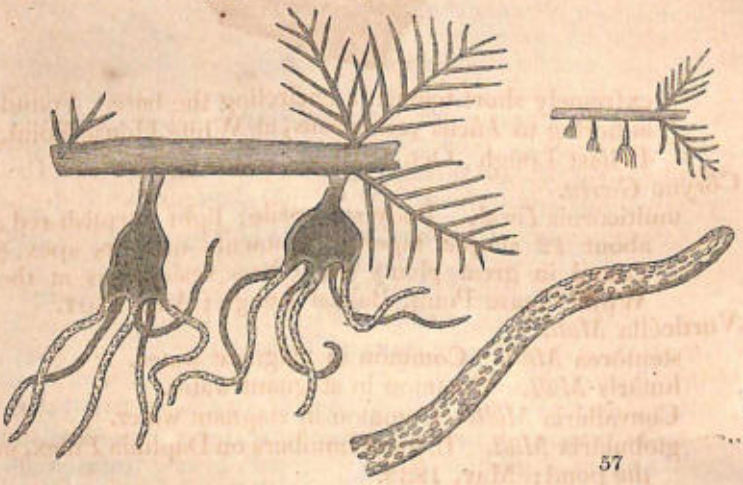
[* Mr. Templeton expressed, previously to his departure for Malta, on about April 12. 1836, a wish that his catalogue could be submitted to



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Hy. grísea *Linn.* Of a cinereous pale green; with from 3 to 7 tentacula, longer than the body. Found in stagnant water; Aug. 1811.

verrucòsa. (*fig.* 57.) Of a pale cinereous hue, with 6



57

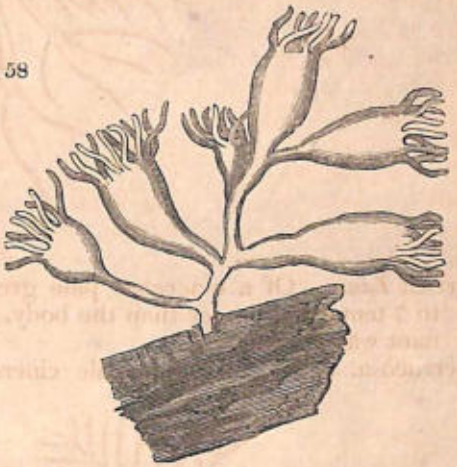
Dr. Johnston of Berwick upon Tweed, to the end of obtaining the benefit of Dr. Johnston's notes upon the contents of it. From the name *Hydra* brúnnea, to the end of the catalogue, has been submitted to Dr. Johnston, and the notes signed G. J. are those which he has made.]

The conclusion is, perhaps, doubtful; for, since the animals have the power of shortening the tentacula very much, unless Mr. Templeton can show that his species could not extend them, when at rest, beyond the

verrucated tentacula, of moderate length, and nearly equal thickness. In the pond at Cranmore; Sept. 1812. This species, when at rest, assumes more of a campanulate form than any other species of the genus, except lùtea and the following. The warts are not uniformly diffused, as in pállens; nor do the tentacula diminish much in size towards the tips.*

Hy. corynària *Lam.* (*fig.* 58.) White; head large; about 10

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extremely short tentacula encircling the base. Found adhering to *F*ùcus vesiculòsus, at White House Point, Belfast Lough; Oct. 1810.

Córyne *Gærtn.*

multicórnis *Forsk.* Body subsessile; light purplish red; about 12 simple tapering tentacula near its apex.† Found in great plenty on *F*ùcus vesiculòsus at the White House Point, Belfast Lough; Aug. 1807.

Vorticélla *Müll.*

stentòrea *Müll.* Common in stagnant water.

lunàris *Müll.* Common in stagnant water.

Convallària *Müll.* Common in stagnant water.

globulària *Müll.* In great numbers on Dáphnia *P*ùlex, in the pond; May, 1833.

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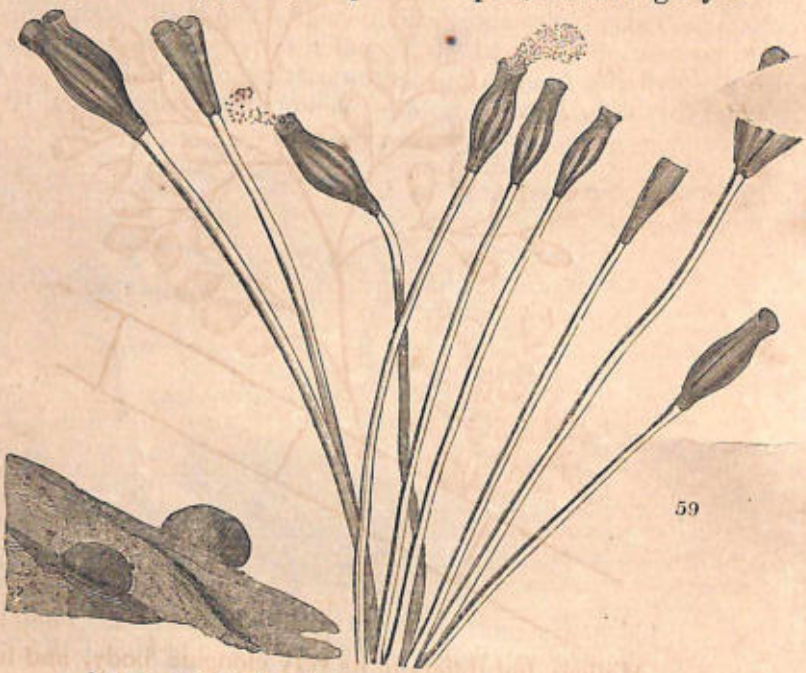
length of the body, it may be identical with Trembley's, after all. The fewness of the tentacula is another doubtful character. Compare the figure with those of Trembley's species in pl. 3. of his *Histoire des Polypes.* — *G. J.*

* The *habit* seems to prove this a good species; but the specific name is objectionable: the tentacula of all *H*ydræ are verrucose. — *G. J.*

† This is surely C. squamàta of Fleming. — *G. J.*

Vor. acinòsa *Müll.?* Globular, or somewhat obovate, with dark grains; peduncle rigid. On *Conférva amphíbia*, in a ditch; June, 1806.

pulvinàta. (*fig.* 59.) Spindle-shaped; mouth slightly di-



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lated; peduncles elongate, simple, aggregate. Found on the rocks and stones in Colin Glen river, forming small hemispheric sponge-like cushions, during the summer months.

*p*olypìna *Müll.* Compound, ovato-truncate; peduncle much branched; branches repeatedly flexed. Among *Conférvæ*.

intrácta. (*fig.* 60. *a*, contracted; *b*, expanded.) Compound, globose, or ovato-truncate; when at rest, closely aggregated; when expanded, the peduncle very much branched.* Found on *Conférva capillàris* at the Point Fields, Belfast.†

elongàta (*fig.* 61.) umbellàta *Müll.?* Obconic, narrow, elongate; peduncle divided; repeatedly branched. Found in the Manyburn River, Ballylesson, c. Down. It bears considerable resemblance to V. umbellàta of

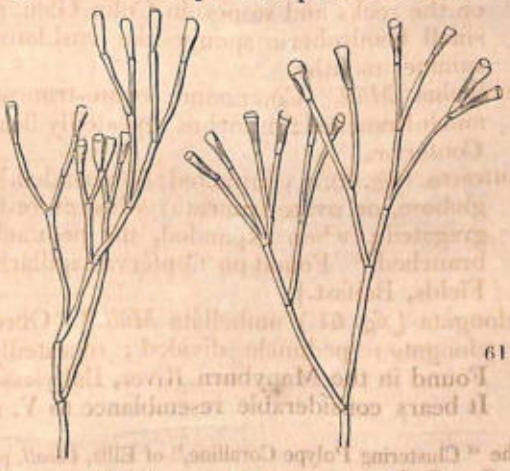
* The "Clustering Polype Coralline," of Ellis, *Corall.* p. 25. pl. 13. fig. *b*. *B. c. C.* — *G. J.*

† ["June, 1811," are inscribed upon the drawing.]

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Müller; but differs in its very elongate body, and in wanting the everted lip. The peduncle has transverse



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partitions, which is a rather rare quality among these animals. — (*To be continued.*)

The species of Ophiùra represented in p. 237. is not, as it is there doubtingly stated to be, O. granulàta: the figure is a magnified one of O. rósula, represented by a figure in p. 231.; but, as the figure in the latter page is not a very accurate copy of the drawing, the figure in p. 237. supplies its deficiencies exceedingly well. — *G. Johnston. Berwick upon Tweed, May* 28. 1836.

Art. VI. *Remarks in Furtherance of the proposed Institution of a Society of Meteorologists in Britain.* By J. G. Tatem, Esq.

Meteorology is a science in which I feel too much interested not to have rejoiced at the proposal for establishing a society to promote its study [p. 251. 305.]. I therefore request a space in your pages to express my anxious wish to be permitted to join any association having for its object the collecting together and reporting observations made at different stations. To prove that I have long wished for such an institution, I might refer to the *Monthly Magazine*, April, 1823 (vol. 55. p. 207.); where, in a letter addressed to the editor, I have endeavoured to show the utility of a meteorological society, and suggested the propriety of the observations being "made with instruments of the same construction, and under circumstances as nearly similar as possible." Your correspondent Mr. W. H. White has recommended this practice [p. 251. 305.], in which every meteorologist will agree. The chief difficulty, as appeared to me, was the finding some medium through which the observations might be made known; and the sanction and authority of a society seemed the most likely to obtain notice, and receive support; but many obstacles will always arise to the formation of such a society; perhaps I should now say, such *new* society: not to enumerate others, it may be sufficient here to state, that the persons most inclined to become members, and best qualified to conduct proceedings, are widely separated by residence, most probably unknown to each other; and their meeting together, to devise means to effect their object, would be attended by inconvenience, fatigue, and expense. Under these circumstances, you, being the conductor of this Magazine, might render the most essential services, by permitting the persons desirous of uniting with such a society to communicate their intentions to you, and by announcing in your pages their names to your readers. I have said, above, *new* society, because it should be knowu that, in October, 1823, a society was

instituted in London, under the title of "The Meteorological Society of London," but which society, although not absolutely dissolved, is now scarcely in a state of existence. Whether that society should be revived, or a new one should be raised, your aid is of the utmost importance, as among your correspondents there are, no doubt, many who would not only be willing to assist, but would be able to propose the means to attain that which has so long been a desideratum, the union of the meteorologists of the kingdom.

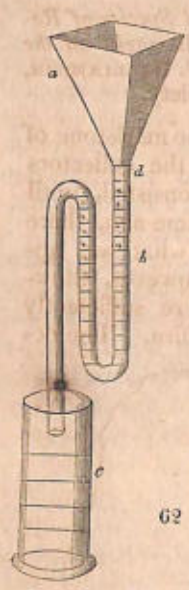
The fear of trespassing too much on your indulgence makes me refrain from entering into any detail of the benefits a meteorological society would afford to agriculturists, the valetudinarian, the traveller, when journeying on the land; and the mariner, while traversing the wide waste of waters.

Wycombe, Bucks, June 13. 1836.

ART. VII. *An Approval of the Proposition of instituting a Cooperative Use, in different Stations in Britain, of uniform Meteorological Journals; and a Notice of a Kind of Rain Gauge.* By T. K.

I WAS very glad to see the proposal, in p. 305., by Mr. White, of a union of meteorological journals, through the medium of your Magazine. I think that the subject is of much importance, particularly as regards the shifts of wind; as, by means of many observers in proper places, a chart of the winds for any moment of time, in these islands, can be easily constructed; and I strongly suspect that currents of wind are occasionally very local. Isolated journals are of slight use; but, when combined with others, their importance is at once perceived. I have been for some years in the habit of daily noting down the height of the barometer, thermometer, &c.; and, if observations made in so westerly a county as Tipperary would be acceptable, I should be very glad to forward them at the stated times. Some definite plan of observations should, certainly, be struck out by some able meteorologist, or by some scientific body, which could be made known, to those who would undertake the task, at the places fixed on, through your pages.

[*A kind of Rain-Gauge.*] I send beneath the plan of a rain-gauge (*fig.* 62.); which is, I think, simple, and yet indicating accurately so small a quantity of rain as the thousandth of an inch. Any of your correspondents could construct one for himself. *a*, a tin funnel, japanned; *b*, a glass tube, bent twice, so that the extremity of it may form a



siphon, and conduct the contents, when filled up to *d*, into the jar *c*. The funnel having a square orifice of 5 in. or 10 in., the proportion between the surface exposed and that in the tube is easily arranged: for instance, the funnel's orifice, 10 in. square, one hundredth of an inch of rain falling, gives 100 times that quantity, or exactly a cubic inch of rain in the tube; which is easily graduated by pouring in that bulk of water, accurately measured, and marking with a file where it rises to in the first two legs. The division into ten parts for a thousandth of an inch may afterwards be done by a rule. The graduation in the jar must be for successive contents of the tube. The whole is to be enclosed in a small box.

Toomavara, Ireland, June 13. 1836.

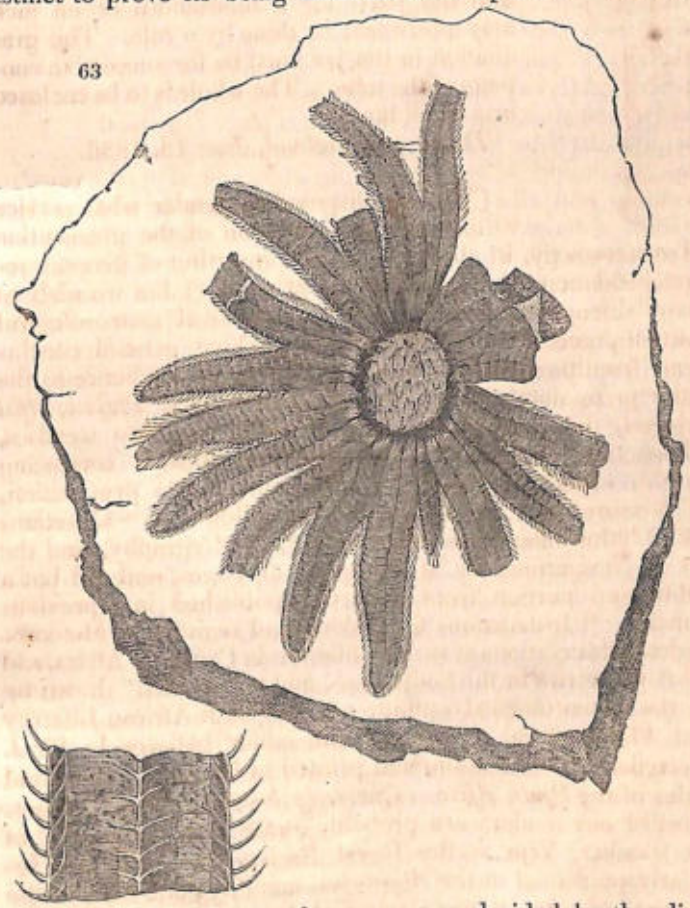
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[We are disposed to render what service we can to the promotion of the prosecution of meteorology, in so far as to the inserting of general recommendations and treatises on principles; but we wish to stand disengaged from publishing individual meteorological journals, and of preparing and publishing general conclusions from them. One may here notice, in obedience to the latter profession, that in the *Edinburgh New Philosophical Journal*, the number for July 1. 1836, are two treatises, whose titles indicate a great likelihood of their conducing to the elucidation, and the direction of the prosecution, of meteorology: their titles are as follows: — "Questions for Solution relating to Meteorology, Hydrography, and the art of Navigation; by M. Arago;" 46 pages, and yet but a continuous portion from a portion published in a previous number. "Instructions for making and registering Meteorological Observations at various Stations in Southern Africa, and other Countries in the South Seas, and also at Sea:" drawn up by the meteorological committee of the South African Literary and Philosophical Institution, the editor believes by Sir J. Herschel, for circulation, and printed in No. I. of the second series of the *South African Quarterly Journal*; 14—15 pages. Most of our readers are probably aware that the journal of the weather, kept at the Royal Society of London, is regularly published in the *Athenæum*, monthly; and that, in the *Literary Gazette*, a meteorological journal kept at Edmonton, by Mr. Charles Henry Adams, is published weekly.]

ART. VIII. *A Notice of Two hitherto undescribed Species of Radiària, from the Marlstone of Yorkshire; and Remarks on the Organic Remains in that Stratum.* By Mr. W. C. WILLIAMSON, Curator to the Manchester Natural History Society.

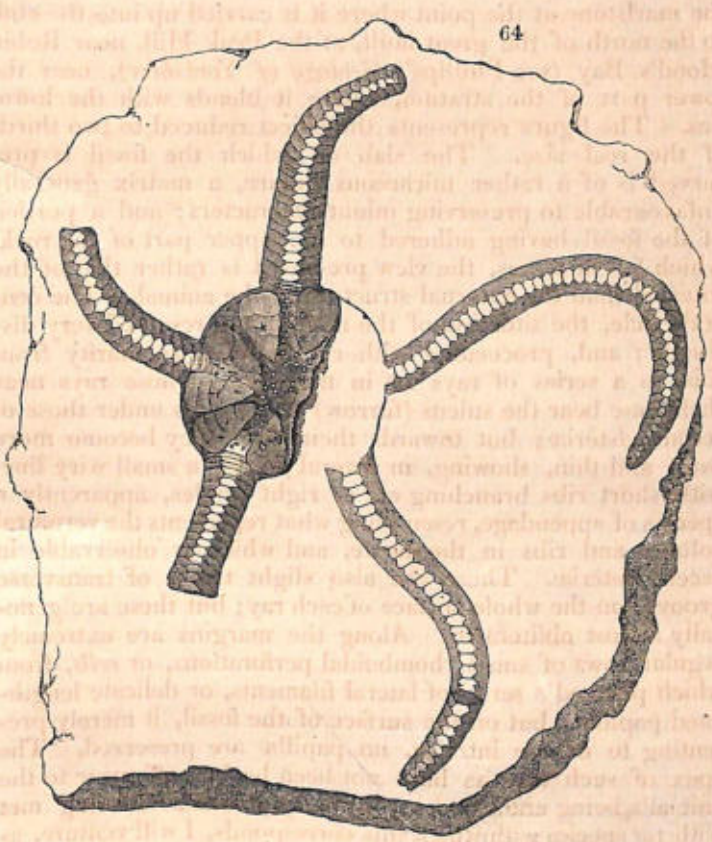
THE occurrence of remains of Radiària in the marlstone of Yorkshire has been for some time known by the collectors of fossils on that coast; but they have chiefly consisted, until lately, of Ophiùra Mílleri Phillips. A little time ago, there were found traces, of an imperfect nature, of what was apparently a true Astèrias, with five rays; only, however, showing the lateral papillæ of the rays, which were sufficiently distinct to prove its being different from Ophiùra. The occurrence of true Astèriæ, however, was decided by the discovery of the fossil now figured (*fig.* 63.), which was found in

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the marlstone at the point where it is carried up into the cliff, to the north of the great fault, at the Peak Hill, near Robin Hood's Bay (see Phillips's *Geology of Yorkshire*), near the lower part of the stratum, where it blends with the lower lias. The figure represents the object reduced to two thirds of the real size. The slab on which the fossil is preserved is of a rather micaceous nature, a matrix generally unfavourable to preserving minute characters; and a portion of the fossil having adhered to the upper part of the rock, which fell in pieces, the view presented is rather that of the internal than the external structure of the animal. The central circle, the situation of the mouth, is preserved very distinctly; and, proceeding with considerable regularity from this, is a series of rays 20 in number. Those rays near their base bear the sulcus (furrow) which runs under those of recent *Astèriæ*; but towards their apex they become more worn and thin, showing, in several places, a small wiry line, with short ribs branching off at right angles, apparently a species of appendage, resembling what represents the vertebral column and ribs in the turtle, and which is observable in recent *Astèriæ*. There are also slight traces of transverse grooves on the whole surface of each ray; but these are generally almost obliterated. Along the margins are extremely regular rows of small rhomboidal perforations, or *cells*, from which proceed a series of lateral filaments, or delicate lengthened papillæ; but on the surface of the fossil, it merely presenting to us the interior, no papillæ are preserved. The apex of such rays as have not been broken off prior to the animal's being entombed are obtusely pointed. Having met with no species with which this corresponds, I will venture, as one more slight tribute to the high scientific character of R. I. Murchison, Esq., to call it *Astèrias Murchisòni*.

Fig. 64. represents a species of Ophiùra [reduced to two thirds of the real size] from the same stratum; but not so low in the series, and found at Staithes, a few miles further to the north. It bears some resemblance to Ophiùra Míller*i*, but differs in two or three particulars. [A figure of O. Míller*i*, copied from that in Phillips's *Geology of Yorkshire*, pl. 13. fig. 20., is given in our III. 275.] The base of each ray has been protected by two strong heart-shaped plates, the spaces between which would seem to have been rather flexible, but protected by small orbicular scales, or plates, which are, however, rather indistinct. The most evident distinction is in the arrangement of the plates of the rays: as in O. Míller*i*, we have here three rows; but, instead of the dorsal row being, as in that species, of double the width of the lateral ones, the



reverse is the case; forming a character at once evident and distinct.

To this species I have given the name of Ophiùra [the specific name is not inserted in the manuscript].

The marlstone on the Yorkshire coast generally averages in thickness about 130 ft. Its ordinary appearance is that of a series of shales and beds of lamellar sandstone, in some parts divided by layers of ironstone of various thicknesses. These occur chiefly in the first 30 ft. from the upper alum shale, and the division from which is marked by a band of irony nodules, so cemented together as to form a solid stratum, about 6 in. in thickness. This seam, as far as I have been able to discover, contains no fossils, except Ammonìtes Hawskerénsis, and a species of small Tròchus. Below this, the ironstones are divided for the space of about 12 ft., with dark shales, filled with a profusion of fossils, of which the

following appear the most important: — Belemnìtes cónicus, B. compréssus, *P*écten æquiválvis, *P.* sublæ`vis, Avícula inæquiválvis, A. *cý*gnipes, Plicátula spinòsa, *O*'streæ. These fossils I have found most abundant below the signal cliff at Staithes, where the shales are better exposed than elsewhere.

At the same place, but nearer low water mark, probably 10 ft. or 12 ft. lower in the series, one of the irony seams is very full of fossils, containing Ammonì*tes* Clevelándi*cus*, A. Stokèsi*i*, Túrbo undulàtus, *C*árdium multicostàtum, Isocárdia lineàta, Córbula cardiöìdes, *M*ỳa b. scrípta, *M.* literàta, Amphidésma recúrvum, Terebrátula subrotúnda, T. tetràedra, T. triplicàta, T. bìdens.

Still nearer the landing-place at Staithes, another layer of ironstone makes its appearance on the Scar, equally prolific in fossils, of which the chief are, Isocárdia lineàta and Ammonì*tes* maculàtus. The latter are rather remarkable, from their being filled with solid crystals of carbonate of lime, which often render the whorls, especially the inner ones, semi-transparent.

Below these layers of ironstone, the seams of sandstone are filled with fossils in the greatest confusion. Ophiùra Míller*i*, O. sp.; Cídaris, an undescribed species (*Woodward*); Dentàlium gigantèum, Belemnìtes elongàtus, Modìola scálprum, M. Hillà*na*, Avícula inæquiválvis, *P*écten sublæ`vis, Plagióstoma læviúsculum, Gryphæ`a bullàta?, *O*'streæ. The two Ophiùræ, Cídaris, Modìola scálprum, and Plagióstoma læviúsculum, are rare, the remainder very abundant, forming a rich harvest for the industrious collector between Staithes and Saltburn, where blocks of the sandstone have fallen from the cliffs above upon the shore.

In one of the sandy seams near the base of this stratum was found the *A*stèrias described above: near the same part, Pholadomỳa Murchisòn*i* is found with several bivalvular shells, often imperfect.

Occasionally hard seams of ironshot sandstone are met with, filled with *C*árdium truncàtum, which is very abundant between Staithes and Saltburn. It is rather remarkable, that the broken, or separated, valves are generally found distinct from the double, or perfect, specimens; as if the former had consisted entirely of dead shells, with the ligament become destroyed.

It was in 1833 that I was first struck with the extreme regularity in the distributions of fossils in the lias group of Yorkshire. This immediately led me to imagine that Dr. W. Smith's theory of identification might be carried even to a still more extended degree of application than had hitherto

been done; and with a view of an investigation, and its application to a useful purpose in the coal districts, I laid a communication before the Geological Society of London. Shortly after that, the interesting work of Mr. Mammatt on the coalfield of Ashby de la Zouch made its appearance; and in perusing it I was not a little pleased at finding that the conclusions I had arrived at were the same as had resulted from the experience of many years spent amongst the gloomy recesses of the mine. I rather hastily adopted the opinion, that the law would prove universal; but such appears evidently not to be the case, although in small districts a great regularity will generally be perceived: particular fossils always occurring in one portion of a stratum, wherever it makes its appearance, but in no other. When, however, we view the same stratum in another part of the country, although the same fossils are there, they do not appear to occupy the same relative positions.

Manchester, June 14. 1836.

ART. IX. *A Notice of the Geological Conditions ascertained from Two Sections in the Brickfield, Copford, Essex; additional to the Section, the Geological Conditions ascertained from which are stated in* VII. 436—438. By JOHN BROWN, Esq.

A FRESH excavation having been made, in the course of the last winter (1835–36), in a different part of the Copford brickfield to the one of which an account is given in VII. 436—438.; and, as there is a considerable variety in one of the sections (the southern) especially, both in the mineral properties of the beds and in their geological disposition, as compared with those of the section above mentioned, I am induced to send you the particulars of the case.

The section given in VII. 436—438. is taken from the western part of the field; those following are taken from the eastern and southern.

The space of ground excavated is about 220 yards square; but the white marl and its accompanying shells are traced east and west a mile distant from this spot. This formation dips to the north beneath the meadows, at an angle of above 5 ft. in 60 yards.

Section at the Eastern Part of the Field. — 1. Brown clay, with rounded and angular flints; boulders of quartz, trap, &c.: from 1 ft. to 2 ft. thick. 2. Fragments of shells mixed with sand and marl: from 2 ft. to 3 ft. 3. Brown clay mixed with sand and marl, called by the workmen race: 1 ft. 4. Blue

calcareous clay with mica, without the laminated character so apparent in the south section: excavated 6 ft.

Southern Section. — 1. Brown clay, with boulders, &c.: 6 ft. 2. Light-coloured sand, and pebbles of flint, that are chiefly not larger, generally speaking, than boys' marbles: 10 ft. 3. Yellow clay, in fine horizontal laminæ, and irregular thin concretions of carbonate of lime in some of the strata seams: 6 ft. 4. Blue clay and fine sand, alternating in horizontal laminæ, so thin, that thirty-three of them lie in the space of $1\frac{3}{8}$ in.: excavated 6 ft.; whole depth unknown.

Organic remains have not yet been found in this part of the field.

The flat concretions of whitish limestone, found in the yellow clay beds of the south section, appear to be an incipient formation of carbonate of lime. On its first removal from the bed, some of it is so soft as to be easily cut with a knife, while some portions of it are harder. But the softest, after removal, and by the action of the atmosphere, becomes as hard as white lias, and much like that kind which is called Cottam marble, but without its dendritical appearances. Care is taken to remove these concretions of limestone from the clay by washing it, previously to moulding it up for bricks, tiles, and various other architectural objects, as material for forming which it is commonly used; but, if by chance any of the concretions are moulded up with the clay into the articles manufactured, they, in passing through the burning in the kiln, become burnt into lime; and the proprietor of the works has informed me that such articles are useless.

There is much calcareous matter in the whole mass of this clay; and, with regard to the calcareous concretions, they are quickly decomposed in diluted muriatic acid. From what we see here passing under our notice, it appears most satisfactorily to those who love to contemplate this subject, that, whether nature produces this excess of lime, or calcareous matter, in one part of this formation more than in another, by the laws of chemical affinity, or by whatever process, it is not straining analogy too far to conclude, that many of our stratified argillaceous limestones are produced in a similar way. On looking at this southern section (although it is on a comparative small scale), with its fine wavy, although generally horizontal, layers, and the incipient formation of some of the layers into limestone, I am strongly reminded (as far only as the laws of stratification are concerned) of the horizontal strata of the lias in the cliffs at Lyme Regis, Dorsetshire, Barrow on Soar, in Leicestershire, and many other localities which I could mention; but especially at the former

locality, where the straight horizontal layers of limestone, and beds of blue clay, alternate from the bottom to the top of those cliffs, in precisely the same manner as the blue clay and fine sand alternate here. It matters not that one is a marine deposit, and the other a fresh-water one: the laws of nature are in both instances the same.

Excepting two species of Valvàta, a whole shell is very rarely to be obtained from this deposit; but in my last visits, I obtained, with a little trouble, the following:—Lymnèus sp.; imperfect, but, by the large size of the fragments, apparently stagnàlis. L. glutinòsus *Turt.* Valvàta obtùsa *Turt.* V. sp., not figured in Turton's work. Paludìna sp., the only species of this genus found fossil here.

Mineral Characters of the Boulders found in the Stratum No. 1. *of each Section.* — Flints, both rounded and angular, with chalk fossils; quartz sandstone; milky crystalline quartz; granular crystalline quartz of that kind termed Druid sandstone; micaceous sandstone; quartz sandstone, with crystals of felspar; very beautiful conglomerates in boulders; compact felspar, with crystals of felspar (porphyry).

Your correspondent Mr. Morris observes, in IX. p. 264., that the existence of the chalk nodules in the blue clay at Copford is an interesting fact, as he (Mr. Morris) has only found them at Grays, in the beds above that stratum. The blue clay containing the nodules of chalk at Copford lies so far above the chalk formation, that that stratum has not been penetrated in sinking wells, in the surrounding neighbourhood, to from 50 ft. to more than 100 ft. deep; but the occurrence of these nodules in sinkings of not more than 20 ft. below the surface was, I thought at the time, an indication of the chalk basin being shallower just at this spot than at other places; or that we have chalk near the surface somewhere in this neighhourhood. (VII. 437, 438.) It would be an important discovery, indeed, if we could find it out; not only in a geological, but in a commercial view; for chalk is an article in high request here for our siliceous soils. But it is certain, that the chalk nodules which I have in my cabinet, as procured from the Copford brickfield, from its blue clay bed, could not be bouldered from our nearest chalk locality (Ballingdon), in water, without being dissipated in the transport. If I have misunderstood Mr. Morris's observation respecting the blue clay bed at Copford, I beg to say that it is a fresh-water deposit upon the London clay; and, therefore, it is interesting to find specimens of soft chalk in it.

Stanway, near Colchester, Essex, May 19. 1836.

ART. X. *Retrospective Criticism.*

WHY do Birds sing? (p. 281—289.) — I am glad to find that my passing observations (VII. 484—486.) upon this interesting subject, have excited the attention of several of your correspondents; and I was much gratified by the perusal of the able paper upon this subject in p. 281—289., by Mr. White. There are, however, two or three points upon which I would offer a few remarks.

From Mr. White's mode of arguing the first part of the question, the capability of some birds to sing, and which he proves from the formation of the trachea, I presume that he infers that all birds so formed do sing. He farther shows that other animals (man) have a somewhat similar provision. All this may be very true, and very admirable: the adaptation of the means to produce modulations of the voice may be all taken for granted; but, to be of any use to the enquiry, I think we must also be prepared to allow, that all animals so formed are singing animals. The power or capability to sing is one thing; to sing quite another. I may be endowed with vocal powers to a redundancy; but that, of itself, would never, certainly, incite me to sing. I grant that there can be no singing without an adaptation of the organs of voice to produce melodious sounds: the trachea of all men, Mr. White tells us, has this adaptation: but all men are not singers. The power of singing cannot, I think, be the cause of singing; and, if not, the subject of the formation of the trachea, though highly interesting, is rather beside the question. Paley's argument of the gardener and the tulip is exactly applicable to this point. (*Nat. Theo.*, v.) The means by which birds sing is not the enquiry; we want to find out the reason why, and not the means by which, they sing.

On the other part of the question, Mr. White observes, "What, then, is the stimulating cause to sing? Is it not their having every requisite organ for song by their peculiar construction, and their being excited by the season?" and then he quotes from Solomon. This, I think, is hardly to the point, or, at least, is not a satisfactory accounting for the singing of birds. I certainly cannot conceive any thing exciting to joyousness in a frosty December morning; and yet upon such occasions the thrush frequently pours forth a tide of melody; and I have, as I have before stated (VIII. 548.), heard the woodlark sing for hours at the same season. This will not, either, explain the singing of the nightingale, to which I have alluded (VII. 483, 484.), as I approached her nest.

But let us examine the observation of Solomon: he says,

merely, "The time of the singing of birds is come:" but we want to know why it is come; is it because spring is come, or because the birds of passage have returned to their singing quarters? By the way, do our summer birds continue in song in the more genial climes to which they return during winter, or do they not? This, I think, is a matter worthy of investigation. I am inclined to think that I put the proper construction upon the words of Solomon, because he connects the singing of birds with the "voice of the turtle." Is the turtle a bird of passage in India? If my conjectures are right, the observations of Solomon are perfectly natural: "The voice of the turtle is heard in our land." Why? because she is just returned from her winter quarters, and the other song birds have returned home with her; and, therefore, "*the time* of the singing of birds is come."

From my own observation, I am a *periodist*, if I may use the term. I conceive that all nature requires a certain period for repose; and, when that period has been accomplished, all awakens to an antagonist, or counterbalancing, period of life and vigour, whatever may be the season. Birds sing, flowers bloom, trees bud, after a certain quantum of repose, whatever the weather may be. A forward spring may excite them to somewhat earlier operation; but I do not think that a backward spring has any great influence in retarding them. I have seen swallows in April during frost and snow; and the cuckoo appeared this spring quite as early as usual: and I am sure there never could have been a spring more ungenial.* I take it, that neither the period of repose, nor the period of excitation, can either of them be protracted much beyond its usual time, either by natural or artificial means, without injury. I take it to be much like sleep: I have been accustomed (it is natural to me) to go to bed at a certain hour, and to get up in the morning at a certain hour; when, therefore, my bed-time arrives, I cannot keep myself awake without pain; when my waking time arrives, then the bed is uncomfortable; and I must farther add, that a change in my sleeping and waking hours is the most disagreeable change I can encounter. Solomon seems to sanction some such idea in the passage quoted, "The time of the singing of birds is come." Why? because the the period of their silence and repose is fully accomplished. I throw out these hints for consideration: I hazard no positive opinion.

As to the utility of phrenological investigation connected with this, or with any other subject (VII. 567, 568.; IX. 207. 288, 289.), upon that point "this deponent sayeth not," ex-

* The ungenial weather does not appear to have left us yet: we had an abundant hoar frost last night, June 5. 1836.

cept it be, "I doubt!" The tunnel from ear to ear, however, to which Mr. White refers (IX. 289.), is, I should apprehend, to be looked upon rather as a Yankeeism, than as a subject for grave consideration. — *C. Conway. Pontnewydd, Monmouthshire, June* 6. 1836.

[*The Question of the Office of the Gland upon the Rump of Birds.* (p. 324, 325.)] — Though Mr. Waterton has found it convenient to leave my arguments almost wholly and literally *untouched*, and has contented himself, as well he might, with laying hold of a stray expression, and even mistating that, I will, by keeping to the subject, set him an example, which I hope in future he will follow; and I accordingly proceed to overturn whatever little he has advanced.

Mr. Waterton professes to quote my words, and makes [p. 267.] me say, that "It is rational to conclude," &c. Now, Sir, will you have the goodness to turn to the page referred to [p. 162.]?, and you will find my words to be, "It is *equally* rational to conclude," &c.; so that the elegant term, "sympathetic stuff" [p. 267.], must apply *to Mr. Waterton's own words*, which *he* has so generously given as mine. Equally with what? why with Mr. Waterton's own fine theory [V. 413.] about the supposed sufferings of birds from the hardness of their bills, when expressing oil from the gland; and that is, *just not at all*; for the whole tendency of my argument [p. 161, 162.] goes to prove, that birds do *not* suffer in the way that Mr. Waterton supposes them to do, any more than it would be *equally* rational (i. e. that it would be irrational) to suppose that the feline race should. Yet Mr. Waterton has not scrupled to make this palpable and egregiously false statement for the sake of a momentary (I correct the expression, for the sake of a poor, paltry, monthly) triumph. I hope next month he will descend from his triumphal car, to apologise for this mischievous violation of truth. Whether the omission of the word "*equally*," which I have quoted above, does not make, as Aristotle says, "not a little, but the whole difference," I leave your readers to judge. Mr. Waterton has given us a most interesting description of his conflicts with certain obscene insects, which shall be nameless, "*quoad me*." When, as he tells us, he "sæpe caput scaberet" (the usual resource, by the way, as his friend Horace tells us, of authors when in a difficulty), has it never occurred to him, that his nail is at least as hard as the bill of a bird, and, according to his own theory, would cause him all the pain that he attributes to the bird to suffer? so that, reasoning from analogy, "it *is* rational to conclude," that the bill of the bird does *not* cause pain to the gland when expressing its contents; for, as I have before said, we must remember that it is a *voluntary* action of the

bird, and that it is not as if some clownish hand were to prick the gland with the bill. Mr. Waterton has also taken care to forget what I had said [p. 161.], about the bills of ducks, &c., "who chiefly use this oil, and to whom it is especially useful." Mr. Waterton contends, that I could not *see* tame ducks apply their bills to the gland, it being covered over with down. Now, I have never said at all that I could *see the gland.* I have *twice* distinctly stated, that the "feathers prevent our seeing what is going on;" and when I did say that I had seen these birds turn back the feathers, when wanting to express the oil, I certainly *never said*, or could say, that I had seen *the gland;* for every one knows (and knew without Mr. Waterton's information) that the bodies of ducks have a thick covering of down, over and above which lie their feathers, through which neither T. G. of Clitheroe, nor myself, has ever said that he could see *the gland.* I only said, that I had seen tame ducks *apply their bills* to the gland, evidently meaning to that part of their bodies where even Mr. Waterton has not attempted to deny that the gland is situated. I have seen them, I say, apply their bills over the root of the tail, and *then* apply their bills to their feathers. Now this certainly looks suspicious; and, by another simile, "I will description the matter" to Mr. Waterton, "if he be capacity of it." On that ever memorable occasion, which Mr. Waterton has so feelingly described to us [p. 268.], is it to be inferred, that, because his hair would not allow us to *see* his head, therefore, it is to be asserted, that he was not able "caput scabere?" I do maintain that, if it is to be said that, because we cannot *see* through the down which covers it, the gland of a duck that is pressing it with its bill to extract the oil which it contains, that therefore the duck does not press it, or that we have no right to say that it does; I do say, that we must likewise assert the contradictory of Mr. Waterton's assertion: because his hair would not allow us to *see* his head, that he could not be engaged *extirpante pediculos* because, to be sure, we could not *see* his actual scalp the while.

Now, however, I have to pass on to the next item, where Mr. Waterton again contradicts, not me, but himself. He tells us (and I should wish to know whether he intends this as an answer to my question, whether any birds are without the oil gland), he tells us, that "the gland in *birds*, whether they be land fowl, or water-fowl, is *always* perfectly developed, and its capaciousness proportionate to the size of the bird." I will leave him to reconcile this with his statement, that *his* barn-door fowl has *no* tail (meaning, in charity we will suppose, no oil gland). Meantime I will suggest another query. He says that he can *now* set the question at rest; that

he can *now* produce a tailless hen, "after a *long* search." On this *fact* (*?*) he now bases his theory: query, on what did it rest before? for he has held his strange doctrine some time. His former arguments I had demolished: so this sacred hen had to arrive just in time, and most propitiously, to prop up a little longer the tottering theory of the author of the *Wanderings*.

Will Mr. Waterton be so kind as to tell me what purpose the oil gland is intended to answer, if it be not to supply oil wherewith to anoint the feathers of birds; and, also, may I request of him (and "I'll have no" equivocations), to save me the trouble of *enumerating* how many of my arguments he has found it convenient to pass over heretofore? — *Francis Orpen Morris. Lendal, York, June*, 1836.

P.S.—I must now take some short notice of his last grandiloquent epistle [p. 323—326.]; and, if he had kindly studied how he might best save me expense of time, ink, steel pen, and paper, he could not have gained that laudable object more securely than by thundering those anathemas against me in his last most empty production. I thank him for his gentlemanly courtesy, and will proceed accordingly in my easy task. As usual, he has left all my arguments entirely unanswered; and, to show us how consistent a *wanderer* (away from the subject) he can be, has added to "Old Nicholas Pescè," the "*Ass* Wouralia," and some borrowed Spanish, to monkeys, Malay cocks and hens, and lice; and has wound up the wondrous whole with Don Quixote, Fraser, a tomahawk, dapple, a roquelaire, and a honey-pot, "all to make the haggis good;" of course, never forgetting a quotation from one of his favourite authors, Virgil or Ovid, with whom he never fails to tells us his acquaintance on every convenient or inconvenient occasion; and has actually thought it necessary to inform your readers that he studied at the Jesuits' College at Stonyhurst. He might have saved himself the trouble of giving them that important piece of intelligence. I will explain my meaning. He comes upon the stage to ridicule, firstly, Buffon; secondly, one Monsieur Herbert; and, thirdly, your most humble servant. I dare say he has laughed heartily at his own wit; and I think he will find about as many of your readers to laugh with him, as have embraced his mode of stuffing birds, or his outlandish doctrine about the oil gland, and "the promenade." Mr. Waterton argues, in the way of a question, that it is absurd to suppose that the dipper can walk under water, because other birds, who are true aquatics, cannot. He must be hard pressed for an argument indeed. Why, Sir, he might just as

well ask, why nature has given to the hippopotamus the very same power, or to the otter, or the water rat *, or the beaver, and has denied it to other animals. We do not ask of her *why* she allows this or that faculty to one animal, and denies it to another : we only enquire whether the fact be so; and, certainly, Mr. C. Waterton is going a roundabout way to disprove that she has gifted the dipper (sometimes so called, says Mr. Waterton) with a singular power, by telling us that it does not *seem* likely to *him*. Really, Sir, he has himself demonstrated that some animals *can* flounder in the mud; and he has not been content with his prowess, but has tried at the same time to bespatter me. Thank goodness, we have plenty of clean water in the pump, despite the long drought. Mr. Waterton answers my question, as to what the *feathers* of a bird have to do with its *anatomy*, by saying, "Every thing." There I shall leave him, happy in his self-conceit, no doubt. Every thing, Mr. Waterton: are you quite sure? Try again: take my advice for once, and try again. "Nil desperandum" would do better for you than a Dutch motto. Every thing? indeed! every thing?

"Being hard pressed for a demonstration of the supposed subaquatic promenade, he [myself] refers us to other writers, and there the matter rests." Not quite so fast, Mr. Waterton, not quite so fast, if you please: the matter does not rest there, "sit venia verbo," nor shall it rest there. When first of all I mentioned the subject, I said it had been well authenticated; when you rail away, I give authorities—eyewitnesses: and if that be not something like a demonstration, I do not know what is. I believe, Sir, there is nothing else to answer in his last letter.

[Before this has been published, Mr. Waterton will have left England, on a visit to the Continent for some little time.]

ART. XI. *Instances of Man's Progress in the Extension of his Knowledge of Natural History.*

THE United Service [Scientific Society and its] Museum.—The following information on these is derived from the fifth annual report of the council, 1836. The United Service Museum has been instituted as a central repository for objects of professional art, science, and natural history, and for books and documents relating to these subjects, or of general information. The delivery of lectures on appropriate subjects is included in the design of the institution. The Society consisted, on March 5. 1836, of

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* *Since writing the above*, I have received a letter from my esteemed friend, J. C. Dale, Esq., in which he writes, "I have shot a rat walking, or rather running, at the bottom of the water. Then *why* cannot the *dipper* do *the like?*" Why not, indeed? Facts are stubborn things: one is worth a hundred baseless theories.

4193 members, most of them also members of the military and marine services; and had instituted some local committees in Britain and abroad. The following are subjects of lectures that had been delivered "during the last season:"—the actual state and prospects of African discovery; the earth's magnetism; steam navigation; the chemical properties of atmospheric air and its constituent gases. The council will neglect no measures to promote so desirable an object as the continuance of the supply of lectures. It is proposed to keep a meteorological journal at the museum. See p. 361. The council invite communications on the various subjects detailed "in the last report." Measures are in progress for completing a systematic catalogue of subjects in the museum. The Society has the advantage of the following favours:—Government transports have received directions to convey contributions from abroad free of expense. Objects intended for exhibition in the museum are to enter the kingdom free of import duties. The East India Company's court of directors has favoured the Society's objects, and not a few of the Society's members are also members of the East India Company's service. The governor in council of Madras has directed arrangements to be made for conveying to England, free of expense, contributions from that presidency. The Society's offices are in Middle Scotland Yard, Whitehall, London.

The editor of the United Service Journal has offered to publish any papers suited to the character of that work.

Dr. Loudon, in his work noticed in p. 334, has invited the attention of the army, navy, and East India medical boards, to the subject of it: it is perhaps suited, also, for the cognisance of the United Service [Scientific Society].

The Medico-Botanical Society.—At the anniversary meeting, held on Jan. 16. 1836, the president, Earl Stanhope, delivered an address rich in botanico-medical information, and, one would conceive, likely to promote the prosperity of the Society; an object in which he is zealous. He is of opinion that, when the objects which the Society pursues are estimated by their practical utility, they "must be appreciated as they deserve, and ought to secure to the Society that encouragement and support which it has not yet received, but which it is justly entitled to expect." The address has been printed in a pamphlet of 31 pages 8vo, by J. Wilson, George Court, Piccadilly. It is not clear that it is purchasable: its being purchasable would be a means by which the information it contains might be more widely dispersed.

The Zoological Society of London.—It appears in the report of the council, read at the annual general meeting on April 29. 1836, and published since, that, during the year preceding the above date, additions have been made to the Society's menagerie and museum, and that improvements have been made in both and in the gardens; and that the improvements made in the museum are as follows:—The Society has engaged premises in Leicester Square, more adequate than those which it has occupied in Bruton Street, for the display of the extensive collection of preserved animals which it possesses. In the new premises, in well arranged rooms and galleries, there is accommodation for more than twice the extent of cases that could be crowded into the rooms previously occupied; and the society will be able to exhibit the most extensive series of Mammàlia and birds that is yet open to public view in this kingdom, occupying a series of cases 460 ft. in length. "The increased extent of the museum, and the importance of completing catalogues of the objects contained in its several departments, and of registering more correctly the accessions to it, have rendered necessary an increase in the establishment, both of persons in charge of it, and of attendants. With the increased powers now devoted to it, its utility may be confidently expected to become very considerably advanced."

The Society, since the date of the annual meeting, has received four

living giraffes, captured in their native locality: an account and picture of them are published in the *Mirror*, No. 781.; and *Penny Magazine*, No. 270.

The Entomological Club of London. — In the *Entomological Magazine*, No. 16., dated July, 1836, is an account of this; and the following particulars are derived from that account:—The Club was established in 1826, for the purpose of engaging in social meetings at the residences of the members, for the communication of facts, the comparison of notes, the naming of specimens, and for mutual improvement in entomology. The club has existed and regularly met from that time to the present; and has established a collection, and is possessed of considerable property, from subscriptions for the purchase of cabinets, and from donations of books, specimens of insects, &c. What had been the character of the collection is not stated; but the prospective character is stated in the following one of the resolutions, which affords, besides, information on other of the Club's purposes, "That a *general* collection be made, consisting of exotic and British insects, Arachnoida, Myriápoda, and Crustácea, with books and manuscripts relating to the science in all its branches; and that a special object of the Club be to form a model named cabinet of insects *unquestionably British*." The Club is to consist of eight members, and of honorary corresponding members: the number of the latter may be unlimited. The eight members now are, Messrs. W. Bennett, J. B. Bevington, J. S. Bowerbank, J. F. Christy, A. H. Davis, J. Hoyer, E. Newman, F. Walker. Any vacancy among the members is to be filled up by election from the honorary corresponding members resident within five miles of the general post-office. Not any pecuniary consideration is to be an essential qualification to membership; but all voluntary contributions from members, honorary members, or others, are to be received and applied to the purposes of the Club. Not any member is to possess any right or property in the Club, which is to be vested in three trustees, to be elected by ballot, and subject to removal by the vote of the Club. The exertions of the officers are to be gratuitous. The ordinary meetings of the club are to be held monthly at the houses of the members in rotation. The honorary corresponding members have an equal right with the members to attend the ordinary meetings of the Club, and to introduce visiters, either personally or by letter, to inspect the collection. The cabinet and library are to be at the house of the curator, Mr. E. Newman, 21. Union Street, Deptford.

The Practical Entomological Society. — A society thus entitled has been instituted, and has already enrolled a great number of members. Its principal objects appear to be the keeping up of a social feeling among the metropolitan entomologists, and the formation of a perfect collection of British insects. Its meetings are held weekly: until more suitable accommodation can be procured, at a tavern, the Duke of Bridgewater, in Macclesfield Street, City Road. (*The Entomological Magazine*, July, 1836.)

The Worcestershire Natural History Society. — The anniversary meeting was held on May 25. 1836, at which thanks among the active promoters of the Society's interests were reciprocated. Dr. Buckland, Professor Brongniart, Dr. Milne Edwards, and T. A. Knight, Esq., attended the meeting, the fact of whose presence was emphaticised by Dr. Hastings, by moving "That is is a matter of high congratulation to the members of this Society." Treatises on these subjects were read: — "On the Geology of the Mountains of Merionethshire, by the Rev. T. Pearson of Great Witley; Observations on the Comet of Halley, as it appeared last year, by the Rev. T. W. Webb of Tretyre, near Ross, Herefordshire; On the Geology of the neighbourhood of Presteign, Radnorshire, by Dr. Davies of Presteign."

The Warwickshire Natural History Society. — This Society was formed

on April 12. and May 24. 1836. The events of the meeting of the latter date are reported in the *Warwick and Warwickshire Advertiser* of May 28.

The Rev. Sir H. Dryden was in the chair. "He considered the results contemplated by this, and institutions of a similar nature, to be threefold: firstly, the general advancement of science; secondly, the increased intercourse of gentlemen resident in the provincial districts, of congenial pursuits and, tastes; and, thirdly, the benefit of public example in exciting in the youth and the less educated classes of the neighbourhood a desire for knowledge, and stimulating them to turn their attention to those branches of science which the Society was desirous of promoting."

Dr. Conolly (see in VI. 428—430.) read the report of the committee appointed to find rooms suitable for the Society's purposes, and to draw up rules. The committee had commenced arrangements by which the Society will be enabled to have one of the large rooms in the Market Hall, Warwick, for the immediate reception of specimens for the museum; and had a prospect of obtaining another, of equal size, and equally well lighted, together with rooms for a curator, at a reasonable rent. The rules were severally submitted to the meeting, and some of them commented on.

The Earl of Warwick was chosen patron; Chandos Leigh, Esq., president; and Dr. Lloyd and Mr. Blenkinsop, curators.

Dr. Conolly reported the amount of some encouraging answers that he had received to circulars that he had distributed.

The Sussex Scientific and Literary Institution and Mantellian Museum. — In the *Brighton Herald* of May 28. 1836, is a report of the extent of more than a column, in small type, of the issues of "a delightful excursion to Lewes and its vicinity [on May 23.] of the members of this Institution, under the able guidance of Mr. Mantell, in quest of objects of antiquarian and geological interest." The report is one delightful to read, and represents Mr. Mantell in a most estimable point of view. The party partook of a cold collation, prepared for them on an appropriate spot, the mount of the castle. Davies Gilbert, Esq., president of the Institution, was in the chair; and there were speeches from him, Mr. Mantell, Mr. Ricardo, and a lady. "Mr. Mantell gives a lecture on corals at the [Brighton] town hall [on May 30]; and the museum is now open, with its stores of geological fossils and antiquarian remains. The collection is of unrivalled interest to naturalists and men of science, from the curious and antique character of its contents; while, from the order, purity, and excellent arrangement of the whole, it is no less attractive and pleasing to the general public. The first *conversazione* of the Institution took place" in the evening of May 24.; and the writer of the notice in the *Brighton Herald* understands that there will be one every succeeding Tuesday.

Since the preceding matter was put in type, a printed abstract of a third lecture that Dr. Mantell had delivered "on behalf" of the above Institution has been received. The subject is "Fossil Corals, and the Marbles which they have formed."

The Shropshire and North Wales Natural History and Antiquarian Society. — The fact of the institution of this Society, and the Society's purposes, are stated in VIII. 678, 679. It was instituted on June 26. 1835; and a report of its condition in January, 1836, has been published. It consisted then of 190 members, and had received donations, for a museum, of specimens of subjects of geology, mineralogy, botany, zoology, conchology, and antiquities, and money donations for fitting up receptacles for these; and donations of books for a library. A list of the individual donations is supplied; and the report includes an interesting review of them under the head of the sciences to which they belong. There is prefixed to the

report the inaugural address of Archdeacon Butler, the first president, which it is a treat to read. In this report it is stated, that

The Ludlow and the Caernarvonshire Natural History Societies, highly meritorious institutions, have been established.

The Botanical Society of Edinburgh. — The purposes of the Society have been noticed in p. 271, 272. Two local secretaries for London have been appointed; namely, Wm. Christy, jun., Esq., Clapham Road; and N. B. Ward, Esq., Wellclose Square.

The Yorkshire West Riding Proprietary School. — On May 21., about 50 of the senior pupils, accompanied by two of the masters, proceeded on an excursion to investigate the natural history of the district round Wakefield. The party set out about 11 o'clock in the morning. As they proceeded over the old bridge, each carrying his vasculum, or entomological apparatus, their joyous countenances showed how exhilarating the prospect of a bright summer day's ramble was to them, though Science dare hardly venture to claim them all for her sons. . . . . The entomologists were not so very successful in capturing many insects remarkable either for their beauty or for any good or bad properties. Another week of warm weather will probably induce a state of entomological things which will better repay their labour. The botanists seem to have fared better, as the following enumeration of the flowers, &c., which came under their notice will show. Then there is appended a list of 93 species of plants, arranged according to Professor Henslow's *Catalogue of British Plants*, and with certain of them distinguished as being only in bud. (*The West Riding Herald*, May 27. 1836.) Professor Henslow himself used to communicate lists, similar to that cited, the results of the herborisations of himself and party, to the *Cambridge Chronicle*.

REVIEWS.

Art. I. *Notices of Works in Natural History.*

DARWIN, C.: Extracts from Letters to Professor Henslow of Cambridge. Printed for distribution among the members of the Cambridge Philosophical Society. 8vo, 30 pages. Cambridge, Dec. 1835.

These extracts contain various interesting statements relating to the geology and natural history of the most remote parts of South America, and also of Chili and the Andes. It must be obvious, that, in a vast extent of an almost unknown country (where the objects are on such an immense scale, and often extremely difficult of access), the visit of a traveller for a few months can allow him little more than to trace the general features of its geology, &c.; but we cannot feel the less obliged for the information given by the scientific pioneer who first opens out the natural history of a country presenting so many wonders, because he must leave the more accurate details to be filled up by numerous succeeding travellers. We may say the same of the labours of Humboldt, who resided some years in different parts of South America, but who left a rich field for succeeding enquirers. In a notice

prefixed to the extracts from Mr. Darwin's letters, we are told, that the opinions therein expressed must be viewed as the first thoughts which occur to a traveller respecting what he sees, before he has had time to collate his notes with the attention necessary for scientific accuracy. From these extracts we have made the following selection, adding a title to each, to render them more distinct. — *B.*

Fossil bones. — "*Monte Video, Nov.* 24. 1832. We arrived here on the 24th of October, after our first cruise on the coast of Patagonia, north of the Rio Negro. . . . . I had hoped, for the credit of dame Nature, no such country as this last existed: in sad reality, we coasted along 240 miles of sand hillocks. I never knew before what a horrid ugly object a sand hillock is: the famed country of the Rio Plata, in my opinion, is not much better; an enormous brackish river, bounded by an interminable green plain, is enough to make any naturalist groan. . . . . I have been very lucky with fossil bones; I have fragments of at least six distinct animals. As many of these are teeth, shattered and rolled as they have been, I trust they will be recognised. I have paid all the attention I am capable of to their geological site; but, of course, it is too long a story for a letter. First, the tarsi and meta-tarsi, very perfect, of a cavia; 2dly, the upper jaw and head of some very large animal, with four square hollow molars, and the head greatly produced in front. I at first thought it belonged either to the megalonyx or megatherium. In confirmation of this, in the same formation I found a large surface of the osseous polygonal plates, which 'late observations' (what are they?) have shown to belong to the megatherium. Immediately I saw them I thought they must belong to an enormous armadillo, living species of which genus are so abundant here. 3dly, the lower jaw of some large animal, which, from the molar teeth, I should think belonged to the Edentata; 4thly, large molar teeth, which in some respects would seem to belong to some enormous species of Rodentia; 5thly, also some smaller teeth belonging to the same order, &c. They are mingled with marine shells, which appear to me identical with existing species: but, since they were deposited in their beds, several geological changes have taken place in the country."

Inhabitants of Tierra del Fuego. Inhabitants. Climate. Geology. — "*April* 11. 1833. We are now running up from the Falkland Islands to the Rio Negro (or Colorado). . . . . It is now some months since we have been at a civilised port: nearly all this time has been spent in the most southern part of Tierra del Fuego. It is a detestable place; gales succeed gales at such short intervals, that it is difficult to do any thing. We were twenty-three days off Cape Horn, and could by no means get to the westward. We at last ran into harbour, and in the boats got to the west of the inland channels: with two boats we went about 300 miles; and thus I had an excellent opportunity of geologising, and seeing much of the savages. The Fuegians are in a more miserable state of barbarism than I had expected ever to have seen a human being. In this inclement country they are absolutely naked; and their temporary houses are like those which children make in summer with boughs of trees. . . . . The climate, in some respects, is a curious mixture of severity and mildness: as far as regards the animal kingdom, the former character prevails; I have, in consequence, not added much to my collections. The geology of this part of Tierra del Fuego was to me very interesting. The country is non-fossiliferous, and a common-place succession of granitic rocks and slates. Attempting to make out the relation of cleavage, strata, &c. was my chief amusement."

Soil of Patagonia. Geology. Ancient Animals. — "The soil of Patagonia is very dry, gravelly, and light. In East Tierra, it is gravelly, peaty, and damp.

Since leaving the Rio Plata, I have had some opportunities of examining the great southern Patagonian formation. I have a good many shells: from the little I know of the subject, it must be a tertiary formation; for some of the shells (and corallines) now exist in the sea. Others, I believe, do not. This bed, which is chiefly characterised by a great oyster, is covered by a very curious bed of porphyry pebbles, which I have traced for more than 700 miles. But the most curious fact is, that the whole of the east coast of the southern part of South America has been elevated from the ocean since a period during which muscles have not lost their blue colour. At Port St. Julian I found some very perfect bones of some large animal, I fancy a Mastodon: the bones of one hind extremity are very perfect and solid. This is interesting, as the latitude is between 49° and 50°, and the site far removed from the great Pampas, where bones of the narrow-toothed Mastodon are so frequently found. By the way, this Mastodon, and the Megatherium, I have no doubt, were fellow brethren in the ancient plains. Relics of the Megatherium I have found at a distance of nearly 600 miles in a north and south line."

Corallines, Propagation of. — "I have already seen enough to be convinced that the present families of corallines, as arranged by Lamarck, Cuvier, &c., are highly artificial. It appears to me, that they are in the same state in which shells were when Linnæus left them for Cuvier to rearrange. . . . . I forget whether I mentioned having seen something of the manner of propagation in that most ambiguous family, the corallines: I feel pretty well convinced that, if they are not plants, they are not zoophytes: the "gemmule" of a Halimeda contains several articulations united, ready to burst their envelope, and become attached to some basis. I believe that in zoophytes, universally, the gemmule produces a single polypus, which afterwards, or at the same time, grows with its cell, or single articulation."

Geology of the Andes. — "Shortly after arriving here, I set out on a geological excursion, and had a very pleasant ramble about the base of the Andes. The whole country appears composed of breccias (and, I imagine, slates), which universally have been modified, and often completely altered, by the action of fire. The varieties of porphyry thus produced are endless; but no where have I yet met with rocks which have flowed in a stream. Dykes of greenstone are very numerous. Modern volcanic action is entirely shut up in the very central parts (which cannot now be reached, on account of the snow) of the Cordilleras. To the south of the Rio Maypo, I examined the tertiary plains, already partially described by M. Gay. The fossil shells appear to me to differ more widely from the recent ones than in the great Patagonian formation. . . . . I have been much interested by finding abundance of recent shells at an elevation of 1300 ft. * The country in many places, is scattered over with shells; but these are all *littoral* ones! So that I suppose the 1300 ft. elevation must be owing to a succession of small elevations, such as in 1822. With these certain proofs of the recent residence of the ocean over all the lower parts of Chili, the outline of every view, and the form of each valley, possesses a high interest. Has the action of running water, or the sea, formed this ravine? was a question which often arose in my mind, and was generally answered by my finding a bed of recent shells at the bottom. I have not sufficient arguments; but I do not believe that more than a small fraction of the height of the Andes has been formed within the tertiary period."

Earthquake. — "*Valparaiso.* You will have heard an account of the dreadful earthquake of the 20th of February. I wish some of the geologists who think the earthquakes of these times are trifling could see the way in

* Though these shells may be similar to recent ones, we have no proof that the species have not existed in the southern hemisphere, in very ancient epochs. — *B.*

which the solid rock is shivered. In the town there is not one house habitable: the ruins remind me of the drawings of the desolated eastern cities. We were at Valdivia at the time, and felt the shock very severely. The sensation was like that of skating over very thin ice; that is, distinct undulations were perceptible. The whole scene of Concepcion and Talcuana is one of the most interesting spectacles we have beheld since leaving England."

Elevation of the Land. — "The whole of the coast from Chiloe to the south extreme of the peninsula of Tres Montes is composed of mica-slate. It is traversed by very numerous dykes, the mineralogical nature of which will, I suspect, turn out very curious. I examined one grand transverse chain of granite, which has clearly burst up through the overlying slate. At the peninsula of Tres Montes there has been an old volcanic focus, which corresponds to another in the north part of Chiloe. I was much pleased, at Chiloe, by finding a thick bed of recent oyster-shells, &c., capping the tertiary plain, out of which grew large forest trees. I can now prove that both sides of the Andes have risen, in this recent period, to a considerable height. Here the shells were 350 ft. above the sea."

Geology of the Cordilleras. — "*Valparaiso, April* 18. 1835. I have just returned from Mendoza, having crossed the Cordilleras by two passes. This trip has added much to my knowledge of the geology of the country. . . . . I will give a very short sketch of the structure of these huge mountains. In the Portillo pass (the more southern one) travellers have described the Cordilleras to consist of a double chain of nearly equal altitude, separated by a considerable interval. This is the case: and the same structure extends northward to Uspellata. The little elevation of the eastern line (here not more than 6000 ft. or 7000 ft.) has caused it almost to be overlooked. To begin with the western and principal chain, where the sections are best seen; we have an enormous mass of a porphyritic conglomerate resting on granite. This latter rock seems to form the nucleus of the whole mass, and is seen in the deep lateral valleys, injected amongst, upheaving, overturning in the most extraordinary manner, the overlying strata. On the bare sides of the mountains, the complicated dykes and wedges of variously coloured rocks are seen traversing, in every possible form and shape, the same formations, which, by their intersections, prove a succession of violences. The stratification in all the mountains is beautifully distinct, and, owing to a variety in their colouring, can be seen at great distances. I cannot imagine any part of the world presenting a more extraordinary scene of the breaking up of the crust of the globe, than these central peaks of the Andes. The upheaval has taken place by a great number of (nearly) north and south lines*; which, in most cases, has formed as many anticlinal and synclinal ravines. The strata in the highest pinnacles are almost universally inclined at an angle from 70° to 80°. . . . . The formation which I call porphyritic conglomerates is the most important and most developed in Chili. From a great number of sections, I find it to be a true coarse conglomerate, or breccia, which passes by every step, in slow gradation, into a fine clay-stone porphyry; the pebbles and cement becoming porphyritic, till at last all is blended in one compact rock. The porphyries are excessively abundant in this chain; and I feel sure that at least four fifths of them have been thus produced from sedimentary beds in situ. There are also porphyries which have been injected from below amongst the strata, and others ejected, which have flowed in streams; and I could show specimens of this rock, produced in these three methods, which cannot be distinguished. It is a great mistake to consider the Cordilleras (here) as composed only of rocks which have flowed in streams. In this range I nowhere saw a fragment which I believe to have thus originated, although the road passes at no great distance from

* Of dykes.

the active volcanoes. The porphyries, conglomerates, sandstone, quartzose-sandstone, and limestones alternate and pass into each other many times (overlying clay-slate, when not broken through by the granite)."

Viviparous Reptiles. — "I also send a small bottle with two lizards: one of them is viviparous, as you will see by the accompanying notice. M. Gay, a French naturalist, has already published, in one of the newspapers of this country, a similar statement; and, probably, has forwarded to Paris some account."

"The following is an extract from the newspaper referred to by Mr. Darwin: —

"'Besides these labours, I employed myself, during the great rains, in dissecting various reptiles. It must be interesting to know the influence of the climate of Valdivia on the animals of this family. In the greater part of those which I have been able to submit to my scalpel, I have found a truly extraordinary fact, that they were viviparous. Not only the innocent snake of Valdivia has offered to my notice this singular phenomenon, but also a beautiful and new kind of Iguana, which approaches very near to the *Liposoma* of Spix, and to which, on account of its beautiful colours, he has given the name of *Chrysosaurus*. All the species, even those which lay eggs in Santiago, here produce their young alive; and the same thing happens with some *Batrachians*, and particularly with a genus near to the *Rhinella* of Fitzingen, of which the numerous species have the skin pleasingly spotted with green, yellow, and black. I need not dwell on the importance of this last example, in reference to comparative anatomy: an importance which appeared to me still greater when, on analysing a tadpole not yet transformed, I satisfied myself that nature has not varied her plan of organisation. In these, as in the tadpoles which live in water, the intestines were of a length very disproportioned to the body. Now, if this length was necessary to the latter, which live upon vegetable substances, it was altogether useless to those which are to undergo their metamorphosis in the belly of the mother: and thus nature has followed the march prescribed to her by a uniformity of construction; and, without deviating from it, has admitted a simple exception, a real hiatus, well worthy the attention of the philosophical naturalist.'"

Faldermann, Fr., Auctore: Horti Botanici Imperialis Petropolitani Cultorum supremo, Societatis Naturæ Scrutatorum Mosquensis, Sodali ordinario, etc. Coleopterorum ab illustrissimo Bungio in China boreali, Montgolia, et montibus Altaicis collectorum, nec non ab illustrissimo Turczaninoffio et Stschukino e provincia Irkutz missorum, Illustrationes. Accedunt Tabulæ v. 4to, pp. 128. Petropoli, 1835.

One hundred and one species are described, and 35 figured. The descriptions are in long detail, and, hence, the more valuable to entomologists; European ones especially. All the figures of species are wholly or partly coloured; and there are figures of dissected parts of five of them. Several of the genera are those of which species are known to occur in Britain.

Lindley, John, Ph. D., F.R.S., L.S., G.S.: A Natural System of Botany; or, a Systematic View of the Organisation, Natural Affinities, and Geographical Distribution, of the

whole Vegetable Kingdom; together with the Uses of the most important Species in Medicine, the Arts, and Rural or Domestic Economy. Second edition of the author's Introduction to the Natural System of Botany; with numerous additions and corrections, and a complete List of Genera, with their Synonymes. 8vo, 552 pages. London, 1836. 18*s.*

This is a second edition of the author's *Introduction to the Natural System*, and appears replete with essential improvement. The following matter is a brief abstract of the author's own notice of the points in which the second edition differs from the first.

The characters of the orders, &c., have been carefully revised and corrected. Additional information is applied on the sensible properties of the different natural orders; and new, more correct, or more extensive, views of their affinities and analogies are presented. The orders are disposed in groups of ranks intervening those of the classes and orders. The diagnoses of the orders which, in the first edition, were prefixed to the characters of the orders are here struck out; the author has been disappointed in their utility, and has not seen how to improve them enough to render them much better. The analytical table of the characteristics of the order has been entirely reconstructed, and, he trusts, upon a better principle. He has collected under each natural order all the genera that he has found referred to it in books, and has added their synonymes. 7840 genera are allocated, and, as are the synonymes, indexed. Some of the generic names now appear for the first time; and the author has "given the characters of such genera in an appendix." There is a distinct "index of officinal and economical plants."

Silvertop, Charles, formerly Captain in the 14th Light Dragoons, retired Brigadier in the Service H. C. M., K. of the royal and distinguished Order of Charles III., and F. G. S.: A Geological Sketch of the Tertiary Formation in the Provinces of Granada and Murcia, Spain. With Notices respecting Primary, Secondary and Volcanic Rocks in the same District and Sections. 8vo, 240 pages, 7 plates of figures of sections, and 1 plate of a Topographic Sketch of the Environs of Murcia. 1836. 10*s.* 6*d.*

It is hoped to present a notice of the contents of this in a future Number.

ART. II. *Literary Notices.*

NARRATIVES of South America; illustrating Manners, Customs, and Scenery; containing, also, numerous Facts in Natural History, collected during a Four Years' Residence in Tropical Regions: by C. Empson. "Just published." 10*s.*

Bell's History of British Quadrupeds. (VIII. 584.) It is announced that Part I. was published on July 1.

The Ornithologist's Guide to the Islands of Orkney and Shetland, by R. Dunn. The following statements are taken from a printed notice. The author has been in the habit, for a series of years, of making excursions to the Orkney and Shetland Isles, for the purpose of procuring specimens of natural objects; and, having sustained considerable trouble and inconvenience, and great expense, from the want of some guide, by which to regulate his movements, he proposes to publish the *Guide*, in order to prevent the like results to others. "The author does not affect to publish a scientific work on the subject, but trusts he shall be able to furnish much information, of a nature not only interesting to the ornithologist and the general reader, but to the traveller to these islands." One vol. 8vo; its price, to subscribers, 4*s.* It seems likely that this work should conduce to the end proposed by a contributor in VII. 573, 574.

The English Entomologist: exhibiting all the Kinds of Coleopterous Insects found in England, by Descriptions expressed in French and English, and by 500 *Figures contained in* 42 *coloured Plates:* by T. Martyn. This is advertised on the cover of the *Entomological Magazine*, the number for July 1. 1836, as published on that day, and as being in imperial 4to, and the price of it 3*l.* 13*s.* 6*d.*

A Lithograph Portrait of the Bust of the deceased A. H. Haworth, Esq., author of works in entomology and botany, has been produced by Mr. Ingpen, Upper Manor Street, Chelsea, of whom copies may be obtained.

The treatise on the subject *Insect*, in Partington's *Cyclopædia of Natural History*, is rich in excellent matter; occupies 58 pages, and includes 152 figures, and some subsidiary ones not enumerated. It may be viewed as an introduction to entomology. It occurs a portion in each of the parts 26. and 27.: 2*s.* is the price of these.

Flora Hibernica: comprising the Flowering Plants, Ferns, Characeæ, Musci, Hepaticæ, Lichenes, and Algæ of Ireland; arranged according to the Natural System; with a Synopsis of the Genera according to the Linnæan System: by J. T. Mackay, Dr. Taylor, and W. H. Harvey, Esq. This has been

published. It contains upwards of 660 pages. The price is 16*s.*

The Birmingham Botanic Garden, or Midland Floral Magazine, to contain accurate delineations, with botanical and popular descriptions, of plants cultivated in the stove, the green-house, or the open garden, and remarkable either for their beauty, their rarity, or the singularity of their structure: to be conducted by G. B. Knowles, Esq. M. R. C. S., F. L. S., &c.; and F. Westcott, Esq.: honorary secretaries of the Birmingham Botanical and Horticultural Society. It is announced that No. 1. is to be published on Aug. 1. 1836.

A Letter from Mr. N. B. Ward to Sir W. J. Hooker on the Growth of Plants without open Exposure to the Atmosphere, published in the *Companion to Curtis's Botanical Magazine*, the number for May, 1836. It seems that the principles are the following: — Plants are planted in cases, in congenial soil, watered, and the water drained off, and the cases rendered air-tight in the glazing; and it is proper that they should be air-tight in every other part. Owing to the prevention of the escape of the moisture contained in the case, plants will grow for many months, and even years, without requiring fresh supplies of water. The degree of developement to which the plants will attain depends, mainly, *cæteris paribus*, upon the volume of air contained within the case, and upon the quantity of light and solar heat received by the plants. Owing to the expansibility of the air by the action of heat, there must, with every change of temperature, be a corresponding change in the volume of air contained within the cases. Without such a variation, the plants would, in all probability, perish. Mr. Ward has appended two letters in testimony of the successful transportation from England to Sydney and Cairo of plants conditioned according to these principles; and he thinks animals of the lower tribes, so conditioned, might be introduced to Britain from abroad. *The Companion to Curtis's Botanical Magazine* is 1*s.* 6*d.* a number.

The Principles to be observed in Botanical Classification. Dr. Lindley has intimated, in the preface to his *Natural System of Botany*, that he was contemplating the early publication of views of his upon the above subject.

Annual Report of the Regents of the University of the State of New York, made to the Legislature, Feb. 29. 1836. 8vo, upwards of 240 pages. Albany, 1836. This contains much matter relative to meteorology, of which some use may be made in a future number.

THE MAGAZINE

OF

NATURAL HISTORY.

SEPTEMBER, 1836.

ORIGINAL COMMUNICATIONS.

ART. I. *Notes on Natural Objects observed while staying in Cuba.* By R. C. TAYLOR, Esq., F.G.S.L., Member of the Geological Society of Pennsylvania, &c.

MY last communication treated of scenes and natural history in the back woods of North America [p. 72—74.]. Without undertaking to be profound in the details of natural science, I propose now to trace a few out of the many objects of interest in that department, by which I am surrounded, during a temporary residence in a tropical region. It is not probable that many of your readers are acquainted with the north-eastern portion of the island from whence I write (Cuba); for I believe that very little has been known or written on this district, and that, possibly, it has never been visited by men of scientific research. For the present, I shall limit myself to a very few points, selecting, in the first instance, one that has furnished me with no small amusement during the present year.

EL BAXO.*

By this Spanish name is designated the intermediate space of moderately shoal water between the main land and the reef. The spot possesses so many objects of a novel and interesting character, particularly in furnishing a beautiful example of a coral reef, that I propose to give the substance of sundry memoranda of my visits to this coast.

The reef stretches eastward, parallel with the shore, for several miles, from the entrance of the fine bay of Gibara to the smaller port of Vjaro; and, although connected with the land at its extremities, encloses an area of shallow water of from a third to half a mile in breadth. Over this reef the

* Pronounced Baho: the shoal, or shallow.

waves of the Bahama Channel break continually with great violence. At the distance of three leagues, we have often listened, morning and evening, to their roar, resembling remote thunder. The Baxo enjoys a certain degree of celebrity here for the abundance of fish, particularly of fine lobsters, inhabiting its waters. Partly, therefore, for the sake of participating in the amusement of fishing, and partly to study the wonderful display of Nature's works in the structure of a coral reef, I joined my friend ——— in his occasional excursions hither.

Our first visit was made by land; and, after passing three leagues through dense woods, perfumed with the blossoms of oranges, limes, myrtles, and numerous other flowering trees, we pitched our tent on the shore, among the wild figs and sea grapes [Coccóloba sp.].

Near the coast, and bordering it for a few miles, is a belt of honeycombed rock, evidently an ancient reef, attaining a height of 20 ft. or 30 ft. above the present high water of the sea. For a considerable space, this old reef forms a low precipitous cliff, against which the sea breaks; but in other parts of its course it recedes from the shore, leaving a breadth of half a mile or more of woody ground and sand-hills, covered with the sea grape, between it and the present coast line. This rock is externally hard and honeycombed, its surface being covered with sharp points and protuberances. In general, it consists of an aggregation of broken corals and madrepores of great size. Amongst them are numerous spines of *Echini*, and univalve and bivalve shells, the internal parts of which are filled with indurated coral sand, furnishing a good example of the progress towards consolidation of a shelly limestone resembling many older rocks, the oolites for instance. From hence I collected a series of specimens illustrative of this solidifying process, or the complete incorporation of the shelly portion with the surrounding calcareous rock, by the filling up of their cavities, and by the cementing together of the various organic and fragmentary substances.

Within this belt of comparatively recent rock, the country inland consists of rocks of the serpentine class, diallage, greenstone, and numerous modified rocks, attesting that great alteration in their structure has taken place by igneous causes.

In connexion with these reefs, which border the coast of Cuba, are some circumstances which offer matter for speculation. The old reef, which we have traced passing from the shore to more than half a mile inland, has been stated to rise to some 20 ft. or 30 ft. above the present high-water level. Now, as the coral insects do not live above high water, and,

for the most part, are beneath the surface of extreme low water (for the rays of a vertical sun would be destructive to their existence if laid dry), it would appear that this inner reef was produced under different circumstances of relative elevation of sea and land; indicating a slight depression in the one case, or an elevation in the other. In the groups of zoophytes which form the aggregate both of the ancient and of the present, or outer, reef, although there are many species which are common to both, a separate or distinguishing character is apparent. That the circumstances which favoured the growth of some species of zoophytes in the one case were absent in the other, seems probable, as it is obvious that many varieties existed formerly in great abundance in the old reef which are not to be traced in the outer one. On comparing the shells incorporated in the rock of the old reef, many were observed to be of different species to those living in the Baxo, or washed upon the beach; and I looked in vain for some which now exist in great profusion among the rocks, and cling in vast numbers to the base of the old reef, where reached by the tide. Extensive fissures, or cracks, in the surface of the old coral rock are visible at low water. These cracks may be traced running many hundreds of feet, commonly in an east and west direction, parallel with the coast, and occasionally traversing it at right angles. Some of them, being a few inches wide, are filled with indurated coral sand and mud, after the manner of a vein, which is occasionally ferruginous, of a dark rusty brown colour, honeycombed, and equal in density to the environing rock. Such extensive perpendicular and longitudinal fissures in this old coral rock would denote that other causes have been exerted than the mere erosion by the ocean waves; and, although we may look to a much less remote date for these operations, we are led to ascribe them to some such causes as have produced those changes in position, and those alterations of structure and composition, which we witness in the rocks of the interior. In this ancient rock of the beach, now as compact as the hardest freestone, we may notice numerous branching corals, of which I could observe none resembling them on the living reef. These zoophytes, as they are seen on the surface of the wave-worn rocks, reminded me of those ramose forms which, years ago, I had observed abundantly in the red chalk of Hunstanton Cliff, in Norfolk, England.

To return to our fishing excursions to the reefs and shoals of El Baxo. The time selected for striking lobsters, and the various fishes of these waters, with harpoons and barbed forks, called grains, is by torch-light, at low water, on dark nights.

At two o'clock, the first morning, we were in motion; and, after two or three hours' wading, we were again in our tent before the dawn of day. The person on whom devolves the charge of striking the fish wades between two others carrying large torches, formed of a blazing resinous aromatic wood found abundantly in the vicinity. On a calm night, when the surface is unruffled, it is a beautiful spectacle, by the aid of this borrowed light, to see, through the clear sparkling water, the white bottom of coral sand, and the tufts of various sponges waving with each movement of the waters, and the varied forms of the living corals, like the plants and flowers in a parterre: here a dark group of large *Echini*, with their long spines, black as ebony, sharp as needles, and dangerous to the foot of the fisherman, occupying some deeper pool, aloof from the yet larger grey *Echini*, with short spines, moving amongst the coral; there, within a few feet, his back level with the surface, groping amidst a cluster of waving *Fuci*, feeds the gigantic lobster, destined to be our prize; here we note the huge conger eel, stealthily drawing beneath his covert of arborescent madrepores; and, anon, we hasten after a retreating fish, which proves to be that bloated ugly animal they term a sea hog. Fishes of smaller size dart swiftly around, hastening to deeper water, if not intercepted in their flight by a stroke of the machete, or cutlass, of the torch-bearer. Some of them, confounded by the unwonted light of the blazing brands, suffer themselves to be readily surprised. Among these we numbered the beautiful green pipe-fish or bill-fish; the runco, or grunter, a fish with golden scales and bright blue stripes; the little striped fish called the old wife; and, a more valuable prize, the gato, or cat-fish. Here, also, we encountered some large species of *Sepia*, an animal whose flexible arms are surrounded with powerful suckers, by which at will it adheres to any substance with which it comes in contact: and woe be to the unlucky wight on whose legs it may fasten. It possesses, when struck or alarmed, the power of discharging a black fluid, probably like that of which the Indian ink is made by the Chinese.

And, now, having waded a mile or two in the shallows, it is time to visit the reef, ere the rising tide covers it too deeply.

Here, too, is a beautiful exhibition of the works of Nature, exemplified in the wondrous labours of the various tribes of zoophytes; each labouring on, like the honey-bee in the construction of its comb, guided by some undeviating law or impulse, and each proceeding, from generation to generation, and century after century, to rear those beautiful and symmetrical fabrics, from the depths of the waters, and amidst

the turbulence of an ever restless surf, until, in the progress of time, man sees emerging from the ocean, in these warm regions, those reefs, and islets, and kays, which, in the lapse of time, become adapted to sustain on their surfaces both vegetable and animal life. Within the reef new colonies are rearing slowly their habitations, and miniature reefs arise around. But here they appear to have nearly completed their labours, and nature has set limits to their combined operations. They have almost brought their work to that elevation beyond which they are unable to proceed, and henceforward the structure must receive its increase in its breadth alone. At low water, some of these corals are level with the surface, and others are low enough to admit the passage of a boat amongst them. We must tread upon their fan-shaped extremities with caution, else the brittle structure may give way, and lodge us in deeper water than is convenient; or they may tear and bruise our feet. You may observe that, from their configuration, they offer less resistance to the rising swell than you had anticipated. They present, not a solid surface, but a partial obstruction as the water rushes beneath and between their stems; and you will also perceive that they are arranged somewhat in rows, not parallel with the reef, but at right angles to the coast line, admitting the broken waves to pass amidst them; and thus for years, perhaps for ages, the thundering and unceasing surf may fall harmlessly upon and amongst these singular productions of an animal whose individual labours and organisation are almost imperceptible.

Amongst the recesses of the coral reefs many fishes conceal themselves, or resort for food, or for safety from the attacks of their various enemies. Here we obtained a fish of excellent flavour, the pargo prieto, or mutton-fish, weighing many pounds; and here, also, the lobster retires after his night's feeding among the sea-weed of the Baxo. Our visits to the Baxo and reef, whether in the night or day, always supplied us with amusement, in the infinite variety of interesting objects in natural science.

Eagerly watching each wave, as it rippled with the rising tide over the white coral sands of the Baxo, were ever to be noticed files of sandpipers; and these little active fishers continued equally busy through the night as by day. When and where they sleep I know not. We might hear their shrill whistle as we lay beneath our tent, or under the shelter of the sea grapes of the sandhills; or they would dash swiftly by our torches, as, at midnight, we also waded and scanned each rising wave, with the selfsame objects. In the gray of the morning, as we retired from our fishing labours, we might

discern a flock of pelicans heavily wending their way to resume a similar occupation. A solitary flamingo, or albatross, might be seen approaching the beach; and all day long, beneath the sun's scorching rays, the persevering vulture, or *Aúra*, hovered and circled above the line of high water to search for something thrown up by the preceding tide, wherewith to satisfy his ever-craving appetite; or a party of them, patiently seated upon the low trees surrounding the cook's fire, would await an opportunity of carrying off some fragments of fish or meat.

During the day, various ways are adopted for taking fish, and for this purpose a boat is almost indispensable. Crossing the reef, which can only be accomplished with a boat in calm weather, owing to the rolling swell and the force of the breakers, we soon find ourselves in five or six fathoms water, on good fishing ground. At this depth, strong lines are required; and here may be taken Spanish mackerel, baracutas, and king fish; all powerful fishes, particularly the latter.

Within the Baxo, in two or three fathoms water, we witnessed the dexterity of our negroes in diving for conchs, and without difficulty found our boat loaded with a large supply of these splendid shells. Standing on the bow of the boat as she slowly moves over the fishing-ground, the diver examines the bottom carefully to the right and the left, through the transparent water. At a glance, he detects the conch moving like a snail along the bottom; he plunges headlong in, and rises to the surface, frequently with a couple of shells whose united weight is 14 lb. Every one has admired the delicate yet splendid tints of these univalves, so much esteemed as an ornament to our mantelpieces; but, as much of this colouring matter is evanescent in the dead shells, it is only when the conchs are first taken living from their native element that they can be seen in their greatest beauty. On one excursion we brought to shore fifty beautiful specimens of the largest and most perfect shells, and, as each shell weighed about 7 lb., their total weight was about 350 lb.; a good load for two packhorses.

At different times, whilst passing with the boat amidst the coral groups and small reefs of the Baxo, various other fishes were harpooned besides those I have enumerated. Amongst them may be mentioned the vieja, or blue fish, having unusually large blue scales; the pargo blanco, or market fish; the chapin, or trunk fish, of which we took two species, having solid shells instead of scales; the sand fish; the turbot; and last, but not least, the sting ray, a fish of great power. Here also our negroes harpooned our first turtle. Once or twice a

solitary prowling shark might be traced, his back fin projecting above the surface, making the best of his way from apprehended danger. Amongst the holes or openings in the coral groups, the large fish called the chierna, or grouper, here reaching to 50 lb. weight, can be harpooned even in the day. The lobster seeks a similar retreat. He is wary and cautious during the day, but may be enticed from his lurking-places by throwing bait to him. We often detect him, merely by his long feelers, protruding incautiously from under some shelving branch of coral. He cannot always resist the allurement of a fragment of conch fish: he leaves his shelter, and is transfixed by the harpoon.

During the rainy season, it is impossible to obtain sleep on the sea shore, because of the multitude of sand-flies and mosquitoes. On this account, we found a desirable retreat from their persecutions by fixing the tent on a wooden frame, called a barbaco, erected in the shoal water, about 120 yards from the shore.

Although I have secured specimens of several birds of this coast, I am unable to furnish an accurate list; nor are they remarkably numerous in the vicinity I have attempted to depicture. At a mile or two inland, parallel with the Baxo, and leading eastward from the bay of Gibara, is a creek, bordered by mangrove trees, whose tangled roots and contorted limbs form an impenetrable barrier on either side, of considerable breadth. These mangrove swamps abound with crabs, which are not eatable, it being considered dangerous food, where they exist among these trees. As we ascend the creek, the passage is so narrow, that the branches frequently meet overhead, or extend across; and a boat is with difficulty guided amidst these obstacles. The roots and pendent branches of the mangroves are thickly clustered with small oysters; and the water is almost stagnant, having a bottom of black mud, looking very favourable to the propagation of yellow fever; whilst the heated and stifling air seems as stagnant as the water. It may therefore be conceived that, under the blaze of a tropical sun, with the usual accompaniment of a cloud of sand-flies and mosquitoes, it would require no small temptation to the sportsman to encounter so many annoyances. In fact, the spot is rarely frequented, except for the purpose of shooting wildfowl, or for taking oysters. As we slowly passed up this avenue of mangroves, pelicans, flamingoes, ducks, cranes, herons, and other waterfowls, rose in succession before us; and our principal prize was a magnificent specimen of the first-named kind. Its stomach and pouch contained twenty-four small fishes, chiefly of the

kind termed mullets, abounding in the bay and inlets adjacent. The Spaniards make their water-proof cigar-pouches with the pouch of this noble bird.

Respecting the natural history of the Baxo I have not much to add. It does not abound much in fine shells, except those I have mentioned, and several inferior genera. Of the *Echinus* family there are many species in the small pools of the Baxo. During the day they conceal themselves, as well as they can, in the holes of the coral rocks; but by torch-light, as I have stated, their numbers are surprising, particularly the large black species, whose spines arrive at the length of at least 6 in., and are a formidable instrument of defence and annoyance. A lobster, of 5 lb. weight, we found had one of these spines passed entirely through his body. A young Spaniard, fishing near us in the shoal, unluckily slipping amongst a bed of these *Echinites*, had no less than twenty-seven spines lodged in his feet, and, of course, was incapacitated from further fishing for a time.

With regard to the *Sepia*, which I have before adverted to, so much has been related of its wonderful powers of sucking or adhering to any substance to which it attaches itself, that, without vouching for all the statements, I shall add a further notice of these remarkable animals. They attain to the weight of 50 lb. in the waters of the Cuba coast, and are held in much esteem, by some, for their flesh. Those we caught were much under this weight. One instance will suffice to show the occasional use they make of their prodigious power, when it is mentioned that they are able to draw out, by main force, the living fish contained within the conch shells, of the large size I have before described; an operation which no human strength can effect. The animal commonly closes its shell with its operculum, when threatened with danger; and the only way it can be extracted is, by breaking through with a heavy hammer, or a machete, a portion of the shell towards the extremity; and then, by cutting the muscle by which it adheres, the fish is withdrawn. It is also affirmed of this *Sepia* (as I presume it to be), that it even occasionally lays hold of the bottoms of the fishing canoes when in shoal water, one portion of the animal adhering to the rocky bottom, and that with so much force and tenacity as to detain them from moving. From the habits of this animal, it is probably the same as that referred to by Humboldt, on the authority of Columbus, as the sucker, or *el reves*, known by the literal name of *el pez pescador*, the fish-fisher, long ago employed by the Indian fishermen of the Cuba coast in securing their

largest fish. I cannot learn that it is ever used for such a purpose in present times.

Gibara, Island of Cuba, May 13. 1836.

ART. II. *Notices of Modes of capturing Fishes; One in India, One in the British West Indies.*

BHEEL Manner of Fishing.—At Ummeerghur, in Upper India, Bishop Heber received a stock of very fine fishes, enough to dine the whole camp. The fishes had been "the inhabitants of a large pool close to the Castle Hill, which appeared, in the rains, to cover about eighty acres, being then supplied from the Bunass river. It usually retained its water all the year; but this cruel season had already brought it very low, and in a month more they calculated that it would be quite dry. Accordingly, all hands were now at work to catch the fish while they were yet alive; and people from the whole country round about had assembled, either for this purpose, or to purchase them; a very large 'rooce' being to be had for a single pice. Captain Gerard, an engineer officer who met me here, went to see the chace, and said it was very curious. The fish were pursued in the shallow muddy water with sticks, spears, and hands, in all directions; but there was little execution done till four Bheels, in the service of the Oodeypoor government, made their appearance. The rabble were then driven away; and these savages, with their bows and arrows, made in a few hours that havoc among the fish which produced such plenty in the camp, singling out the largest, and striking them with as much certainty as if they had been sheep in a fold. The magistrates offered to renew the sport for my diversion in the evening; but, being Sunday, I did not choose it. I saw the fishermen, however, who were the first of their nation I had met with; middle-sized slender men, very dark, with frames which promised hardiness and agility more than much muscular strength. They were bare-headed, and quite naked, except a small belt of coarse cloth round the loins, in which they carried their knives. Their bows were of split bamboos, very simply made, but strong and elastic; more so, I think, than those of buffalo-horn, which are generally used in Hindoostan. They were about 4ft. 6 in. long, and formed like those of Europe. The arrows were also of bamboo, with an iron head coarsely made, and a long single barb. Those intended for striking fish had this head so contrived, as to slip off from the shaft when the fish was struck, but to remain connected with it by a long line,

on the principle of the harpoon. The shaft, in consequence, remained as a float on the water, and not only contributed to weary out the animal, but showed his pursuer which way he fled, and thus enabled him to seize it." — *Bishop Heber.* (Sent by *J. G. Sept.* 1830.)

In the British West Indies, among other Substances employed for the capturing of Fishes by Inebriation, is the Bark of the Root of the Dogwood Tree (*Piscidia Erythrina*), common in most of the islands; and on the medical properties of which I communicated a paper, in 1812, to Mr. Nicholson, who inserted it in the 33d volume of his *Journal of Natural Philosophy*, p. 145. The best time for collecting this bark is at the period of full moon; and the best season spring, in the month of April, when the dogwood is in full flower, and before the expansion of the foliage: the dogwood being one of the few periodically deciduous trees in the West Indies, and not recovering its foliage before the month of March. It is at this season that the young roots are cut for the purpose of obtaining the bark, which is stripped from them, coarsely bruised, and mixed with temper lime and the lees of the still-house, and put into small baskets. The spot selected for this sport is usually some small and sheltered bay on the leeward side of the island, where the boats being launched, and one or two negroes seated in each, furnished with a basket of the bark prepared as above, they pull out into the middle of the bay; where, resting occasionally on their oars, the negroes with the baskets gradually wash out their contents, which soon communicate a dusky brown hue to the water for a considerable space, at the same time destroying that transparency which is so remarkable in the West Indian seas. The effect is almost instantaneous; and, to one unaccustomed to the sport, astonishing. For myself, I can only say that few things ever made a stronger impression upon me; and, although I was but once a spectator of it, the recollection is nearly as vivid as when I witnessed it, now nearly a quarter of a century ago. Hardly had the discoloration of the water indicated its being impregnated with the narcotic preparation, before the surface of the bay was covered with multitudes of the smaller fishes (silks, roach, hinds, &c.), floating in perfect insensibility, and some of them even dead, offering themselves a ready prey to those in the boats, who took them up in baskets as they floated alongside; while the larger fish, as the conger eels, &c., swam about in mad disorder, lifting their heads above the infected fluid, and striving, but unable, to escape from its pestiferous influence.

The fish so taken are perfectly wholesome, as I can attest from having myself partaken of them at a marooning party made for the occasion.

The inebriating effect of the mixture arises from the combination of the ingredients, and not from the simple operation of any one substance. The active constituent of the bark of the roots of the Piscídia is a resin, which requires the solvent powers of the low wines, as the lees of the still-house are generally called, to render it miscible with the quicklime; by which union I imagine that a kind of resinous soap is formed, miscible with the waters of the sea. Such, at least, appears to me to be the rationale of the operation; as, otherwise, any of the ingredients singly ought to be capable of producing a similar effect.—*W. Hamilton, M.D. Oxford Place, Plymouth, Dec. 4. 1835.*

ART. III. *A Notice of the Elephant's Mode of Progression.* By J. G. TATEM, jun., Esq.

IN calling the attention of your readers to the elephant's mode of progression, I am led to do so by observing the indifference to the circumstance displayed in most delineations of the animal. The mode is remarked by Bishop Heber: he says, "At Barrakpoor, for the first time, I mounted an elephant, the motion of which I thought far from disagreeable, though very different from that of the horse; as the animal moves both feet on the same side at once, the sensation is like that of being carried on a man's shoulders." Capt. Williamson, likewise, alludes to it, and compares it to the artificial pace of ambling taught to some horses. But, in most works on natural history it is not only unnoticed, but the figures of the animal are incorrectly drawn, from the fact of the elephant's moving both feet on the same side at the same time not having been attended to: thus, in the recent volume of the *Naturalist's Library*, plate 3., the animal is represented as trotting in the manner of the horse: this is an error of the draughtsman, which must have escaped the observation of Sir W. Jardine, for we cannot believe so eminent a naturalist ignorant on this point. Mr. Daniels, also, in the *Oriental Annual*, in which he has given an engraving of the caparisoned elephant, has committed the same mistake. That the peculiar movement of the elephant might escape a superficial observer, I can readily conceive; for its rapid, though shuffling gait, in some measure obscures it: indeed, so little is it ordinarily noticed, that a gentleman, who had long resided in India, and was

familiar with the habits of the animal, to whom it was mentioned, not only had never remarked it, but refused to believe it. Sceptics may, however, have their doubts removed by visiting the Zoological Gardens.

It is much to be regretted that artists are not naturalists; for errors, and this one in particular, would not then be propagated by incorrect delineations in popular works.

High Wycombe, Bucks, July 23. 1836.

[In Professor Rennie's *Field Naturalist's Magazine*, vol. i. p. 14—18. is a short treatise, entitled, "On the Walk in Quadrupeds;" and is stated to be "by J. A. Borelli, Professor of Mathematics, Naples," and to be "translated from the Latin work, 'De Motu Animalium,' by John Sharp, Esq." The short treatise contains figures.]

ART. IV. *Notes on the Habits of the Windhover Hawk.* By CHARLES WATERTON, Esq.

NOTHING can be more unfortunate for a man, than to bear a strong resemblance to another who is notorious for his evil deeds. The public eye marks him as he passes on, and tacitly condems him for misdemeanours of which he is, probably, as innocent as the lamb which gambols on the lawn. This may be applied with great truth to the windhover hawk. He is perpetually confounded with the sparrowhawk, and too often doomed to suffer for the predatory attacks of that bird on the property of man. But, when your gun has brought the poor windhover to the ground, look, I pray you, into the contents of his stomach; you will find nothing there to show that his life ought to have been forfeited. On the contrary, the remnants of the beetle and the field mouse which will attract your notice, prove indisputably, that his visits to your farm have been of real service to it.

This hawk has received the name of windhover on account of his custom of hovering in the air. By the way, he is not the only bird which performs this curious evolution. The sparrowhawk, the barn-owl, the gull, and the kingfisher are often seen in a similar position.

A little attention on the part of the beholder would soon enable him to distinguish the windhover from the sparrowhawk. The windhover, when in quest of food, glides softly through the air, at a moderate height, now poised in the breeze on fluttering pinion, now resting in the void, apparently without motion; till, at last, down he comes, like a falling

stone, upon the unconscious prey below. But, should he be disappointed in his purpose, he rises again in elegant ascent, to seek for food elsewhere. The sparrowhawk, on the contrary, though he will sometimes hover in the air, still he usually secures his prey by means of a very quick pursuit. Both at early dawn and at the fall of night, he will dart past you with inconceivable velocity; and then woe betide the luckless victim that attracts his eagle eye. This bird often makes his appearance at a tower which I have built for the starlings, and to which above fifty pairs of these birds resort during the spring of the year. His unwelcome visit causes a tremendous uproar. A universal shriek of horror announces his detested presence; and scarcely have I time to fix my eyes upon the tower, ere the intruder is off with a starling in his talons.

Did the nurseryman, the farmer, and the country gentleman know the value of the windhover's services, they would vie with each other in offering him a safe retreat. He may be said to live almost entirely on mice; and mice, you know, are not the friends of man; for they bring desolation to the bee-hive, destruction to the pea-bed, and spoliation to the corn-stack. Add to this, they are extremely injurious to the planter of trees. The year 1815 was memorable, in this part of the county of York, for swarms of field-mice exceeding all belief. Some eight years before this, I had planted two acres of ground with oaks and larches in alternate rows. Scarcely any of the oaks put forth their buds in the spring of 1816; and, on my examining them, in order to learn the cause of their failure, I found the bark entirely gnawed away under the grass, quite close to the earth, whilst the grass itself, in all directions, was literally honeycombed with holes, which the mice had made. In addition to the bark of young oaks, mice are extremely fond of that of the holly tree: I have hollies which yet bear the marks of having been materially injured by the mice in winter. Apple trees, when placed in hedgerows, are often attacked by mice, and, in many cases, are much injured by them. I prize the services of the windhover hawk, which are manifest by the quantity of mice which he destroys; and I do all in my power to put this pretty bird on a good footing with the gamekeepers and sportsmen of our neighbourhood. Were this bird properly protected, it would repay our kindness with interest; and we should then have the windhover by day, and the owls by night, to thin the swarms of mice which overrun the land.

As the windhovers make no nest, they are reduced to the necessity of occupying, at second hand, that of another bird.

I once made the experiment to try if a windhover would take possession of a nest newly built; and, in order to prepare the way, I singled out the nest of a carrion crow. As soon as the crow had laid her third egg, I ascended the tree, and robbed the nest. In less than a week after this, a pair of windhovers took to it: and they reared a brood of young in its soft and woolly hollow.

The windhover is a social bird, and, unlike most other hawks, it seems fond of taking up its abode near the haunts of men. What heartfelt pleasure I often experience in watching the evolutions of this handsome little falcon! and with what content I see the crow and the magpie forming their own nests, as I know that, on the return of another spring, these very nests will afford shelter to the windhover. Were I to allow the crow and the magpie to be persecuted, there would be no chance for the windhover to rear its progeny here; for Nature has not taught this bird the art of making its nest in a tree. How astonishing, and how diversified, are the habits of birds! The windhover is never known to make use of a nest until it has been abandoned for good and all by the rightful owner; whilst, on the contrary, the cuckoo lays her egg in one of which the original framer still retains possession.

The windhover usually lays five eggs, and one of them sometimes proves addle. This bird is seen to the greatest advantage during the time that it is occupied in rearing its young; at that period, nothing throughout the whole range of ornithological economy can surpass the elegance of its aërial evolutions.

Perhaps it is not generally known, that the windhover is a migratory bird; but, whether the greater part of these hawks leave England in the autumn, or merely retire from their breeding-place to some other part of our country, more congenial to their habits, is a problem which remains yet to be solved. For my own part, I am of opinion, that a very large proportion of those which are bred in England leave it in the autumn, to join the vast flights of hawks which are seen to pass periodically over the Mediterranean sea, on their way to Africa.

Last summer I visited twenty-four nests in my park, all with the windhover's eggs in them. The old birds and their young tarried here till the departure of the swallow, and then they disappeared. During the winter, there is scarcely a windhover to be found. Sometimes a pair or so, makes its appearance, but does not remain long. When February has set in, more of the windhovers are seen; and about the middle of the month their numbers have much increased. They may

be then heard at all hours of the day; and he who loves to study nature in the fields may observe them, now on soaring wing, high above in the blue expanse of heaven; now hovering near the earth, ready to pounce upon the luckless mouse; and now inspecting the deserted nests of crows and magpies, in order to secure a commodious retreat, wherein to perform their approaching incubation. Allowing, on an average, four young ones to the nest, there must have been bred here ninety-six windhover hawks last summer: add the parent birds, and we shall have, in all, one hundred and forty-four. Scarcely five of these birds were seen here from Michaelmas to the latter end of January.

The periodical disappearance of the windhover from its breeding-place might give rise to much ornithological enquiry; but I suspect that, when every circumstance shall have been duly weighed, we shall still be in the dark with regard to the true cause of its departure. The want of food cannot be supposed to force it away; for food the most congenial to its appetite is found here in great abundance at the very time when it deserts us. Neither can supposed inclemency of weather be alleged in support of its migration, as the temperature of England is remarkably mild long after the sun has descended into the southern hemisphere.

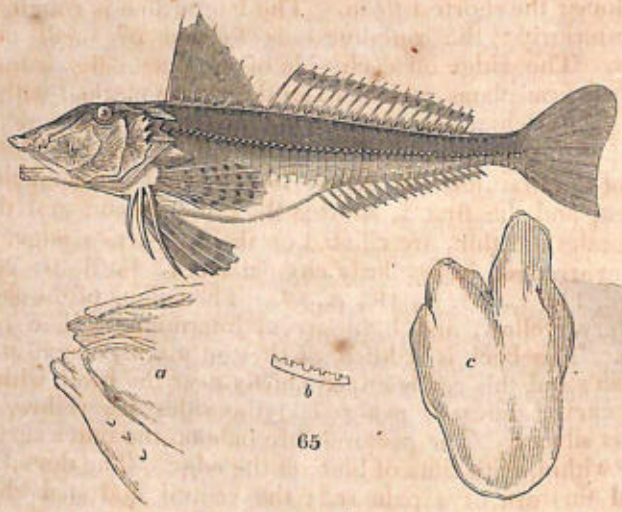
Walton Hall, Yorkshire, June 3. 1836.

[A few days ago, a sparrowhawk, the most deadly to the small birds of the whole tribe, darted against a half open window of a house in High Street, drew the head of a favourite canary through the wires of his cage, held the grip with all the force of a smith's vice, and busied itself in picking out the eyes and brains. The mistress of the family, who happened to be sitting in an adjoining apartment, heard a noise or flutter, and hurried to the spot, under the impression that all was not right with a bird endeared to her by many tender recollections: but she was too late, and, in the first burst of emotion, seized the intruder, and dashed it to the ground with such force, that it instantly expired. (*Dumfries Courier*, quoted in the *Morning Chronicle*, *July* 14. 1836, and communicated to this Magazine by *G. E. Dennes*, 12. *South Square*, *Gray's Inn*, *July* 14. 1836.)]

ART. V. *A Description of the Characteristics of a Kind of Trígla hitherto confounded with the Trígla Blóchii, with Figures.* By JONATHAN COUCH, Esq., F.L.S.

THE British species of the genus *Trígla*, though few in number, and sufficiently well marked in their characters, were

involved in great confusion until the appearance of Mr. Yarrell's *History of British Fishes*, which has satisfactorily settled the specific differences of six species, with the five first of which I am well acquainted. But that the species I have now to announce (*fig.* 65.) as an addition to the British fauna is really as distinct from the latter, *Trígla* Blóchii (*Br. Fishes*, vol. i. p. 50.), as it certainly is from all the former, will appear from the following description: —



65

The length of the specimen was 26 in.; the girt, where thickest, 15½ in. Its figure was much like that of the common tub-fish (*T. Hirúndo Br. F.*, vol. i. p. 41.); but from eye to snout it is more elongated and pointed, consequently, less abrupt. The head is more roughly marked with similar stellated lines, and is far better armed. The snout (*a*) is deeply bifurcated, and each section is formed of three roundish distinct teeth: in this respect, the fish more closely resembles the piper (*T. lyra Br. F.*, p. 44.) than any other British species. From the snout to the centre of the eye, measured 4 in. The under jaw is pointed, and has a fleshy tubercle at the symphysis. The jaws are rough with beds of fine teeth. The summit of the head is wide and flat, resembling, in this respect, but not quite equalling, that of the tub-fish. The gill rays are 7. The cheek-plates and gill covers are very rough and striated, more so than in the tub-fish, or in the elleck (*T. Cùculus Br. F.*, p. 34.); the usual spines being stouter, and that on the upper portion of the hinder gill-plate much longer than in

either of the two other named fishes; the second, or middle, gill-plate has, also, two well-developed bifid spines on its lower part, the uppermost longest. The markings of the gill-plates will farther distinguish this fish from our other *Trígla*; the two first being striated, the hindmost punctulated, the roughness being as if dotted in with a pin. From the snout to the margin of the gill opening, the distance is 7 in. The pectoral fin is 5 in. long, not reaching to the vent, and not so wide as in the tub-fish. The longest digit is rather less than 4 in. long: the shortest 2½ in. The lateral line is rough, most so posteriorly: the roughness is formed of small obtuse points. The ridge on each side of the dorsal fins is formed of broad firm plates, which, when dried, are marked with fine teeth (*b*). Behind the fins, the body is round, with a depression in a line with the margin of the tail. The edge of the rays of the first dorsal is smooth; the second ray is much the longest, and the first is shorter than the second and third. The scales are thin, are ciliated on their posterior edge, and are not arranged in regularly circular lines. 1st d., 9; 2d d., 19; p., 11; v., 15; a., 18; c., 18. The colour of the cheeks is silvery, yellow, and light green, intermixed. The iris is white. The back is reddish, of the tint usually found in the tub-fish; but this red is mixed chiefly near the head, with definite curved lines of pea-green; the sides are yellow, the belly is silvery. The pectorals are pale on the outer surface, dusky within, with tints of blue on the edge. The dorsal and caudal fins are of a pale red; the ventral and anal white; the caudal reddish, with tints of blue. The specimen weighed five pounds.

The fish here described agrees in all its essential characters with the *Trígla* noticed by Cuvier (*Poissons*, vol. iv. p. 67.) under the name of *T. Cùculus Bl.*; from whose description it differs only in the absence of a dark spot on the first dorsal; a circumstance which, it is remarked by that author, is liable to variation. But it is distinguished from Bloch's gurnard of Mr. Yarrell (*Br. F.*, p. 50.) in a variety of particulars, of which the chief are, the very great difference of size, the latter "rarely exceeding 1 ft. in length, and seldom above 9 in. or 10 in.;" "the whole body rough," whereas this fish is not rougher over the body than the tub-fish is; "the lateral line more strongly serrated than in the grey gurnard," whilst in the fish now under consideration this part is but faintly, though distinctly, roughened: "Bloch's gurnard" is also distinguished, not only from this, but every other British species, by having the first dorsal ray the longest; a circumstance not noticed by Cuvier in his description, which is very

minute, and especially instituted for the purpose of distinguishing it from the neighbouring species; between which and it that circumstance would have formed the most decided character. The air-bladder (*c*), the shape and size of which offer good marks of distinction in the different species of *Tríglæ*, is, in this species, 4 in. in length, and 6 in. in circumference, divided anteriorly into two lobes, both conical, but one much larger than the other.

Polperro, Cornwall, July, 1836.

ART. VI. *A Catalogue of the Species of Rayed Animals found in Ireland, as selected from the Papers of the late J. Templeton, Esq., of Cranmore, with Notices of Localities, and with some Descriptions and Illustrations.* By ROBERT TEMPLETON, Esq.

(*Continued from* p. 422., *and concluded.*)

RADIA'TA.

PO'LYPI.

VAGINA'TI.

TUBI'FERI.

Tubulària *Linn.*, *Cuv.*

ramòsa *Linn.* Found on the shore of Dublin Bay.

Anguinària *Lam.*

spatulàta *Lam.*, Sertulària *anguìna* *Linn.* Found on the shore at Carrickfergus, on the sand; Aug. 1811.

Campanulària *Lam.*

verticillàta *Linn.*

volùbilis *Linn.* Found in Belfast Lough.

dichótoma *Linn.* Found on the shore of Dublin Bay, &c.

Clỳtia Lamour.

rugòsa *Linn.*

ùva. Found on *Fùcus* nodòsus, on the coast at Kirkubbin, county Down; July, 1806.

Laómedes Lam.

spinòsa *Linn.* Found on the shore of Belfast Lough: common.

geniculàta *Linn.* On the shore of Belfast Lough, &c.

Plumulària *Lam.*

myrióphila *Linn.* Found by R. Brown, Esq., on the shore at Ballycastle. In Dublin Bay.

falcàta *Linn.* On the shore of Belfast Lough, &c.

Plu. cristàta *Lam.*, Sertulària plùma *Linn.* On the shore of Belfast Lough, &c.

setàcea *Soland. et Ellis.* Belfast Lough.

Serialària *Lam.*

lendígera *Linn.* Found in Belfast Lough, and Dublin Bay, &c.

imbricàta, Sert. imbricàta *Linn. Trans.*, t. 2. f. 5—11. Found common on the shore of Belfast Lough. White House Point.

verticillàta. (*fig.* 66.) Stem simple, or but slightly branched, having elongato-ovate cells, in distant verticillate groups. On the *F*ùci and *C*onférvæ, on the

66



shore of Belfast Lough, near White House Point; Sept. 1813.*

* A variety of Vesiculària imbricàta. — *G. J.*

Antennulària *Lam.*

indivìsa *Lam.*, Sert. antennìna *Linn.* On the shore of Dublin Bay.

ramòsa *Lam.* Found on the shore of Belfast Lough.

Sertulària *Linn., Cuv.*

abiétina *Linn.* Found on the coast.

polyzònias *Linn.* On the shore of Belfast Lough.

argéntea *Linn.* On the coast.

cupréssina *Linn.* On the shore of Magilligan Strand, county Derry.

operculàta *Linn.* Common on the shores.

rosàcea *Linn.* Shore of Belfast Lough.

pùmila *Linn.* Common on *F*úcus serràtus.

pinnàta. Greater and lesser branches alternately pinnated; denticles alternate, elliptical, with emarginate mouths; vesicles ovate, with a denticulate mouth and transverse undulated striæ. Dredged up, with other marine productions, in the sound of Donaghadee. Received from Mr. J. Gilles; Aug. 1805. The branching of this species is somewhat peculiar, each of the primary and secondary branches springing out at an angle of 40° or 50°. That part of the stem which bears the denticles is waved so as to bear each denticle on the projecting part; the denticles are elliptic, and the mouth of each apparently a little hollowed inwards, perhaps arising from the extremity being fractured; the vesicles are ovate, with 4 or 5 blunt teeth surrounding the mouth, and divided into 6 or 8 portions by annulated undulating lines. It might be classed among the large and strong sertularias, the principle shoot being of the thickness of a sparrow's quill at its base, and 4 in. or 5 in. long. The branches shoot forth from opposite sides, the whole coralline thus assuming a flat form, to the extent of 4 in. or 5 in.*

Thoèa Lamour.

*h*alecìna *Linn.* Found on the shore of Belfast Lough.

CELLULO`SI.

Crìsis *Lamour.*

ebúrnea *Linn.* Found on *F*ùcus serràtus.

ciliàta *Linn.* Found on *F*ùcus siliquòsus, and on other corallines.

fastigiàta *Linn.* Common on the coast.

*a*viculària *Linn.*

* Certainly not Dynámen*a* pinnàta (Sertulària pinnàta *Auctorum*) of Fleming. Perhaps the S. nìgra of Pallas. — *G. J.*

Cri. réptans *Linn.* Found on *Fùci* in Belfast Lough.
scrupòsa *Linn.* Found in Dublin Bay.
Acamárchis Lamour.
neritìna *Linn.* Found in Dublin Bay and Belfast Lough.
Lorícula *Lamour.*
loricàta *Linn.* Common on the coast.
Eucràtia *Lamour.*
cornùta *Linn.* Found in the pools on the rocks below Bangor: very common.
Salicorniària *Cuv.*
fistulòsa *Linn.*
Flústra *Linn.*
foliàcea *Linn.* Common along the coast.
truncàta *Linn.* Common on the coast.
carbàsea *Soland. et Ellis.*
dentàta *Soland. et Ellis.* Common on the stems and leaves of *Fùci.*
pilòsa *Linn.* Common the stems of *Fùci.*
spongiòsa. Allied to the preceding: the mouths of the cells with several long setæ. Found by Robert Brown, Esq., on the coast at Ballycastle. In pilòsa the mouths of the cells are surrounded by several very short teeth, with only one hair-like appendage. In this species the teeth appear lengthened into long setaceous bristles.
Pherùsa Lamour.
tubulòsa *Soland. et Ellis.** Found affixed to Sertulàriæ, &c.
Cellépora *Fab.*
pumicòsa *Soland. et Ellis.* Found on the stems of various corallines, and on the roots of *Fùci.*
Hippóthoa Lamour.
There are two or three species of this genus native, and rather common.

TUBULI'PORI.

Corállina *Linn.*
officinàlis *Linn.* Common on all parts of the coast.
Jània Lamour.
Linn. Found on the shore of Belfast Bay, &c.

ART. VIII. *A Not[illegible] posed to be Gymnau[illegible].*

I FOUND, on June ye native uncharacterised species, on [illegible] friend Mr. A. Irving, [illegible] under what name?—*G. J.* both in Surrey, what I a[illegible]

small corallines and shells, very common in protected bays. *

Nullípora *Lam.*, *Cuv.*

infórmis *Lam.* Found on the coast of Ireland. In some places dredged up and used as manure.

lichenöìdes *Soland. et Ellis.* Found encrusting rocks, shells, the stems of marine plants, and corallines, on every part of the coast; and is conspicuous from its variety of colours, red, purple, and blue, on a white ground. It is certainly not the Mill. *b*yssöìdes of Lamarck.

(NAGEURS.)

Scirpeària *Cuv.*

mirábilis *Linn.* Dredged up in Belfast Lough.

(ALCYONS.)

*A*lcyònium *Linn.*

digitàtum *Linn.* Found in Belfast Lough.

tomentòsum *Linn.*, *S*póngia tomentòsa *Linn.*

medullàre *Lam.*

búrsa *Linn.*

Spongílla *Lam.*

friábilis *Esper.* Found very common on the shores of the county Monaghan lakes, during the summer months.

pulvinàta *Lam.*, Ephydàtia canàlium *Fleming.* Found adhering to the walls of the locks of the Lagan canal.

*S*póngia *Linn.*

oculàta *Linn.* Found on the shore of Belfast Lough.

stupòsa *Soland. et Ellis.* On the shore of Belfast Lough.

palmàta *Soland. et Ellis.* On the shore of Belfast Lough.

dichótoma *Linn.* On the shore of Belfast Lough.

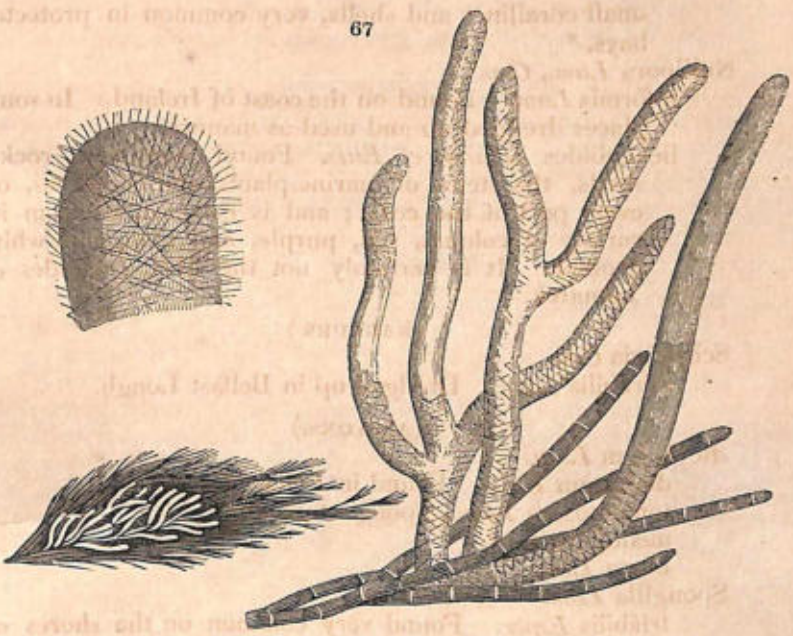
digitàta *Mont.* On the shore of Belfast Lough. Base of the stem ferruginous; the remainder of a pale yellowish brown.

*c*onfervícola. (*fig.* 67.) With irregular branching shoots, having elongated perfectly cylindric branches, rounded at their extremities, and composed of intersecting spiculæ.† Found growing on *C*onférva *r*upéstris, at the White House Point; Oct. 1810. [illegible] several crys- [illegible]. Sept. 1812. This is, perhaps, one [illegible]nite sugarcandy, of sponge, the shoots being sc[illegible] of a plant of *R*ho- [illegible] observe the manner

* If Mr. Templeton would intrust the ed[illegible] was left with me for be characterised in this Magazine, and the [illegible]oms had all fallen, and *G. J.* [illegible]t the abortive ovaries,

† *S*póngia complicàta of Montagu. —

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inch long, and of so brilliant a white, as to render them very conspicuous on the deep green of the conferva.

Spon. botryöìdes. Found on the shore of Belfast Lough, adhering to the stem of a plant of *Fùcus* siliquòsus; April, 1806.

tubulòsa.

foliàcea *Mont.* Found on *Conférva* rupéstris, and other marine plants, not uncommonly.

penicíllus *Mont.* Found on the rocks at White House Point; July, 1811.

ùrens *Soland. et Ellis.*, *S.* tomentòsa *Mont.* Found on various parts of the coast, sometimes forming an irregular crust on the rocks, at other times growing on and surrounding the stems of *Fùcus* siliquòsus.

cristàta *Soland. et Ellis*, *Mont.* On rocks: most probably not [illegible] from the last.

[illegible]edal disk, beer. Found on the shore near Carrickfergus.

the disk in this dim Found on various marine substances sides, when they aga Belfast Lough.

but the two lateral lig One a good deal like *Spóngia* lobàta regularly tapered at e brown, and covering the stems of a When the latter reach a quòsus. Another, which resembles line of the pedal disk, the *era Soland. et Ellis;* but it seemed

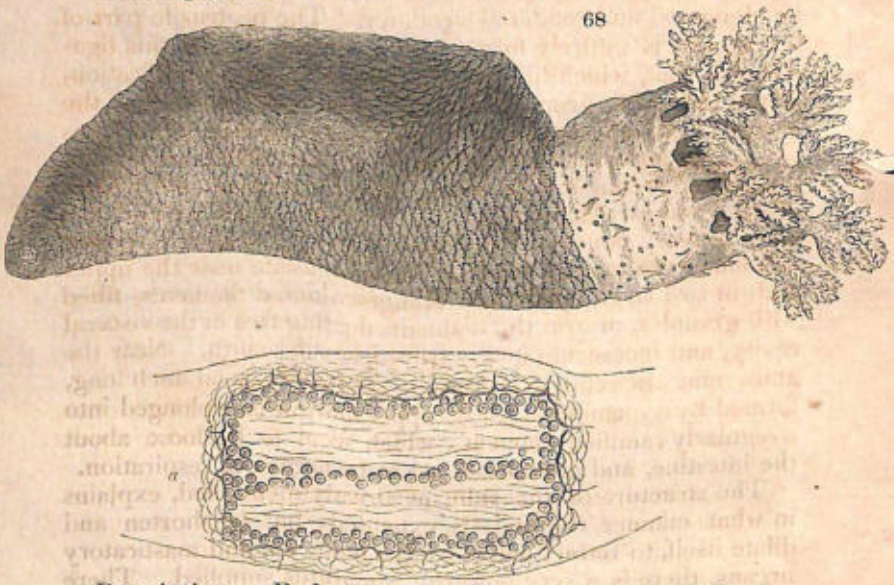
very old, and might have been thrown out of some vessel, and been washed on shore.

ART. VII. *Illustrations in British Zoology.* By GEORGE JOHNSTON, M.D., Fellow of the Royal College of Surgeons of Edinburgh.

CUVIE'RA PHA'NTAPUS. (*fig.* 68.)

Synonymes. Holothùria Phántapus *Lin.*, Syst., 1089.; Müll. Zool. Dan. Prod., 231., no. 2803.; Turt. Gmel., iv. 109.; Lam. Anim. s. Vert., iii. 73.; Cuv. Règ. Anim., iii. 239. Ascídia rústica *Turt.*, Gmel., iv. 93.; Turt. Brit. Faun., 132. A. eboracénsis *Penn.*, Brit. Zool., iv. 99., tab. 25. fig. 3. Cuvièria Phántapus *Flem.*, Brit. Anim., 483.; Blainv. Man. d'Actinologie, 194.

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Description. — Body fusiform, thick and round, resting on an oblong flat disk, obtuse and cylindric anteally, tapered to an obtuse point retrally, covered with imbricate, semicircular, granular, subcalcareous scales, and with a thin epidermis of an earthy brown colour, under which it is a reddish white, sometimes marked with faint orange dots. Rough, being the head ligamentous, about an inch in with a tuft of rigid protruded, covered with scattered scarlet, there are numerous some white conical papillæ arranged sparcely retractile. Opermouth a simple aperture in the centre obtuse point, and there the tentacula, of which there are twenty tubercles along their with a thick cylindrical stalk dividing, inferior surface is furnished

manner, straw-yellow spotted with scarlet: ventral disk large, oblong-quadrangular, rugose, but not scaly, having short tubular suckers set in two, or at some places in three, rows round the sides and within the margin of the square, and a single row down the middle of it, becoming triserial at the ends (*a*): anal aperture terminal, posterior, simple.

The coat of this remarkable animal, which our figure represents of its natural size, is very thick and coriaceous, divisible into two parts; viz. an exterior, scaly, true skin, of a subcalcareous texture, and an inner muscular layer, formed of ligamentous fibres arranged in close parallelism, and transverse or circular in their direction; so that, when in action, their effect must be a compression of the body, by which it will be elongated and rendered slenderer. The protrusile part of the mouth is entirely formed by a continuation of this ligamentous coat, which likewise, in a more delicate modification, forms the arborescent tentacula. The oral aperture in the centre of these is small and simple; but it immediately widens below into a short pharynx, which is lined with a beautifully plaited and crenulate membrane, and strengthened with a circle of 10 osseo-cartilaginous pieces, between which we find the large salivary pouches depending. The intestine is long and tortuous: the ovaries are attached to one side near the upper end, in two large bundles of orange-coloured filaments, filled with granules, or ova, the filaments floating free in the visceral cavity, and measuring nearly two inches in length. Near the anus, and encircling it, there is a canal fully an inch long, formed by a membrane whose upper margin is prolonged into irregularly ramified filaments, which seem to lie loose about the intestine, and are considered to be organs of respiration.

The structure of the skin, as already mentioned, explains in what manner the body is extended; but to shorten and dilate itself, to retract and move the tentacula and masticatory organs, there is a very powerful apparatus supplied. There are fine strong ligaments inserted around the anus, exterior to the canal, in connexion with the branchiæ, which run up along the sides of the body, to which they are closely adherent, and are inserted into the ring at the base of the tentacula. The three distral ligaments, when they reach the margin of the pulchélla *So*- come suddenly much smaller, and run across

frágilis *Mont.* inished size, the tubes opening along their dredged up inn enlarge and taper to their insertions:

Doubtful species. uments are thickest in the middle, and *Mont.*, of a darkch end to their place of insertion.

piece of *Fucus* si. spot corresponding to the inferior extremely *S.* prolif: are joined to another strong liga-

ment which originates here; and the ventral ligaments receive a similar accession before they have completely crossed the disk. These strong accessory ligaments are free or unattached to the skin, and some of them arise by two distinct heads, and the three connected with the ventral are actually digastric, or consist of two equal muscles, with a common origin and insertion. These muscular bands are also inserted into the ring at the base of the tentacula, so that there are ten ligaments inserted into the apparatus about the mouth, five of which run the whole length of the body, and five, of which three are digastric, originate near the middle, and are limited to the upper half. From their size and strength, their action over the tentacula, and the parts in connexion with them, must be very violent.

The tubes which penetrate the pedal disk are similar to those which garnish the furrows in the inferior surface of the rays of the star-fish: they serve to fix the creature to the bottom of the sea, and prevent it being cast on shore by every storm; while, at the same time, they probably conduct water into the interior, which, floating round the respiratory filaments, is ultimately forced through the canal that leads to the anus.

The specimen from which our figure was drawn was taken on the coast of Berwickshire.

ASTE'RIAS PAPPO'SA. (*fig.* 69.)

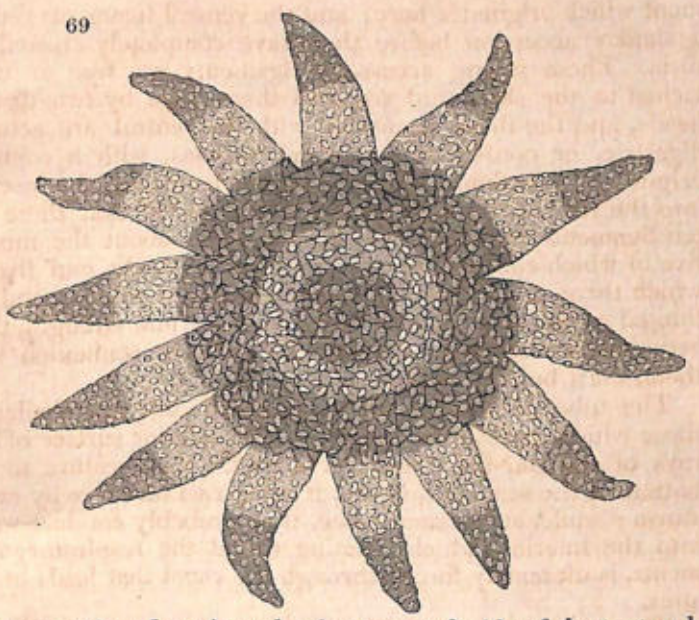
A. *pappòsa.* Rays 12 to 14, shorter than the diameter of the disk, which is covered with spiniferous produced tubercles; the spines in brush-like bundles.

A. pappòsa *Barb.*, Gen. Verm., 85. tab. 10. fig. 2.; Penn. Brit. Zool., iv. 135.; Turt. Brit. Faun., 141.; Stew. Elem., i. 400.; Flem. Brit. Anim., 487.; Encyclop. Méthod., tab. 107. figs. 6, 7.

Hab. — Frequent on the British coast, in deep water.

This is a beautiful species, the upper surface being of a fine blood-red colour, variegated more or less with pale circular bands. It is sometimes 1 ft. in diameter, the disk occupying about 6 in., and each ray about 3 in. of this breadth; and these proportions are the same in the smaller and more common specimens. The upper surface is flat and Exsertile pap covered with prominent tubercles, surmounted length when fully spines. Intermixed with these tubercles tubercles, and with pale soft papillæ, which appear to be scr five imperfect rows: culum lateral. The rays taper to an of the circle formed by is an obscure row of somewhat larger, nearly equal in size, margins, distantly placed. The in upwards in an arbuscular

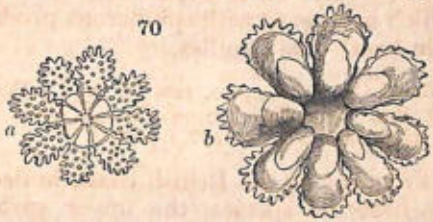
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with a series of pectinated spines on each side of the tentacular furrow.—*Berwick upon Tweed.* [*Received on July* 25. 1836.]

[In VIII. 78. note *, are figures, here repeated (*fig.*70.), of an example of some curious bodies that our correspondent G. J.

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had taken from the stomach of a Tritònia, and which he has deemed to be the fry, or young, of *Astèrias* pappòsa. The figures represent the animal magnified; and *a*, the upper surface ; *b*, the under one.]

...ubens *Linn.*

spermóphorus

Lough, Dublin

Discópora (Obèlia).

...ce of the Discovery in Britain of what is sup-posed to be the ...nia odoratissima. By Mr. W. Pamplin, jun.

There are at least fi...28. 1833, in company with my esteemed ... between Juniper Hill and Box Hill, ... m very much inclined to think is the

* In what work ?, or ...

Gymnadènia (*O*rchis *L., and of others*) odoratíssima. We had set it down for a casual variety of G. conópsea; but, from looking over Sir J. E. Smith's admirable observations, appended to his description of *O*rchis conópsea in the *English Flora*, vol. iv. p. 24., and comparing our specimen with the description of *O.* odoratíssima *L.* (Persoon's *Synopsis*, vol. ii. p. 505.) and with the cut in Bauhin's *Prod.*, 30. f. 2., referred to in the above cited place in the *English Flora*, I have great reason to think that what we found is this latter species. I extract the following matter from my memoranda made on examining the recent specimen: — "Mem.: Mr. A. Irving and self found a very curious variety (apparently) of Gymnadènia conópsea. Lip very broad, in three entire unequal lobes; the middle lobe by much the broadest; with the petals and upper calyx leaves much converging; spur very minute and short, not one fourth so long as in G. conópsea." [*Fig.* 72. represents the flower of G. conópsea; *fig.* 71. the flower of the supposed G. odoratíssima.]

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72



A solitary plant only was found. I cut off many of the flowers from its spike, and preserved them, to show the spur, &c.; and I cultivated the plant itself: but, if it is alive now, which I doubt, it is in a very weak state.

Lavender Hill, Wandsworth, Surrey, April 8. 1836.

ART. IX. *A Notice of the Fact, and of Particulars on the Mode, of Sugarcandy being produced in the Flowers of* Rhododéndron pónticum L.; *and a Notice of the Effect on the Germination of the Seeds of an* Acàcia Necker *of boiling them variously.* By the Rev. J. S. HENSLOW, M.A., Professor of Botany in the University of Cambridge.

I SEND you a notice of some facts upon two interesting physiological subjects, and some of your correspondents may, perhaps, favour us with farther particulars connected with the subjects to which they refer.

On Crystals of Sugarcandy formed by the Flowers of Rhododéndron pónticum L. — I was lately shown Near Wh..... tallised fragments of what appeared to be of the smallest species which were found in the decaying flowers arcely a quarter of an dodéndron pónticum *L.* That I might in which they had been formed, the plan tor with specimens, they will a few days; but, unfortunately, the blos pecimens carefully returned. — nothing remained of the flowers bu

already more or less withered. On some of these there was still a drop of a thick transparent saccharine fluid, evidently of the same flavour and composition as the crystals. I washed those ovaries which seemed to possess the most vitality: and, at the end of a few hours, there was a decided exhibition of a fresh supply of the syrup from several of them. This syrup gradually hardened, like a drop of gum, into a solid transparent, and perfectly colourless, mass; but those which I had received before exhibited some distinct crystalline facets, above a line in length. The largest mass was three lines long, and two broad, and weighed as much as four tenths of a grain. Eight fragments from different flowers weighed, together, 1·8 grain. In the *Gardener's Magazine*, vol. iii. p. 208., is the following notice, extracted from the *Bulletin Universel* : — "*Rh*ododéndron pónticum is found to contain some grains of common sugar, of a pure and white colour, on the surface of the upper division of the corolla." The present example appears to offer the same substance, in larger masses than those here alluded to. I find that the syrup always exudes from the upper surface of the thickened base upon which the ovary is seated, and, apparently, from a minute glandular spot placed between the sinus formed by the two upper teeth of the calyx. The excessive formation of the syrup, in the present example, may be ascribed to a morbid state of the plant, which was in a pot, and kept in a room; and the crystals were stated to have been found more particularly within some of the flowers which had withered without fully expanding.

On the Stimulus afforded to the Germination of the Seeds of an Acàcia by their being scalded with boiling Water. — Sir John Herschell lately sent some seeds of an acacia from the Cape of Good Hope, to Captain Smith of Bedford, with directions that they should be scalded, in order to secure their germination. Captain Smith having presented me with a dozen of these, I subjected them to the following experiments: — Two were placed in boiling water, and left to soak for an hour, until the water had become cool; two were kept at the boiling temperature for 1½ minute; two for 3 minutes; two for 6 minutes; and one for 15 minutes. Some of these were sown immediately, under a hand-glass, in the open border; and the rest were kept for 3 or 4 days, and then sown in a hot-bed. The following are the results obtained: —

Under the hand-glass, —

1, boiled for 1½ minute, failed.
1 - 3 minutes, came up in 14 days.
1 - 6 - - - 13 days.
1, not steeped at all, did not germinate.

In the hot-bed, —

1, boiled for	1½	minute,	came	up in	8 days.
1 -	3	minutes -	-	-	7 days.
1 -	6	- -	-	-	7 days.
1 -	15	- -	-	-	13 days.
2, in boiling water, left to cool -					9 days.
2, not steeped		- -	-	-	21 days.

We cannot draw any decided inference from the single seed, which was boiled for 15 minutes, having been more retarded than the rest, as it might have been a bad specimen; but it seems very clear, that the heat to which these seeds were exposed must have acted as a decided stimulus to their germination; whilst it is a very singular fact, that they should not have been completely destroyed by it. Had I supposed it probable that the seed which was boiled for 15 minutes would have germinated, I should have boiled some of the others still longer, in order to ascertain the extreme limit to which such severe treatment might be carried without destroying the vital principle.

Cambridge, July 8. 1836.

"Having procured, while in England, seeds of various species of the Australian *Acàciæ*, and sown them immediately on my arrival at the Cape [of Good Hope], I was much disappointed at the apparent failure of many of them, but have found several of them vegetating after being three years in the ground, during which period they were duly attended in weeding and watering. Seeds, also, of *Acàcia longifòlia*, saved at the Cape, and sown ten days after gathering, showed the same tardiness in vegetating. This circumstance led me to consider the best mode of treatment in trying experiments with the Cape species of *Acàcia*, and other South African Leguminòsæ; and I find that nearly the whole of this order thrive better by having water heated to 200°, or even to the boiling point of Fahrenheit's thermometer, poured over them, leaving them to steep, and the water to cool for twenty-four hours. Where there is a numerous collection, and the quantity small of each species, they may remain in the papers." — *J. Bowie. Cape of Good Hope, Feb.* 16. 1831. (*Gard. Mag.*, vol. viii. p. 9.)

"Great degrees of heat, short of boiling, do not impair the vegetative power of seeds; nor do we know any degree of cold that has such an effect. Those who convey seeds from distant countries should be instructed to keep them dry; for, if they receive any damp sufficient to cause an attempt at vegetation, they necessarily die, because the process cannot, as they are situated, go on. If, therefore, they are not exposed to so

great an artificial heat as might change the nature of their oily juices, they can scarcely, as several cultivators have assured me, be kept in too warm a place." (*Smith, in his Introduction to Physiological and Systematical Botany*, 6th ed., p. 81.)

ART. X. *A Notice respecting the Revival of "The Meteorological Society of London," which was established in October, 1823; but which has been in a State of Inactivity for several Years.* By Mr. W. H. WHITE.

I FEEL persuaded that not only the contributors of meteorological papers to this Magazine, but every one who is friendly to meteorological science, will read this announcement with much pleasure, particularly when I state that I am instructed by the president, Dr. Birkbeck, to say, that "The Meteorological Society of London has not been dissolved; but has only sunk into a state of rest, not from the want of pecuniary means to effect the objects of the Society, as some have imagined, but, apparently, from a want of zeal in some of the members to carry into effect various important objects."

About three years ago, a meeting was called, at the request of the treasurer, for the purpose of determining what should be done with the balance then in his hands. Several members were present; and it was unanimously decided, that the money produced by the treasurer should be invested, and that 75*l.* stock, the amount which it would purchase, should be applied to the promotion of meteorological science, in the form of two prizes, of 50*l.* and 25*l.* (stock), for the best and second essay, on subjects connected with meteorology, afterwards to be determined. The money was accordingly invested in the three per cent consols.; and six half-yearly dividends have been received; so that there is now an accumulating fund for the advancement of meteorological science.

At the meeting above mentioned, a committee was also appointed to prepare a question of the most comprehensive nature, for competition, and to make the necessary arrangements for presenting it to the scientific world. No such question or arrangements have yet been promulgated; and the committee, I believe, would feel obliged by questions suitable for discussion being sent, free of expense, to the president of the Society, Dr. Birkbeck, Finsbury Square, for their assistance in making a suitable selection; to whom, also, those meteorologists who are desirous of becoming members are hereby requested to signify their wishes without delay. This may be expected to lead to an early meeting of the

present members, for the purpose of reviving the Society, balloting for new members, fixing upon the prize question, and other effective business.

I ought to observe, that the Society consists of three classes of members, according to its regulations, of which I procured a copy from the treasurer; viz.:—

Resident members, "who reside in the metropolis, or within seven miles thereof."

Corresponding members, "who reside at a greater distance from the metropolis than seven miles;" and

Honorary members, "who are persons eminent in meteorology, or sciences connected therewith."

It is very desirable that so eligible an opportunity of establishing a *cooperative system of meteorological observations* should be embraced without delay; and, therefore, I sanguinely hope that *every meteorologist*, at what distance soever he may be placed from the metropolis (and the more numerously stations, in every portion of the habitable globe, can be established, the more desirable), will lose no time in forwarding his intention of becoming a member. — *W. H. White. Old Kent Road, Aug.* 16. 1836.

ART. XI. *Short Communications.*

BIRDS.—*The Northern Diver.* — I am much inclined to think that this is more common on the south coast than is generally supposed. I saw many in Mount's Bay and Falmouth Harbour in May, 1834. On about May 10. 1836, one was taken in a fishing net near this place. — *T. S. Martin. Seaton, near Axminster, Devonshire, June* 18. 1836.

An individual of the immer, or great doucker, or ember goose (*Colymbus Immer* Lin.), was taken, a few days ago, near the mouth of the Ystwith, at Aberystwith, in a net, at night, in company with a fine salmon. The kind had never before been seen in these parts. When alive, it weighed near 14 lb., and made a shrill noise, like the wail of a person in distress. It was savage in its nature, and seized with its strong bill on the feet or lower garments of any person who approached it, leaping up at him. (*Quoted in the Worcester Herald of Nov.* 30. 1833, *from the Salopian Journal.*)

The Daring of Birds on Account of their Young or their Eggs (VIII. 504—508); *an Instance in the Robin, or Redbreast, on Account of its Eggs.* — I perfectly agree with Mr. J. D. Salmon (VIII. 504.), that questions like that "treated of in VII. 483, 484., can only be satisfactorily answered by

different correspondents reporting their personal observations;" and I submit a fact connected with the redbreast a little at variance with the opinion of S. D. W., given in VIII. 508.; who there states that "the redbreast flies off to a neighbouring bush, where she sits uttering her plaintive note till the prying naturalist is out of sight, when she returns to her nest, and resumes her maternal office." The fact to which I was witness occurred in my garden at Edmonton, many years ago, and is as follows: — A redbreast had built her nest in a hole in an old cherry tree, which obtained where a dead branch had been cut off: the hole might be about 9 in. in depth. I, having discovered the nest, mentioned of it to a friend then visiting me, who, wishing to take a peep, looked into the hole, but was much startled by the bird's dashing out against him; and, whether the time required by my friend to count the eggs, and satisfy his curiosity, was longer than suited either the convenience or temper of the redbreast, I know not; but certain it is that she twice darted from a wall, to which she had retreated, and struck him on the head with her beak and wings, before he would remove and allow her to resume her seat. — *James G. Tatem. Wycombe, Bucks, April* 4. 1836. [The case of the male mistletoe thrush's defence of its mate, described by Mr. Waterton (p. 411.), may be cited in relation to this subject; for one of the conditions of that case is, the pair had then a nest. In p. 227. are notices by Mr. Waterton of two conditions of birds' attachment to their eggs.]

Birds' building Nests in unusual Situations (VI. 32—37.): *Two Instances in the Robin.* — We a few weeks since noticed the singular circumstance of a robin having built its nest, and hatched its young, under a corner of the cushion in the clergyman's reading-desk at the parish of Bosham. Since that, another nest has been discovered in a similar situation, namely, at the corner of a cushion in the seat of Edward Bennett, Esq. This bird had been sitting on three or four eggs, and the young ones were hatched on Sunday. Much interest has been excited in the parish and neighbourhood by these birds, and many a visit has, in consequence, been made to the church. (*Hampshire Advertiser*, May 28. 1836.) [*Communicated to this Magazine by Mr. G. E. Dennes.*]

Sixty Grubs, that had been recently taken, were found within a Rook that was killed in a field close to Foster's Booth, Hampshire, belonging to the Rev. W. H. Clarke, a short time since. (*Dorset Chronicle* for May 30. 1831.) — *W. B. C.*

Starlings (*Stúrnus vulgàris* Lin.) feed their young with cockchafers during the time they are to be found. I believe that

starlings breed twice a year. — *B. T. G. Gloucester.* [*Received on February* 14. 1835.]

Insects. — *Deiléphila gàlii.* — I observe in the 14th Number of the *Entomological Magazine* several instances recorded of Deiléphila gàlii having been taken in various parts of the country. To these I would add one other, which has come under my own knowledge. I have now in my possession a specimen of this insect, kindly given me by its captors, the Misses Wilmot, who took it last summer (in July, I believe), at Coundon, about a mile from this place. Mr. Enoch, I see, states, in the *Entomological Magazine*, that two examples were taken, last year, at Warwick: I had not previously heard of the insect occurring in this neighbourhood. — *W. T. Bree. Allesley Rectory, June* 30. 1836.

" Deiléphila gàlii has been found at Bridgewater, Langport, Charmouth, Yarmouth, &c.: all within these last two or three years: August and September seem to be the season for it." (*J. C. Dale, M.A., F.L.S.*, in the *Naturalist*, No. I. p. 13.)

[*Vanéssa Antìopa, Satúrnia Pavònia mìnor, Cerùra vínula, the common Wasp, and the Death's Head Hawk Moth: Information on.*] — The beautiful Vanéssa Antìopa was seen upon the wing in this neighbourhood, a few days ago, apparently new from the chrysalis. The caterpillars of the emperor moth (Satúrnia ? *pavonìna* *) have been unusually plentiful this season; as have also those of the common Cerùra vínula. As yet I have not seen a single individual of the common wasp, nor has any person to whom I have put a question on this subject. Last year many larvæ of the death's head hawk moth were picked up hereabout: these are known to the common people by the name tater grubs. — *E. Blyth. Tooting, Surrey, Aug.* 14. 1836.

Art. XII. *Queries and Answers.*

[*The Mole, Carrion Crow, Nightingale, Serpent, Toad: do they occur in Ireland?*] — I do not find that any of your correspondents have speculated on the absence from this island of the nightingale, toad, mole, and serpent; and, as far as I have observed, the carrion crow. The hoodie-crow is common. (*Extracted from a letter from the Archbishop of Dublin, dated January* 8. 1835.) [" There are neither toads in Ireland nor snakes to eat them; neither did I ever see a mole

* Would not this be a more convenient mode of designating this insect, than that of distinguishing it from the larger species (S. Pavònia) by the additional words màjor and mìnor, as is commonly done?

there." — *Agronome, in a communication in* IV. 556, 557. Agronome, who is Mr. John Howden, lived some time in Ireland, in the service of Lord Doneraile, upon his estate in Doneraile. The fact of the carrion crow's occurring in Ireland is stated in IX. 128.; and that of the natterjack toad's (*Bùfo Rubèta Flem.*) occurring, in IX. 316, 317.]

What is the best Method of depriving Birds of the Power of Flight, with the least Appearance of Mutilation? — E. Ventris. Cambridge, Jan. 18. 1836.

The best mode of permanently doing this is described in Rennie's Montagu's *Ornithological Dictionary*, under the article "Wing."—*E. Blyth. Tooting, Surrey, March* 10. 1836.

Do any, and what, British Species of Birds breed before they have attained Mature Plumage? — E. Ventris. Cambridge, Jan. 18. 1836.

We are in want of further information on this subject. That some of the large Falcónidæ and *Láridæ* do, is well known; but these are more than two years in acquiring their fixed colours. (The *Làrus glaúcus* is, in some instances, at least four years: see in VI. 27. 171. 278, 279.) Wilson thus, in describing what he terms the "sea eagle," which is no other than the young of the white-headed American species, observes, as confirmatory of his suspicion of their identity, that "their [the sea eagles'] place and manner of building on high trees, in the neighbourhood of lakes, large rivers, or the ocean, exactly similar to the bald [or white-headed] eagle, also strengthens the belief," &c. — *E. Blyth. Tooting, Surrey, March* 10. 1836.

[*Does the Herring Gull* (*Làrus argentàtus* Brunn.) *acquire its Mature Dress at the Autumnal Moult of the Third Year? and does it Breed before it has acquired it? and does Confinement affect the Moultings of the Gulls?*] — Most late authors appear to consider the autumnal moult of the third year to be the period at which the herring gull (*Làrus argentàtus Brunn.*) acquires its mature dress. Can any of your correspondents, from his own observation, inform me if this is the case? and whether it breeds before that dress is assumed? Audubon says that confinement affected the moultings of an eagle: is it known to affect the gulls? — *T. S. Martin. Seaton, near Axminster, Devonshire, June* 18. 1836.

Do not Rooks, in providing themselves with Nests, habitually appropriate any Old Nests which have remained from a former Year, either by Repairing and Adopting them, or by Using All or Part of the Materials of which they are composed in the Construction of their New Nests? (VII. 515) This is an extension of the question just introduced in VII. 515. If it be the fact

that they do, as doubtless it is, another instance is supplied of provision for the prevention of waste in nature. Forster, in his *Encyclopædia of Natural Phenomena*, ed. 1827, p. 112., has. under the subject

Nidification, this remark: — "Birds build very early, and begin to repair their old nests in the beginning of February." Do all nest-building species of birds repair their old nests? If not all, which do, and which do not?

What is the Most Effectual Method of Preventing the House Martin (*Hirúndo úrbica* Lin.) *from Building in Particular Spots?* — I am no enemy to house martins; on the contrary, I cherish them as friends; summer friends, indeed, but yet friends in a birdish sense of the word. Yet is there one particular nook which I would fain teach them to regard as tabooed; where, in plain English, I wish them not to build. To effect this object I have tried various devices. I have washed the wall with salt and water: this did not prevent them. I then rubbed it well with soap and water; for a time this perplexed them sorely; they could not make their mortar adhere, and down it fell as fast as they attempted to apply it: however, on they went, and, in a few days, their mansion has progressed most rapidly; and the little black and white rogues are ever and anon peeping out from behind their mud wall, as much as to say, "We have beaten you, and the more you annoy us, the more we won't go." The rascals know well enough that, the walls once up, I shall not have the heart to pull them down; and so, having got possession, they laugh to scorn all my attempts to dislodge them. What would you advise against another year? for in this I can, of course, do nothing. — *S. Taylor. Whittington, near Stokeferry, Norfolk, May* 22. 1836. [The spreading of a thick coat of soap over the place wished free is recommended by Mr. Fennell, in VII. 82.: the insufficiency of soap and water, noticed above, discourages expectation of the sufficiency of soap.]

The Mocking Bird (*Orpheus polyglóttus*). — Has the attempt ever been made to naturalise this bird in this country by giving some individuals their liberty? or would it be likely to succeed if made? — *E. Ventris. Cambridge, Jan.* 18. 1836.

There is no doubt that the mocker would be able to sustain itself in this country as easily as our different thrushes. It would migrate in winter; but, then, all migrative birds return annually and instinctively to the same breeding-place; a well-known fact, bearing importantly on the distribution of the feathered race. Man would be the only impediment to its introduction, as there is no means of securing it from the ceaseless persecution with which every rare bird (and more particularly so conspicuous a species) is sure to be assailed in

this densely populated kingdom. — *E. Blyth. Tooting, March* 10. 1836.

Is not the Sylvia hippolàis Lath. (*S. lòquax* Herbert) indigenous? Its arrival is usually dated about the end of March, or the commencement of April; or, if individuals have been noticed previously to this, the circumstance has been considered as remarkable. Our zealous countryman, Montagu, has seen it so early as February, and even January; but these were only single specimens, which had wintered in Britain, contrary to the supposed custom of the species, which is said to depart in October. Now, I am inclined to a different opinion, founded on several years' experience. In ordinary winters I have rarely met with the hedge warbler previous to April 1.; but, in the few last remarkably mild and open seasons, I have known of a considerably earlier appearance. In 1833, the first individual was seen on March 6.; in 1834, on March 2., in 1835, on Feb. 16.; and in 1836, on Feb. 6. Now, previously to the above-mentioned periods, not a single individual had been seen, which might be supposed to be proof positive that the species is migratory in Britain. But, then, we must take into consideration its extreme shyness; and I dare say that the field ornithologist will at once believe me when I say, that, for the last two months (Feb. and March), I have only twice *seen* this species in these parts, though it is here quite plentiful, and may be *heard* at all hours of the day. Thus, it is by no means improbable that it may winter with us, without ever being seen or heard; especially as, I believe, it has no chirp or call-note, but only its monotonous summer ditty, which has been, strangely enough, likened to the words, *chiff chaff, chiffy chaffy*. Indeed, it is little likely that the bird would take its departure only for so short a period as three months, which would actually have been the case during the past season, as the last individuals seen here in the autumn of 1835 were *seen* on Oct. 28., and the first this year was *heard* on Feb. 5. That this extremely early appearance did not only take place in this county, I have ascertained from personal observation, having seen it, towards the close of February, about Leamington and Southam, and likewise, in great abundance, near Worcester. Mr. Blyth informs me that he saw the first individual in Surrey, in the latter part of March; but I think it probable that it must have been heard very considerably before that time in so southerly a station. That individuals have wintered in this island is quite certain; and future observation may possibly discover the species to be either wholly or partially indigenous to Britain. That it could brave the rigours of our northern winters, there is, I think, no doubt, as the gold-

crested kinglet, a much more delicate species, commonly outlives our severest winters. The Sylvia hippolàis commences singing early or late, in proportion as the winter is mild or severe, and the spring forward or otherwise. On windy days it sings much seldomer than in calm weather; and I have observed all birds of sheltered situations to be averse to wind. Thus the song, or rather garden, thrush frequently sings away bravely in fine weather in February, while the March winds completely silence it, and it reserves its strains for showery April. — *Neville Wood. Sudbury Hall, Derbyshire, April* 1. 1836.

[In VIII. 330. is a notice by Mr. Blyth of the influence of the state of the weather upon the song of the cuckoo. In IX. 317. is an implied supposition that it may have some effect upon the voice of frogs. A gentleman, whom the writer has known, used to lose the sonorousness of his voice after being some time in the heated atmosphere of his plant stove. In VI. 93, 94. 185.; VIII. 509, 510.; are facts and views on the calling of what is concluded to be the night heron connectedly with facts on the state of the weather, either coming or present.]

Is the Redstart known to feed upon the Hive-Bee? (p. 207.)— I should not be inclined to charge the tree (or common) redstart with the eating of bees. — *N. Wood. Sudbury Hall, Derbyshire, April* 1. 1836.

Is the Redstart known to feed upon the Hive-Bee? — Notwithstanding that the redstart is an insect-loving bird, I have never observed it to feed on bees; although, for several years in succession, a pair of these birds (whether always the same I cannot say) regularly built their nest in a hole near the top of an ivy-clad wall, which surrounded the orchard of an old family mansion. Under this wall was placed a range of bee-hives, generally from six to ten, so that, if the redstart had given preference to hive-bees for food, here was an ample provision available at little expense or trouble; but I never observed them to interrupt the industrious insects. Indeed, if they had preferred hive-bees as food, they would have considerably diminished the colony during the period of their possession of the wall, which was generally about five months, namely, from about the middle of April till about the middle of September; but, as this was not the case, I am inclined to think the redstart does not feed upon the hive-bee, except in seasons when there is a scarcity of coleopterous and other small insects. In fact, the redstarts had, on this occasion, a full opportunity of devouring hive-bees, and might have devoured hundreds unobserved, yet the secret would have been detected when the hives were destroyed for the honey; but

there was no lack of honey during the periods of the occupation of the wall by the redstarts; neither was there any deficiency of numbers observed during the time of swarming.

[*Other Points in the Redstart's Economy.*] — The redstart is not a very shy bird; its song is very agreeable, although it possesses but little variation, and not great force. Its song may frequently be heard in the night; and it is generally among the most early risers in the morning. I have frequently heard the redstart imitate, very closely, the robin, the hedge sparrow, and the blackcap; still I do not think it deserves to rank among the mocking birds. I should be glad of the opinion of any gentleman on the song of the redstart. It is amusing to witness the horizontal motion of its tail, like that of a dog, and not like that of the wagtail. Its nest is very loosely built; chiefly of moss, and well lined with feathers; and sometimes a little hair, or down, is intermixed. — *W. H. White. Old Kent Road, April* 1. 1836.

[Von Osdat has noted (IV. 411.) the close similarity of the young of the robin, when it first leaves the nest, to the young of the redstart, and that they may be readily distinguished by the peculiar horizontal movement in the tail of the redstart.]

A Canary Finch, kept by a friend of mine, one year sang most delightfully, and the next ceased altogether to sing. Is this fact unusual? — *F. O. Morris.*

A Notice of Exotic Localities of the Glowworm. A Question on the Kind of a certain Exotic Species of Luminous Insect. — Mr. Wilson (VII. 251.), whom I think I recognise as an old college friend, speaks of glowworms at Keswick, so late as Sept. 2. 1833 (so misprinted for 1832). I remember that, when I was there in the autumn of 1821, our party found them in the woods below Walta Cray; and also on the other side of the lake, near Gordon's Bay, as late as the very end of that month.

I am surprised that Lord Byron, when expatiating about the grasshopper and the other ornaments of the evening landscape, near Vivas and along the Jura, did not allude to the glowworm. They are abundant there, so much so, that I recollect a party of young ladies coming into the hotel, one beautiful evening in July, 1825, with their head dresses ornamented by dozens of those living jewels which they had collected for amusement in the course of their walk.

Can any of your readers tell me the *exact* name and species of the *winged* glowworm, which is so numerous in the ruins of Rheinfels, on the Rhine, near St. Goar? In a dark warm evening in summer, they quite illuminate the air under the shady trees that border the steep ascent to the castle. Is it the fire-fly? — *W. B. Clarke. Stanley Green, May* 10. 1834.

[This question has been submitted to an entomologist, who has been so kind as to answer as follows: —]

The only luminous German insects that I know of are of the genus *Lampỳris*. The British species *Lampỳris noctilùca* (the common glowworm) abounds in some parts of that country. The males of all the *Lampỳrides* are winged; the females only are apterous and grub-like. You will say "' is all very vague information, but it is impossible to nam insect positively ("exact" your correspondent says) merely from knowing that it shines by night, and inhabits St. Goar. *E. N. D., May* 28. 1834.

Do Female Wasps first Swallow, and afterwards Disgorge, the Food they distribute to their Young in the Grub State? — W. H. White. June 6. 1836.

To what Properties in Nature is it owing that the Stones in Buildings, formed originally of the frailest Materials, gradually become indurated by Exposure to the Atmosphere and by Age, and stand the Wear and Tear of Time and Weather every bit as well, in some instances much better, than the hardest and most compact Limestones and Granite? (p. 379.) — In addition to the fact mentioned by Mr. Hunter (p. 379, 380.) relative to the induration of soft sandstone, I would adduce an excellent example of the same effect in the Cathedral of Basle, in Switzerland. The cathedral is wholly built of a soft coarse-grained sandstone, of so deep a red as to resemble long-burned brick. The numerous and delicate ornaments and fine tracery on the exterior are in a state of excellent preservation, and present none of the mouldering appearance so common in old cathedrals that are built of stone which, when quarried, was much harder than this sandstone. The pavement in the interior is composed of the same material; and, as almost every slab is a tomb, it is charged with the arms, names, and often statues in low relief, of those who lie below, delicately sculptured in the soft material. Yet, though these sculptures have been worn for ages by the feet of multitudes, they are very little injured; they still stand out in bold and distinct relief: not an illegible letter, not an untraceable ornament is to be found; and it is said, and I believe with truth, that they have now grown so hard as not to be in the least degree farther worn by the continual tread of thousands; and that the longer the stone is exposed to the air, the harder it becomes. The cathedral was built in 1019.

The causes of the different effects of air on stone must be numerous, and the investigation of them excessively difficult. With regard, first, to rocks *en masse*, if their structure be crystalline, or their composition argillaceous, the effect of the

air will, I think, ordinarily, be found injurious. Thus, in granite, which has a kind of parallelogrammatic cleavage, water introduces itself into the fissures, and the result, in a sharp frost, will be a disintegration of the rocks *en masse*; and, if the felspar be predominant in the composition of the granite, it will be subject to a rapid decomposition. The moraine of some of the Chamouni and Allée Blanche glaciers the composed of a white granite, being chiefly composed of quartz and felspar, with a little chlorite. The sand and gravel at the edge of these glaciers appears far more the result of decomposition than attrition. All finely foliated rocks, slates, &c., are liable to injury from frost or wet weather. The road of the Simplon, on the Italian side, is in some parts dangerous in, or after, wet weather, on account of the rocks of slate continually falling from the overhanging mountains above: this, however, is mere disintegration, not decomposition. Not so with the breccias of central Switzerland. The rock of Righi is composed of pebbles of different kinds, joined by a red argillaceous gluten. When this rock has not been exposed to the air, it is very hard: you may almost as easily break the pebbles as detach them from their matrix; but, when exposed for a few years to wind and weather, the matrix becomes soft, and the pebbles may be easily detached. I was struck with the difference between this rock and a breccia at Epinal, in France, where the matrix was a red sandstone, like that of the Cathedral of Basle. Here, though the rock had every appearance of having been long exposed to the air, it was as hard as iron; and it was utterly impossible to detach any of the pebbles from the bed: it was difficult even to break the rock at all. I cannot positively state that the gluten in these sandstones is calcareous, but I suppose it to have been so. Compact calcareous rock, as far as I remember, appears to be subject to no injury from the weather. Many churches in Italy, and almost the whole cities of Venice and Genoa, are built of very fine marble; and the perfection of the delicate carvings, however aged, is most remarkable. I remember a church, near Pavia, coated with the finest and most expensive marbles: a range of beautifully sculptured medallions running round its base, though old, were as distinct and fine in their execution as if they had just come out of the sculptor's studio. If, therefore, the gluten of the sandstone be either calcareous or siliceous, it will naturally produce the effect above alluded to, though it is certainly singular that the stone should be soft when first quarried. Sandstone is a rock in which you seldom see many cracks or fissures in the strata: they are generally continuous and solid. Now, there may be a certain degree

of density in the mass, which could not be increased without producing, as in granite, fissures running through it: the particles may be supposed to be held in a certain degree of tension, and there may be a tendency to what the French call *assaissement* (I do not know the English term), which is, nevertheless, resisted by the stone *en masse*; and a quantity of water may likewise be held, not in a state of chemical combination, but in one of close mixture with the rock. On being broken or quarried, the *assaissement* may take place, the particles of stone may draw closer together, the attraction become stronger; and, on exposure to the air, the water, however intimately combined, will, in a process of years, be driven off, occasioning the consolidation of the calcareous, and the near approach of the siliceous, particles, and a consequent gradual induration of the whole body of the stone. I offer this supposition with all diffidence: there may be many other causes, which cannot be developed until proper experiments have been made. It would be interesting to ascertain the relative hardness of different specimens of sandstone, taken from different depths in a bed, the surface of which was exposed to the air, as of specimens exposed to the air for different lengths of time.—*J. R. Herne Hill, July* 25. 1836.

Mr. P. Hunter's Queries on Geologic Subjects in p. 380, 381. I give the best solution of them that occurs to me at present, as follows: —

"*Can any of your Correspondents recommend something more efficient to prevent the Decomposition of these interesting Fossils?*" (p. 380–1.) — I have found strong transparent varnish a good preservative for fossil bones found in clay deposits; but I do not know that there was very much pyrites in those fossils so preserved, although it is well known to be an abundant mineral in all clay deposits. As pyrites decomposes most rapidly when atmospheric air has free admission into its pores, the stopping up of those pores is most essentially necessary; and, on this ground, I think that, if we were to add to the washing with turpentine and lamp oil, recommended by Mr. Hill, the giving of the fossils, after allowing them time to dry, a dressing of dissolved isinglass, it would be the best mode to preserve them from decay. I have known the tusk of an elephant, 7 feet 8 inches long, and 8 inches in diameter at the base, which was found fossilised in the London clay at Walton, in Essex, well preserved by simply a coat of varnish: this tusk was, when found, in a forward state of decomposition.

"*What is done with the immense Quantity of Pyrites collected on the Beach at Sheppey, which is shipped off to London,* &c. (p. 381.) — Iron pyrites was formerly collected on the

beach at Walton, on the coast of Essex, in great quantities, and a considerable business was there carried on in manufacturing that mineral, by a chemical process, into sulphate of iron, or, as it is commonly termed, green copperas; and I think that it is most probable that the pyrites collected at Sheppey is sent to London to undergo the same process. The copperas works at Walton have been for some years past abandoned, and the ground on which they formerly stood is occupied by the buildings of the new town; but the making of copperas from pyrites collected on the beach there is within the recollection of many of the present inhabitants of Walton. The uses to which copperas is put in the arts, &c., are well known.

Whence is the Calcareous Spar derived which is found more than a Quarter of an Inch thick in the Argillaceous Nodules, or Septaria? (p. 381.) — I beg to submit that this spar is derived from the water, charged with calcareous matter, which is infiltrated through the substance of these nodules into the cracks formed in them by desiccation. The colour it appears of is merely accidental. The spar in these nodules is sometimes dark brown, at others of the colour of amber. These nodules are sometimes cut and polished, and are very beautiful, owing to the various colours of the spar. — *John Brown. Stanway, near Colchester, Essex, Aug.* 2. 1836.

An Enquiry for the Cause of the Difference in Temperature of River Water and Spring Water, both in Summer and Winter. In the summer time the river water is much warmer than that from a spring; during the severe frosts of winter it is colder; and when the stream is covered over with ice, the spring, that is, well or pump, water is unaffected by frost. Does this difference proceed from the exposure of the surface of the river water, in summer, to the sun's direct influence; and, in winter, to that of frost; while the well water, being covered, is protected from their power? Or is there in river water, from the earthy particles it contains, a greater susceptibility of heat and cold? — *Indigena. April* 19. 1836.

[The answering of Indigena's enquiry is left to the favour of other correspondents. Considerations more or less relative to the subjects of enquiry are in V. 91. 303. 395, 396, 770.: they are offered on the subject of anchor frosts.]

Art. XIII. *Retrospective Criticism.*

Remarks on the recent Controversies between C. Waterton, Esq., and the Rev. F. O. Morris. — It must be a source of

regret to all the readers of this Magazine, the two engaged in the controversy alone excepted, that so considerable a share of each number should, for some time past [except Nos. 57, 58. 60. 63.] have been occupied with the various controversies between that highly-talented naturalist Mr. Waterton, and the Rev. F. O. Morris of Doncaster. These disputes might be unobjectionable if carried on in the true spirit of science, and wholly devoid of acrimony and personal abuse; but, as the latter appear to me to predominate in the papers alluded to, and as the parties seem more desirous of outdoing each other in their sarcastic retorts, than of discovering the true state of the point in dispute, the controversy is evidently but little suited to the pages of a scientific periodical. — *Neville Wood. Campsall Hall, near Doncaster, Yorkshire, Aug.* 4. 1836.

The Controversy current between Mr. Waterton and Mr. Morris. — I am sorry to perceive in the last numbers of the Magazine, that the contention between Mr. Waterton and Mr. Morris, upon hitherto an interesting subject has, unfortunately for the credit of the Magazine, descended into mere personalities, the insertion of which must be anything but gratifying to the subscribers, who, I feel assured, would greatly prefer to see these talented opponents engaged in such communications as Arts. 2. [by Mr. Waterton] and 3. [by Mr. Morris] in the last number, the perusal of which has afforded me much pleasure. — *J. D. Salmon. Thetford, Norfolk: extracted from a letter dated Aug.* 10. 1836.

[*It may be that it is not the Ibis* (*Ibis falcinéllus* Temminck) *that is the Type of the Figure of a Bird in the Coat of Arms of the Town of Liverpool.*] — Professor Rennie, in his edition of *Montagu's Ornithological Dictionary*, p. 267., has given the following statement: —"The ibis is adopted as a part of the arms of Liverpool, and, formerly, if not at present, stood conspicuous on the top of the Guildhall, in truly golden array. This is termed a liver, from which that flourishing town derived its name, and is now standing on the spot where the pool was, on the verge of which the liver was killed." I was greatly surprised on reading this statement; as not any writer who has attempted the history of the town has alluded to any kind of bird frequenting the Old Pool, except the imaginary liver or the cormorant; and on what ground, then, is the ibis placed in the same historical connexion? — *A. C. Liverpool, April* 4. 1836.

The glaucous Boatfly (*Notonécta glaúca*): *its imputed inflicting a Wound from which Pain ensues* (VII. 259.) *disputed.* — I have often very freely handled this species, but never suf-

fered the least pain from so doing; and, for my own part, I discredit Ray's representation of its being able to inflict a wound. — *James Fennell. May*, 1834.

Polyómmatus Argìolus. (IV. 477—479. 558.; V. 109. 205. 496.; VI. 544.) — Enough, and more than enough, perhaps, has already been said in the Magazine about Polyómmatus Argìolus, and the question of its being in different districts, respectively, either single or double-brooded. I must crave leave, however, to add one word more on the subject. I have stated (IV. 477., and V. 496.) that, in this neighbourhood, the insect is common in the early spring, and that it is only single-brooded; while, on the authority of others, as well as from my own observation, it appears that, in many other parts of England, there are two broods of it during the season. From a love of truth, I now feel it incumbent on me to record one exception to the above rule, so far as it applies to the appearance of the insect in this neighbourhood. On the 28th of August last, I took a single specimen of P. Argìolus in the garden here: it was a female, and, though not fresh from the chrysalis, was yet in tolerably good condition. This must unquestionably have been an individual of a *second* brood. It should seem, therefore, that, although this species is for the most part only single-brooded in this part of the country, it does nevertheless occasionally, though rarely, produce a second brood during the same season. I may add, that P. Argìolus was much less abundant than usual in the spring of 1835: I did not observe more than two or three specimens. The collectors at Coventry distinguish this little butterfly by the appropriate English appellative of the "holly blue," from the circumstance of its delighting to frequent the holly.

I have often wondered that Póntia cardámines, an insect which appears so early on the wing as the month of April, should not produce with us a second brood during the summer, as it does in Switzerland according to Mr. Brown's List of the Papiliónidæ of that country. (VIII. 218.) Has any entomologist known an instance of this species producing a second brood in England? — *W. T. Bree. Allesley Rectory, near Coventry, Warwickshire, June* 30. 1836.

[On the matter presented in V. 768., under the name Polyómmatus Argìolus, it is stated, in VII. 532., that it relates to P. Aléxis.

"Genuine insects terminate their existence after they have laid their eggs, but the Crustàcea live longer and lay more than once." (*Kirby and Spence's Introd. to Ent.*, iii. 9, 10. 1826.) From this premiss the consequences are deducible, that any

individual female insect cannot have two broods of young ones in the sense in which an individual duck or hen is said to have two broods; and that in the use of the terms "single-brooded," and double-brooded," above, single-brooded means that there is one new generation in a year; and double-brooded, that there are two new generations in a year.]

The Kind of Narcissus *noticed in* VIII. 118., *as being the* Narcissus (*Ajax* Haworth) *moschatus, and found wild, is not this Kind.* — In a letter formerly addressed to you, an extract from which you have inserted in VIII. 118., I somewhat too hastily announced that Narcissus (Ajax Haworth) moschatus had occurred wild at Meriden, the adjoining parish to this. I was led to make this communication from inspection of a living plant kindly sent to me by the lady who discovered it; the flower of which was, at the time, far advanced, and in a withered condition. I have since cultivated the plant in the garden, and it bloomed beautifully with me last spring. I now feel bound to correct the error which I committed, and to state that the plant in question is not Narcissus moschatus, but what I conceive to be a white variety of *N.* Pseudo-Narcissus. When I say a "*white* variety," the expression requires some qualification: on first expanding, the petals are white, or nearly so, and the cup bright pale yellow; but, after a time, the yellow disappears, and, long before the blossom withers, it becomes of a uniform white. By some, perhaps, it might be considered a distinct species (in this genus, a slight difference, we are taught, is enough to constitute a species); but, for the present, I prefer calling it a variety only. At all events, the plant is an interesting and highly ornamental one, and well worthy of cultivation. The place where it was found wild is a large moist meadow, which abounds with the common *N.* Pseudo-Narcissus almost to suffocation. I visited the spot the spring before last, when the daffodils were in flower, but was unable to find any more of the white variety. — *W. T. Bree. Allesley Rectory, June* 30. 1836.

[*Our Printing Greek Words not in Greek Characters.*] — Allow me to complain of your printing Greek quotations in English characters, as you have done in p. 383. This is a most objectionable practice, unattended with any counterbalancing advantage. It does not render the sense of the Greek quotation at all more intelligible to the unlearned reader, while to the scholar it makes it less so, and has, besides, a most awkward, bungling appearance. One would suppose that your Magazine had issued from the printing-office of some obscure country town, in which Greek types were not to be procured. I hope this practice will not be repeated. — *W. T. Bree. Allesley Rectory, July* 4. 1836.

REVIEWS.

ART. I. *Notices of Works in Natural History.*

Mudie, Robert: The British Naturalist. 2d Edition. London, Orr and Smith, 1835.

IN our review of the first edition of the *British Naturalist* (V. 49—71.), we spoke, on the whole, very favourably of the work; but, at the same time, as our manner is, we took the liberty of finding, here and there, a little fault with it, and pointing out what we conceived to be a few of its errors and imperfections. Authors, we believe, seldom pay much regard to the remarks of reviewers: sometimes, indeed, they treat us with great indifference and contempt, affecting not to have the curiosity even to read our criticisms. In a general way, therefore, we ought not, perhaps, to expect that our suggestions should be much attended to by those whom they are mainly intended to concern. From Mr. Mudie, however, in the present instance, we had hoped better things; for we happen to know that he *did* read our article, and, in consequence, addressed a letter (now lying before us) to the editor of this Magazine, expressing his obligation for the favourable notice taken therein of his work, admitting that the critique was just, and stating that, in a second edition, which would ere long be forthcoming, he should be "*able to profit by the hints of the reviewer, which are all very much to the purpose.*" With this letter, which, moreover, was not a little complimentary to ourselves individually, we confess we were gratified: it convinced us that we had performed our office as reviewers fairly and impartially; and it afforded us a sort of guarantee (so, at least, we flattered ourselves) that what we had written would have worked well, and would prove not to have been written in vain. Now, relying, as we did, implicitly on the good faith of this epistle, we very lately sent for the second edition of the *British Naturalist;* and our readers may judge of our surprise and disappointment when we tell them that, on comparing the two together, we find all the blemishes and blunders which we pointed out in the first edition repeated verbatim in the second, even down to the most glaring typographical errors! This, after what has been stated, we really think is too bad. Were it only from a regard to his own literary character, Mr. Mudie, we should have thought, would have made the second a *corrected* and *improved* edition. In mere matters of taste, one man may have as much right to indulge his fancy as another; perhaps, therefore, we ought not to quarrel with our author for having introduced again into the second edition the pretty *fable* about Hannah Lamond and the eagle, much as it may be out of place (p. 69. 2d. ed.);

nor yet, again, for having repeated the absurd compliment he had thought well to pass upon the beauty of certain "daughters of the principality," while expatiating on the extraordinary virtues attributed to the waters of Bala Lake (p. 100.); which, however, in our judgment, is the most nauseous trash. But let this pass. What we do complain of (and, in the present case, think we have a right to complain of) is, that the positive errors and mistatements which we pointed out have not been corrected. There is in this second issue from the press all the same confusion about the different species of *Vaccínium* (p. 55.); the same misstatement, that "the nest of the swift is constructed much in the same manner as that of the common swallow" (p. 359.); that moths are "always indolent" (p. 360.); that the gizzard of the corncrake resembles that of poultry (ii. p. 373.); that this bird "is in general gone before it can do any injury to the crops" (ii. p. 374.), &c. In one instance, Mr. Mudie does alter a passage with which we found fault. We remarked upon the confusion of thought under which he seemed to labour on the subject of "variety" and "species," when he told us that "of the dragon fly (Libéllula) there are several varieties" (i. p. 197., 1st ed.): he now flounders deeper in the mire, and gravely informs us, that "of the dragon fly there are a great number of *specimens*" (i. p. 196., 2d ed.); and this, too, after we had actually put the right word into his mouth! Is it possible that Mr. Mudie should not know the difference between "specimen" and "species"?

We adverted above to the typographical errors with which this work abounds. Of these let one example suffice. Who would have supposed that such a sentence as the following could have escaped correction, and found its way a *second time* into print? "The sand martin (Hirundo riparia) is the species most frequently met with in such localities, as it nestles in holes of the steep banks, generally in colonies at one place, *whichsoever the stream hath upwards and downwards.*" (ii. p. 381., 2d ed.) It would puzzle Œdipus himself to make any thing like sense of the latter part of this passage. We will, therefore, for the benefit of the readers of the *British Naturalist*, inform them, on Mr. Mudie's own authority (for no one else could have explained the enigma), how this passage ought to have stood; viz.: — "The sand martin is the species, &c. . . . . as it nestles in holes of the steep banks, generally in colonies at one place, *whisking over the stream both upwards and downwards.*"

Of the woodcuts which adorned the first edition we, on a former occasion, could say little in praise. Mr. Mudie, in the letter already alluded to, promised that in the new edition the

cuts should be "different, all original, and from the rare or new species." This promise, we regret to say, has not been very strictly fulfilled. There are, it is true, about a dozen new cuts; but these do not represent the subjects which most needed illustration; nor have they, we suspect, much claim to originality: unless we greatly mistake, they have been (to use the language of the trade) "found" by the bookseller; that is, copied from other works. It is but justice to say, that the author has, as we suggested, added an index to the second edition, for which we thank him. With these exceptions, the new edition differs little from the old; and, in our judgment, reflects discredit, either on the author or the publisher, if not on both.—*A. R. Y.*

Maund, B., F.L.S., and *Holl, W.*, F.G.S., conductors, assisted by several eminent scientific men: The Naturalist; illustrative of the Animal, Vegetable, and Mineral Kingdoms. To be continued monthly. No. I. was published for August, 1836; consists of "a highly finished coloured engraving," and 48 pages of text, that include 8 woodcuts; and its price is, in 8vo, 2*s.*; in 4to, 2*s.* 6*d.*

The following notice of the contents of No. I. will indicate the character of it, and partly the intended one of the work:—

A History of the Swiftfoot (Cursòrius isabellinus), and of the genus, as to characters and habits. By Shirley Palmer, M.D. Two woodcuts and a coloured portrait of the C. isabellinus are supplied. The description is made from a finely preserved specimen of an adult that is in the Birmingham Museum of Natural History. The author of the history has proposed "to give occasionally, in *The Naturalist*, a sketch of some of the rarer or more curiously constructed animals;" but "with the view rather of eliciting and collecting, than of communicating, information."

The Study of Nature. No. I: The Reciprocal Influence of the Natural Sciences. By R. Mudie. The primary subjective views presented may be discerned in what follows:—"Let any one cast a glance of knowledge over the globe which we inhabit, and mark the various productions of its different hemispheres, its different latitudes, its different elevations, its different surfaces and soils, and its different alternations of land and of water; and he will not fail to see that some principle which will meet all those differences is absolutely necessary, if his contemplation is to do any thing else than torment him with the sting of his own ignorance." It is the "general attention to the whole which is requisite, not only to the pleasure and profit of a well-cultivated mind in

the business and enjoyment of life, and the furtherance of the general weal of society, but, also, to the proper understanding and successful pursuit of" any "one branch, although that branch is ultimately to be studied professionally." The author has argued, accordingly, besides the argument contained in the first quotation above, that we should study nature by general principles before we undertake the details of the constituent subjects.

Observations on the Importance of the Study of Comparative Anatomy, with a Translation of the Chapter, in Blumenbach's Manual of Comparative Anatomy, on the Structure of the Bones. By P. The author has stated, that it is his intention to supply in the *Naturalist* a close translation of certain portions of the pure text of the last edition of Blumenbach's *Manual*, and to add new facts and illustrations in notes, if the readers' reception should be such as to induce him to prosecute the intention.

Notes on British Insects. By J. C. Dale, M.A., F.L.S. The kinds of insects noted on are rarer species, most of them such as Mr. Dale or others have captured specimens of; and the notes consist chiefly of dates of place and time, and of some facts on habits. Similar communications, made by Mr. Dale to our Magazine, occur in it in III. 332—334.; IV. 21—23. 265—267.; V. 249—252.; VII. 497—499.

Notes of a Botanist. By J. Murray, F.L.S., F.G.S.

An Account of the Structure of the Heart in the Testùdo Mydas, or Green Turtle. By L. P. This is illustrated by two engravings.

Animal Prognostics of the Weather. By R. M.

Observations, illustrated by 5 figures, on the A'rgulus foliàceus *Jurine*, as injurious to Gold and Silver Fishes. By Miss Dobson and Mr. Samouelle, the author of the *Entomologist's Useful Compendium*. This is an especially interesting communication.

Observations on the scarce Swallow-tail Butterfly (*P*apílio Podalírius). By J. E.

*Al*ýssum calycìnum: a Notice that it has been discovered in Charnwood Forest, Leicestershire.

On the Fen Reedling (Salicària arundinàcea *Selby*); Reed Wren, or Reed Warbler, of some other ornithologists. By Edward Blyth. Mr. Blyth has grounds for suspecting that this species is more diffused over the country than is commonly supposed, and that it is confounded with the sedge reedling (S. phragmìtis *Selby*); and he has produced a sort of advertising notice of its characters of person and of habits, to enable others to distinguish it; and he wishes that they would communicate information relative to the distribution of

it. Mr. Blyth has stated, that he is "very desirous of ascertaining with accuracy how the migratory land birds are distributed over the country:" that this "can only be satisfactorily elucidated by the cooperation of naturalists resident in different parts;" and that, "at present, there is a good deal to be learned on this subject."

Papilio Machàon; on the Mode of its changing out of the Larva State into the Pupa one. By J. Curtis.

S. Kennaway on the Music of Snails. The pith of this communication is the following statement by a young lady:—"One evening, I kneeled upon the window seat, when it was nearly dusk, and heard a soft musical sound: not a humming or murmuring, but a truly musical tone. I saw a snail; and, having a desire to annihilate those destroyers of fruits and flowers, took it from the window: I had silenced the music! I recollected what I had heard, and felt a sort of pang."

A Notice of the reported Capture of the Common Garpike (*Bélone vulgàris*) in the River Tame. By S. P.

Notes on the Redshank (*Tótanus* Cálidris).

Reviews: Agassiz's *Recherches sur les Poissons Fossiles*, and Jenyns's *Manual of British Vertebrate Animals*, are reviewed.

Under the head, "From the Foreign Scientific Journals," is given an abstract of an account recently produced by Professor Meisner of Basle, of the mode of the prodigious growth of the incisor teeth, in some of the rodent mammiferous animals. This subject has been elucidated by facts, treatises, and figures, published in our II. 134—137.; III. 27.; VI. 21—25. 390—393.]

Empson, C.: Narratives of South America; illustrating Manners, Customs, and Scenery: containing, also, numerous facts in Natural History, collected during a Four Years' Residence in Tropical Regions. 8vo. London, W. Edwards, 12. Ave Maria Lane, 1836.

The matter on natural history included in this volume would afford pleasure, and some profit, to the naturalist; but it is not presented with sufficient technical precision, nor in sufficient quantity, to satisfy him.

Twelve coloured fac-similes of drawings illustrative of the Narratives, mounted on tinted paper, and enclosed in a suitable portfolio, are published by Messrs. Ackermann and Co., Strand, London; and C. Tilt, Fleet Street, London.

Bell, T., Lecturer on Comparative Anatomy at Guy's Hospital, F.R.S., F.L.S.: A History of British Quadrupeds; illustrated by a woodcut of each species, and by numerous

vignettes. There are to be three sizes of the work; 8vo, royal 8vo, and imperial 8vo. The work in the 8vo and royal 8vo sizes is to be completed in about 8 parts, published monthly, and designed to compose one volume. The price of the numbers, in 8vo size, is 2*s.* 6*d.* each, in royal 8vo, 5*s.*: the number of copies produced of the latter size will be limited. The copies in imperial 8vo size will not be delivered until the work is completed: 50 will be produced.

"It is intended to give, in all cases," characters of the genera and species, and an account of the native or domestic habits of the species; of "their utility in food, in manufactures, in agriculture, or in domestic economy;" and of "the noxious qualities of such as are injurious to mankind."

The general style of illustration will be similar to that adopted in Yarrell's *History of British Fishes*: see below.

In Nos. 1. and 2. the bats, the hedgehog, and the mole are described and illustrated: the account of the mole is not finished. Seventeen species of bats are described, and there are 43 figures illustrative of them, and one tail-piece: in this numbering of the figures every view of position of the head, or of the animal, is counted. Of the hedgehog there are one figure and a tail-piece. Of the mole, in its hands, head, and runs, 6 figures. The text and figures are of a superior order: the text as to both matter and manner.

"It is not proposed to restrict the work to those species which are truly indigenous to the British Islands, but to include the principal varieties of such as are preserved amongst us in a state of domesticity."

Correspondents of the author's have communicated to him facts and observations, and the loan of specimens of rare species, relative to the subject of his work; "and he earnestly solicits a similar act of kindness on the part of any British zoologist who may have it in his power to offer it."

Yarrell, W., F.L.S., &c.: A History of British Fishes; comprising upwards of 900 pages, and upwards of 400 woodcuts, disposed in two volumes, whose joint price, in 8vo size, is 2*l.* 8*s.*; in royal 8vo, 4*l.* 16*s.* 1836.

This work is now finished: the last part, the 19th, includes the titlepages, preface, introduction, and general index.

"So great has been the success in obtaining species either" absolutely newly ascertained, or newly ascertained in relation to our coast, "that this work contains a greater number of species by one fourth than has yet appeared in any British catalogue, with an extensive list of well authenticated localities and local names. Two hundred and twenty-six species

are described and figured, several of them in different stages of growth. The number of representations of fishes amounts to 240. The drawings, in almost every instance, have been made under the author's superintendence from the specimens. The best artists, both as draughtsmen and engravers on wood, have been employed; and the representations will be found characteristic of the species, and highly creditable as works of art. Besides the figures of the fishes, there are upwards of 140 illustrative vignettes subservient to the general subject, representing teeth, scales, gill-covers, swimming bladders, and other viscera, occasionally, when interesting in structure, form or function; and the different boats, nets, and apparatus in use at our various fishing stations on the coast..... The systematic arrangement of Baron Cuvier, as detailed in the last edition of the *Règne Animal*, has been adhered to..... The author hopes that the care bestowed on every part of the work will merit the approbation of all lovers of natural history."

Turton, J., of Sheffield, Yorkshire: The Angler's Manual, or Fly-Fisher's Oracle; with a brief Compendium on Bottom Fishing. Small 8vo, 91 pages and a frontispiece. London, Groombridge; Sheffield, G. Ridge; 1836.

The author, in his preface, has stated as follows:—"Having for 30 years practised the art of angling, — fishing for whole seasons through, when the weather permitted, particularly for trout and grayling, in all sorts of waters, — I have acquired a considerable knowledge of the art; being, also, in the habit of making rods, and spinning lines with fine gut twisted amongst the hairs, and of supplying gentlemen regularly with flies; my friends have, for some time, urged me to publish a treatise on angling, comprising a proper description of feathers for making artificial flies; particularly from what part of the birds they are obtained, which, although of great importance, is left out by most authors. Perceiving, therefore, so many young gentlemen, and other persons, practising and wishing to learn the art of fly-making, I have yielded to the particular request of so many friends, and now make public what has so long been my study." Seventy-seven kinds of artificial flies are treated on by the author, who has stated what the materials are of which each kind is made, when it is to be used, and, in some instances, for what kind of fish. There is various information in the volume on other kinds of apparatus, on kinds of baits and fishes, modes of fishing, conditions of weather and waters, &c. The author is an enthusiast, but a sensible one. The abominable part of his book, and of the art, is that which relates to the using of live baits, and to kindred barbarity.

Mackay, J. T., M.R.I.A., A.L.S., &c.; Dr. *Taylor*, and *Harvey, W. H.*: Flora Hibernica; comprising the Flowering Plants, Characeæ, Musci, Hepaticæ, Lichenes, and Algæ of Ireland; arranged according to the Natural System; with a Synopsis of the Genera, devised according to the Linnæan System. 8vo, upwards of 650 pages. Dublin, London, and Edinburgh, 1836. 16*s*.

The work may be designated as a description of the exterior anatomical characteristics of the species of plants that have been found wild in Ireland, and a statement of the places, and kinds of places, in which they have been found. It is consistent with this view of the work's character to estimate its measure of merit on the four points, of the degree of numerousness of the species described, the manner in which they are described, the number of the localities pointed out, and the degree of faithfulness in which they are pointed out; and, the work thus estimated, there are good grounds for deeming it an able and a valuable one.

Mr. Mackay has "been induced to adopt the natural system" of arrangement, "not only because it is the method followed by Dr. Allman, the learned Professor of Botany in Trinity College," Dublin, but because it "is best calculated to give the student an accurate knowledge of" botany; "but," Mr. Mackay has continued, "as the Linnæan method enables us to ascertain the genus of a plant with greater facility, a synopsis of the genera [disposed] according to that system [and these characterised] has, therefore, been prefixed." It "is hoped" that, the work, hence, combines "to a considerable extent the advantages of both methods."

The device cited seems an able and serviceable one: serviceable, should it only answer the end of contributing to familiarise the student to the power and use of contradistinctive categories. Perhaps the characters of the genera in this part may be yet somewhat improved. There does not appear to be a synopsis of the genera of the Ferns, and of the characteristics of them.

"The second, and not least valuable, part of the work contains the orders Musci, Hepaticæ, and Lichenes, by Dr. Taylor," well known as the coadjutor of Hooker in the production of "the Muscologia Britannica," and "who, of all the botanists of Ireland, was best qualified for the task. It will be seen that he has added a new genus, Hygrophila [irrígua; synonyme, Marchánt*ia* irrígua *Wilson*, Hook. Eng. Flora, vol. v. part i. p. 106.], in the order Hepaticæ; and in the order Lichenes, a good many hitherto undescribed species."

"W. H. Harvey, Esq., the well known algologist, before his departure to the Cape of Good Hope, kindly undertook to describe the Algæ. Since his departure, I have been fortunate enough to add nine species," newly discovered in "Ireland, communicated by several botanical friends, as will appear in that portion of the work."

A desire has arisen with one, that a second volume could now be produced, occupied with entertaining matter of narrative, adduced on such species of plants described in the first volume as there might be this kind of matter appertaining to. The kind of matter meant occurs in Johnston's *Flora of Berwick upon Tweed*, *The Naturalist's Poetical Companion*, Baxter's *Illustrations of One Species in every Genus of British Flowering Plants*, and in Loudon's *Arboretum Britannicum*.

Murray, A., M. D.: The Northern Flora; or, a Description of the Wild Plants belonging to the North and East of Scotland; with an Account of their Places of Growth and Properties. Part I. 8vo, 183 pages. Edinburgh, Black: Aberdeen, Brown and Co., and Clark and Son; London, Smith, Elder, and Co.; 1836.

"It may be fairly observed, that the Scottish floras of Lightfoot and Hooker belong to the south and west of the kingdom, rather than to Scotland in general..... The tract of country at present in view may be supposed to be separated from the rest of the island by an irregular boundary, stretching from the Forfarshire coast on the east, to that of Sutherlandshire on the west; and may, in a general way, be said to consist of that portion of the east and interior of Scotland which lies to the north of Montrose, in addition to the western part of the county of Sutherland..... The object has been to offer an account of the native vegetation of the tract referred to, which might afford to those residing within it the means of acquiring a knowledge of the native plants they may expect to find, without the evident and well-known inconvenience arising from the extraneous matter occurring, of necessity, in works of a more general character; while a knowledge of our indigenous species might be imparted to others at a distance who may be interested in such matters."

The species are treated on in the order of the Linnæan method of arrangement. Part I. includes from Monándria to *Cúscuta* in Pentándria. The species are treated on in a style as original as can well be. A large portion of narrative matter, relative to the contradistinction of the species, to their uses in medicine and agriculture, perhaps to other subjects

besides, is interspersed with that which relates to their generic and specific anatomical diagnostics.

Rhind, W., M.R.C.S., Member of the Edinburgh Medical Society, and Lecturer on Zoology and Geology: Excursions illustrative of the Geology and Natural History of the Environs of Edinburgh. A second, and greatly enlarged, edition. 12mo, 146 pages, and more than 27 woodcuts, and a map of the district. 1836. 3*s.* 6*d.*

"The descriptions are what they profess to be,—the result of actual visits made to the particular scenes; and this will explain the frequent allusions to scenery and other phenomena, as identified with particular seasons of the year, and other adventitious circumstances. In many cases, however, the facts and observations of repeated visits are all included under one description." There is much and various interesting information in the volume: the greater portion relates to geology. The author has quoted as a motto a remark of Gilbert White's, in which is the sentiment, that "investigation, where a man endeavours to be sure of his facts, can make but slow progress, and all that one could collect in many years would go into a very narrow compass." One questions whether the author has not made his work larger than he should have done consistently with the spirit of this motto. Dr. Neill has supplied the list of species of fishes. Captain Brown, and E. Forbes, Esq., have supplied many of the localities adduced of the "land shells" (? land, shelled, molluscous animals).

Art. II. *Literary Notices.*

Sir W. J. Hooker's *Figures and Descriptions of the Rarer, or less known, Species of Plants of which Specimens are preserved in his Herbarium: Icones Plantarum rariorum vel minus cognitarum ex Herbario Hookeriano selectarum.* It has been announced that Part 1. will appear on Sept. 1. 1836.

Taylor's Scientific Memoirs: A prospective notice of this work is given in p. 279. It has been announced that Part 1. was published on Aug. 1., in 8vo, with 3 engravings: its price is 6*s.* There is not much matter of natural history in it.

A Familiar History of Birds, their Nature, Habits, and Instincts: by the Rev. E. Stanley, M.A., F.L.S., Rector of Alderley, Cheshire. 2 vols., *with many engravings.* 7*s.* This has been published some time.

Synopsis Generis Lupini, Auctore J. G. Agardh, Botan. in Academia Carol. docente. Pag. lvi. *cum tabula unica. Lundæ,* MDCCCXXXV.

THE MAGAZINE

OF

NATURAL HISTORY.

OCTOBER, 1836.

ORIGINAL COMMUNICATIONS.

ART. I. *Further Remarks on the Affinities of the feathered Race; and upon the Nature of Specific Distinctions.* By EDWARD BLYTH, Esq.*

THERE are two modes of estimating the typical standard of a natural group of species. There are two distinct principles upon which, according as we desire to frame a system upon obvious and tangible characters, or upon the physiological relations, that is the true affinities, of species, we may arrive at very different conclusions as to which form is the more worthy to be considered the general type of the whole. I have said (p. 406.), that it is not unusual to find certain characters, which, in typical forms, are comparatively little noticeable, carried out, in particular modifications of those general plans of structure, to a much greater extent; in exemplification of which may be adduced (as a familiar, though not, perhaps, the most striking instance) the great developement of the bill laminæ in the shoveller genus (Spathùlea); also the perfection of the bill, as a groping instrument, and as a sentient organ, in the snipes and woodcocks; in consideration of which, many naturalists, esteeming these to be the most characteristic peculiarities of their respective major groups, have therefore adopted the above-named genera as the types of extensive natural families. Now, this may be very well in a confessedly artificial system; but, where *affinity* is to be considered the basis of classification, these forms will rather have to be arranged as ultimate modifications of their respective types, in a particular direction. They are neither

* I wish the reader to excuse, for the present, my not entering into detail on the moultings of birds, as, just now (this being the chief season for moulting), I have some opportunities of considerably extending my information on the subject.

of them *centres of radiation* (at least, to any extent), such as the form of *A*nas *B*óschas undoubtedly is in the duck family; and such as the godwits (Limòsa) at least approximate to be in the natural family to which the snipes appertain. *C*órvus and *A*rdea are good examples of thoroughly typical forms, which, modified in every possible way, radiate and ramify in every direction around; and so, also, is *M*érula, and that central division of the finch family to which the term *C*occothraústes has been given. All these graduate, through a series of species, into almost every form referable to their respective groups; and such must necessarily be the case with the more characteristic examples of every general plan of structure, of whatever value. Typical forms, in fact, as a leading rule, are merely those examples of each plan which are the least bound, as a matter of necessity, to particular localities; and we accordingly find them (I mean the *forms*, rather than species) to be of comparatively general distribution; whereas the more one of these plans is modified to suit any particular purpose, the more completely it is adapted to any peculiar sort of locality or mode of life: the *adaptation*, of course, implies a receding from the general, or central, type; and the species may therefore, in technical language, be termed *aberrant*, even though its deviation be a farther developement of characters peculiar to its group.

It is clear that we must either admit this, or allow of a multiplicity of primary types to every natural family, to every group of species framed upon the same general or leading plan: the which must necessarily lead to such gross violations of *affinity* as the adoption of *P*hasiánidæ and *T*etraónidæ of the Quinarists as separate and independent natural groups, equivalent and equally distinct from each other, as are either of them from the two contiguously ranged families, *C*olúmbidæ and *S*truthiónidæ; and this, too, while the very genera assumed to be typical of them, *T*étrao and *P*hasiànus, are allied so nearly as to hybridise together.

This is so interesting a subject, that a few additional remarks may be well devoted to its elucidation. Assuming a type to be merely the abstract plan upon which a certain number of species are organised, the said plan being variously more or less modified according to the purpose for which a species was designed, it certainly does not necessarily follow that organisms simply illustrative of the mere plan should have been created, seeing that all creatures are obviously framed in direct relation to their indigenous haunts, and not as mere counterparts of one another. At the same time, wherever an extensive array of species are organised upon

one general plan of structure, there cannot but appear some tendency to converge to a general centre; a tendency becoming more obvious as we recede from the extremes, whereupon there is usually a marked increase in the number of species exhibiting the same characters, till at length a sort of focus presents itself, as a central genus, the proper limits of which completely baffle the ingenuity of naturalists to define, inasmuch as the various species it comprises blend with, and continuously radiate into, the immediately subordinate divisions.

In illustration, it is sufficient to mention the already cited genera, *Córvus*, *Árdea*, *Mérula*, and what should be *Fringílla*, but which is at present better known as *Coccothraústes*.

Take either of these divisions, and observe how difficult it is to define its (artificial) boundaries; how unbroken is the concatenation of species which links them with what are simply aberrant modifications of their structure, but which naturalists have been accustomed to consider as separate and distinct generic divisions. Let us, for a moment, consider *Mérula*. Some naturalists try to separate the spotted-breasted thrushes from those in which the markings are less broken; and, unquestionably, taking the extremes, there is much diversity; but there is quite as much between the different spotted-breasted thrushes. In either case, however, where can the dividing line be drawn? The blackbird has, when young, a spotted breast; and, in fact, the characters of its nestling plumage alone forbid its alienation from the spotted thrushes. Where, indeed, can we trace the line of separation between *Mérula* and *Philomèla* even? And does not also the same form, in another of its various gradations, merge imperceptibly into Petrocíncla, and thence into the different saxicoline genera, *Erýthaca*, *Phœnicùra*, and Siàlia? one ousel (Petrocíncla, or, rather, Geocíncla *Gould*) being absolutely a large robin, another a great redstart, while a newly discovered species of Siàlia has the markings, and many of the characters, of a Petrocíncla? But it would be endless to follow *Mérula* into all its diversified ramifications. I shall content myself with tracing the series into *Philomèla*, which is at once conclusive as to the true affinities of the latter.

To be brief, then, we observe in the European song thrush a deviation from the gregarious character of its nearest British congeners, and an approximation to the style of marking in the transatlantic species. *M. mustelìna* of North America is yet more solitary, and does not even associate to migrate; in this resembling *Philomèla*, which its habits (as described by all who have observed them) accord with in

almost every particular: still it retains a good deal of the true *Mérula*; and it builds a plastered nest, like our thrushes. In *M.* solitària the size decreases, the number of breast spots are diminished, the tarse is much lengthened (a character which commences in *M. m*ustelìna), the nest is constructed without plaster, and even the tail is rufous, as in the nightingales. *M.* Wilsònii has the very form of *P*hilomèla, and is the smallest bird that ranks in *Mérula*: its breast-spots are but very few, and these appearing as though more than half obliterated; its habits are exactly those of *P*hilomèla, and so is its nidification; and its bill hardly differs from that of our nightingale. The great nightingale of Eastern Europe has, according to Bechstein, an obscurely spotted breast, also a stronger bill than the common species; it is described to be more omnivorous in its diet, and, consequently, to be more hardy in a state of confinement: even its size implies an approach to the small *Mérulæ*. And, lastly, look to the nestling plumage of the song nightingale (*P. L*uscínia), a character of no small importance in indicating the true affinities of birds, and we at once perceive its true station in the system, and how distinct it is from those forms with which (apparently from its mere size) it has been hitherto associated: it is, in fact, an ultimate modification of the type represented by *Mérula*.

Let us now compare, for a moment, the extremes of the genus *Mérula*; let us bring together the large mottled-backed thrushes of the East, and those diminutive solitary thrushes of the West. Does it seem proper that these should rank in the same minimum division? And yet how are they to be separated? How can the former be divided from those of the missel thrush form *; the last-mentioned from the fieldfare group; the fieldfares from the merles, or from the congeries to which the song thrush belongs, which last we have seen to inosculate with the nightingales? How, in like manner, can we divide the genera *A*rdea or *C*órvus?

It indeed appears that, in these very typical genera, there

* On examining a series of specimens of *M.* viscívora, it will be seen that many exhibit conspicuous traces of the mottling on the upper parts, particularly on the rump,-and that space covered by the tertiary wing feathers; also on the upper tail-coverts; the latter being broadly edged with a paler tint, which in the former occupies the centre of each feather. Here we have an interesting illustration, in the plumage of birds, of the gradual developement of a particular marking as we recede from the type. There is also a regular increase in the size of the bill, which, in the missel thrush, is rather small. I am unaware that the form of *M.* vària and its immediate congeners is further modified, but suspect them rather to be the extreme ramifications in that direction.

is a sort of clustering of species (if I may be allowed the phrase) about the centre of radiation. In *Ardea*, and *Corvus* particularly, the central species become extremely difficult of determination; if, indeed, in some instances, the proximity is not even too close for detection. How nearly do some of the typical crows resemble! Upon the most scrupulous and minute comparison, C. L. Bonaparte was unable to discern the least difference between specimens of the European *Corvus Corone* and the common crow of America; and he consequently infers their identity: yet who that attentively peruses the various descriptions of the latter, that considers well its marked gregarious habits, and the diversity of its note from that of our crow, can for a moment coincide with him in opinion? Look, again, to the raven, that formerly was considered a bird of universal distribution, as was also the snipe. First, the African species must be detached, as Le Vaillant's description of it should long ago have indicated; for we find that, independently of the differences in the bill, and certain particulars connected with its plumage, the proportionate size of the sexes is the reverse of that of the European species, as Le Vaillant himself ascertained and published. Then the beautifully glossed raven of the Brazils is obviously distinct; also the raven of the South Sea Islands, and, there is reason to believe, that of India. And what if these can be proved to be separate species, by fixed and constant structural distinctions; do they not show how nearly species may resemble, and point to the almost inevitable conclusion, that, in some instances, there may possibly be no means whatever of knowing them apart?

How vastly important is this consideration when we contemplate the natural productions of America! Many years have now elapsed since the genius of Buffon suggested the capital proposition, that there is no absolute specific identity between any organism of the Eastern and Western continents, with the exception of those which inhabit very far to the north. All subsequent investigation has gone to prove the force and acumen of this sterling remark; and the number of species (exclusive of evident stragglers) supposed to be common to the two continents has been gradually diminishing, on more careful and exact comparison from that time to the present. In fact, I think we may now fairly venture to assume, putting aside stragglers, that those species alone are satisfactorily identical in the two continents which are distributed over the whole north of Asia, and may be looked for on the north-western coast of America. Very lately, the American scaup (pochard) was found, on comparison,

to be distinct from that of Europe, although the difference almost wholly consists in the obliquity of its wing spectrum; a character which, however, proved to be fixed and constant. Had there not been this diversity, the two species would have been, of course, equally distinct: yet how should we have discriminated them apart? The barn owls of the two continents, which are now believed (and on good grounds) to be distinct, are even more similar.*

Equally close resemblances obtain in other departments of the zoology of Europe and North America, and particularly in the insect tribes: many butterflies, for instance (as several of the Colìa*des*), from the opposite shores of the Atlantic, being only to be told apart by the slowly acquired practical ken of the entomologist. The natural productions of Japan, again, in many instances, present the most astonishing similitude to those of Europe; yet they exhibit characters which cannot be well reconciled with variation, however unimportant in themselves, because they are distinctions which climate or locality are not in the least likely to bring about. Besides, supposing the latter, we should not only expect to meet with specimens in every degree intermediate, but to find the same species equally flexible to circumstances in other places, which is not the case.

In ornithology, the jay and bullfinch of Japan may be selected from among numerous other instances; the former differing only from the European bird in the greater developement of certain markings about the head, and the latter presenting no other difference than the much paler, or roseate, tint of its abdominal plumage. Taking a series of species, we have every grade of diversity, from the obviously distinct Japanese peafowl (*P*àvo mùticus), to the mealy linnet, which, apparently, differs in no respect from that of Europe. In a specimen of a pettychaps from the same locality, the only difference I could perceive from our common Sýlvia *T*ròchilus on very minute inspection, consisted in a peculiar slight curve at the extremity of the upper mandible: still we know how nearly two British species of this genus resemble, and yet how very diverse are their notes. Perhaps the song of the Japanese pettychaps is dissimilar from that of either: at any rate, a

* From subsequent investigations, I am enabled greatly to strengthen the above position. Minute comparison of a considerable number of American specimens with examples of what have been hitherto esteemed the same species in Europe has brought to light distinctions as curious as, in some instances, they were unexpected. Thus, the osprey of North America may be always told, by trivial though constant characters, from that of Europe; and the same obtains with a variety of other species considered identical.

dry skin is hardly sufficient on which to found a definite opinion.

Of course, all these various facts lead us to the important consideration of, What is a species? What constitutes specific distinction? To which the only rational reply appears to be (and even this is quite incapable of probation), Beings derived from a separate origin. For it appears that hybridism, after all, is but an uncertain guide, however satisfactory in particular cases; there being much reason to conclude, from a general survey of the facts recorded, that, as the degree of fertility in hybrids (paired with individuals of pure blood) varies according to the degree of proximity in the parent species, the possibility of mules being produced at all existing only within the sphere of a certain affinity; so, on the other hand, when the parent species approach so nearly as some that I have had occasion to mention, their mixed offspring would be almost equally prolific, hybrid with hybrid. This is, at least, stated of all the members of the genus *Bós*; and most naturalists concur in the opinion, that our common fowls are derived from the blending of a plurality of species. Certainly, if the analogy of plants can be admitted, the fact is in so far settled; for I know many hybrid plants which of themselves yield fertile seed in abundance: the mixed produce, for example, of the Calceolària purpùrea and C. *plantagínea*; the former a half-shrubby species, the latter herbaceous.* A variety of additional instances could be enumerated. Hybrid plants, however, are equally sterile with mule animals, if the parent species are not very closely allied.

It is to be hoped that, ere long, the experiments of the Zoological Society will have solved this curious and important problem. Already some highly interesting and complex hybrids have been obtained under their management.†

* It is greatly to be wished that horticulturists would not name their hybrid plants in the same manner as genuine species; the confusion thus already induced in many genera being quite inextricable. Surely they could find some other mode of denoting them.

† Since writing this, I have ascertained the fact, that the mule progeny of the *Anser cygnoïdes*, coupled with the domestic goose, breed freely with one another; and have seen an individual of which both the parents were hybrids. We do not, indeed, know the wild stock of the domestic goose; but, certainly, no one would dream of referring it to *A. cygnoïdes*. As Mr. Jenyns well observes, the common gander, after attaining a certain age, is always white, a character which, it may be remarked, is in accordance with the snow goose (*A.* hyperbòreus) of North America, a species obviously distinct. Let it be, however, borne in mind, that, in every known instance, intermixture of species is solely induced by man's agency; even the mules that have been found wild between *Tétrao Tètrix* and *Phasiànus cólchicus*: for instance, White of Selborne, who figures one of these,

I have found it to be a very general opinion among naturalists, that specific diversity must of necessity be accompanied by some perceptible difference in the structure. To this I cannot accede, until I hear of a sufficient reason why it should be the case. We perceive every grade of approximation, till in the shrews, for instance, a slight diversity in the form of one of the back teeth comprehends all the difference. It is therefore presumed that, as so very trivial a deviation cannot be said to affect the animal's habits, for what purpose, then, does it exist, save to intimate the separateness of the species? But, surely, it will not be contended that species were created with a view that man should be able to distinguish them! Surely, differences were not imposed merely to facilitate the progress of human knowledge! Is it not much more rational to conclude, that, as great differences in the structure import corresponding diversities in habit, so, by the same rule, minor differences also imply an equivalent diversity in degree? Let us, again, consider the American and European crows: here it would seem that specific diversity is unaccompanied by any structural deviation.

Of course, it is hardly necessary to hint the importance of these facts to geological enquirers: they intimate the excessive caution requisite ere we can venture to identify the fragments of an organism, when even existing species, in many instances, are not, probably, to be told apart. It must be admitted that they warrant a good deal of scepticism as to many of the identifications that have been assumed.*

But to return now to the four typical genera, which have led to the above lengthy digression. I certainly do not conceive it necessary that there should be, in all instances, an unbroken gradation into the subordinate forms, similar to that from *M*érula into *P*hilomèla; for it is evident that the affinities of *P*hilomèla, and its relations to the thrush genus, would be the same, were there no intervening examples. Still it is reasonable to suppose that, generally speaking, such series would occur; not, however, for the mere abstract purposes of arrangement, but because there are grades in localities and modes of life. That there should be species variously modified upon any particular plan of structure, and that the deviation should be greater in one instance than in another, of course implies radiation from a general centre;

states, in one of his first letters, that black game was formerly abundant in the neighbourhood, but that only one solitary grey-hen had been seen for many years: such an individual might be expected to breed with a cock pheasant.

* For some facts bearing upon this subject, see Art. VII. — *Ed.*

and the very circumstance that the same characters are more developed in one species than in another, necessarily also occasions a gradation in the particular direction, which may happen to be more or less regular, according as circumstances (*adaptive* relations) require. That there should be a slight break, for instance, in the series where the fringillidous type is modified into Lóxia, is perfectly consistent with the nature of the deviation; but the true affinities of the crossbills are, nevertheless, equally recognisable, and the same may be said in other cases where the hiatus is much more considerable.

And here it will not be out of place to say a few words upon the terms *perfection*, *degradation*, and the like, as applied to natural productions. Let it be borne in mind, that, although every species is equally and wondrously perfect, even to the most trivial minutiæ, in reference to the office for which it was designed, still, if we desire to cite an instance wherein the adaptation, if not more *perfect*, is, at least, more obviously remarkable and extraordinary than in another, it is to *aberrant* species, rather than to the central or typical exemplifications of a general plan of structure, that we must direct attention; inasmuch as the former exhibit those modifications of that plan, those adaptations to a peculiar mode of life, which are the most calculated to excite our wonder and admiration. Such forms as Lóxia and Recurviróstra are sufficient illustrations of the position. There, perhaps, would be no objection to the word *degradation*, understood strictly in a classical sense; but, when we consider its popular, its *English* meaning, in which alone it will be apprehended by an extensive class of readers, no term should be more carefully avoided: the most *degraded* species absolutely happening to be those which are the most worthy our especial admiration.

The difficulties of classification arise from the necessary fact (obviously necessary when we consider the adaptive relations of species) of there being successive centres of radiation; the different modifications of a leading plan of structure radiating in their turn, and thereby constituting an irregular series of subordinate types, of every degree of value. Thus, the starling type is comprehended in the omnivorous or corvine plan of structure, and, in its turn, comprises others of less importance, upon all of which may be organised an indefinite number of species, diversely modified to suit a variety of localities, and often *approximating* in external appearance to species framed upon other general types of structure, wherever they are alike modified to perform the same office in the *adaptive* system: such *approximation*, however, by no means inducing an additional degree of physiological *affinity*.

Before concluding this, I must call attention to another point worthy of consideration. To recur again to the four typical genera we have all along been considering, and which, of course, it is most satisfactory to revert to in every instance, it appears that the central species, for the most part, exhibit a marked increase of size, being generally about the largest of those framed on their respective plans of structure. I do not say that this obtains in every instance, but still it is so general as to be quite worthy of attention; and the rationale of it appears simply to be, that, as typical forms are more adapted for general distribution, and better calculated for finding subsistence in a variety of localities, than those modifications of them which are organised expressly for peculiar places only, we must infer that an increase of stature would, as a general rule, be incompatible with the well-doing of aberrant races; or, to put it inversely, that beings of comparatively large size require to be less partial in their adaptations; that (their wants being greater) they should not be too much confined to particular places for the needful supply of food. However, this is a rule so broken into by exceptions, and so entirely dependent on the character of the particular adaptation, that, though obvious enough in the main, it is much more likely to meet with assent than demonstration. Certain it is, that, in very many groups, the largest species are among the most centrally typical. Witness, by way of example, the woodpeckers and the parrots.

In fabricating an arrangement according to the natural method (i. e. based on the true *affinities* of species), we cannot be too much impressed with the consideration that organisms must be ever regarded in their totality; that no one structural character can be expected to hold in all instances, however important in particular cases. We have only to consider the fact, that, in a natural group, it is but the same leading plan of structure which is so variously modified, each organ, in its turn, being adapted differently to diverse circumstances; and we perceive how valueless are the arbitrary characters of those who try to frame artificial systems. Even the dentition of the Mammàlia, so paramount in the majority of cases, becomes quite a secondary means of distinction in the Marsupiàlia; and the structure of the bill in birds, so important and corresponding a character in most instances, yet loses almost all its value in the Certhiadæ. Unquestionably, all the yoke-footed tribes are very nearly related by affinity; yet how discordant are they in the details of their structure! A single, and comparatively trivial, resemblance in the organisation of the foot becomes, in this instance, a character of the very first importance. — *Tooting, Surrey, August* 13. 1836.

ART. II. *Some Remarks on Mr. N. Wood's British Song Birds.* By C. J.

"Indeed, very many birds are strangely named, not less in *pure* Latin, than in English, French, and Dutch; and very many are every year receiving names still stranger than those they bore."—*Audubon.*

THESE are the words of an ornithologist who has devoted the greater part of a life to the study of the birds of his native country; who has ascended the craggy eminence of the mountain rock to examine the rude eyry of the eagle, and waded through the morass to tell us of the economy of birds that inhabit there; who has wandered with untiring zeal through the desert forests, and probed the cavities of perpendicular cliffs, that he might inform the world of the peculiar habits of the feathered race that dwell in those localities: these are the words of a man who has examined with scrutinising accuracy into the habits and history of the birds of America in their own peculiar haunts; and, in giving to the world the result of his laborious investigations, has raised for himself a monument which will immortalise his name.

Having, then, given the opinion of Audubon on the nomenclature of birds, I will not presume to offer any remarks on the list of appellations which appears in the table of contents to Mr. N. Wood's book on the British song birds; but will proceed to note down a few observations on the book itself, which, if they fail to interest your readers, may be the means of attracting the attention of the author (should he honour them with a perusal) to a few of the apparent defects and inaccuracies (not of observation, but of taste and judgment) which, in the humble opinion of the writer of this article, appear to need correction and reconsideration: and, as the author, in his preface, does not appear disinclined to receive any observations that may conduce to the improvement of a second edition of his work, it is hoped that he may not take umbrage at the following remarks of a sincere admirer of the feathered race.

To begin, then, at the very beginning:—on the exterior of the volume, the words "Wood's British *Song* Birds" are printed in large golden characters, which fail not, at any rate, to attract attention in the shop window. On opening the book, we find the "house sparrow" included amongst the birds of song, together with many others which possess equal powers of melody. Now, as it has pleased Mr. N. Wood to be rather facetious at the expense of the country gentlemen, farmers, and gardeners, and to hold these worthy folk up to ridicule for denominating the whole race of small birds that may commit slight depredations on their corn and fruit

"sparrows," I think they may with equal propriety have the laugh at our author for calling the "yelping" house sparrow a singing bird.* I cannot agree with Mr. N. Wood in considering the country folk so totally ignorant of ornithology as to mistake a house sparrow for a hedge sparrow, or hedge dunnock, as it is more appropriately entitled by the author, though the former appellation is apt to mislead the *town* resident.

In a note at the foot of page 39., the name of an original observer in natural history is introduced in a somewhat petulant and unbecoming manner, which might have been avoided. Should animosity unfortunately exist in the bosom of one naturalist towards another, it were better that it should rankle there, than be suffered to pollute the pages of a book which professes to treat of those cheerful creatures, whose notes are ever "full of love and joyance." But, not to detain your readers with any speculations as to the amount of knowledge and entertainment that is obtained, by the world in general, from the perusal of original works on natural history, or of compilations from the writings of various authors and observers, I will proceed to transcribe some of the notes that were made on perusing Mr. N. Wood's book. But, as it would occupy too much of that space in your useful Magazine, which is usually filled with more important matter, to note the tenth part of them, I will open the book at random† (page 230.), and observe what is stated of the song of the meadow pipit (*Anthus pratensis*). "The song of the meadow pipit," observes our author, "bears some resemblance to that of the *skylark*, being rather *monotonous*. In power, however, it is greatly inferior to that 'bird of the heavenward song,' being scarcely audible except when heard close; but the strains are, in my opinion, somewhat superior in melody to those of the skylark," &c. The skylark, as a songster, in the opinion of Mr. N. Wood, has little merit, as will appear by the observations on his musical powers, which will hereafter be transcribed from his biography of that bird. "The meadow pipit," continues Mr. N. Wood, "usually pours forth its melody *whilst rising perpendicularly in the air*, which is performed with a singular quivering action of the wings. It seldom mounts so high as to escape observation; but, having

* See *British Song Birds*, p. 202.

† [If the author of the present critique had not opened Mr. Neville Wood's book "*at random*," he would probably have seen the following observation: — "If only song birds found their way into this little volume, the house sparrow, with all its impertinence and wily tricks, had never been admitted here." (p. 330.) — *Ed.*]

attained a reasonable altitude, begins to think it high time to return from its aerial excursion, and descends, retracing its steps in a perpendicular line. Now, it is singular that *the song is not commenced until the bird begins to descend;* or, rather, it hovers for a few instants at the top of its flight, singing all the time; while the skylark offers its 'grateful tribute' in its ascent, as well as in descending." It is obvious that there must be some inaccuracy in this passage: the bird that does not commence its song till it has ascended to a certain distance in the air, and begins to descend, cannot "pour forth its melody whilst rising perpendicularly in the air." If the former observation of Mr. N. Wood is correct, the latter cannot be so: but it is well known that the bird in question does not pour forth its song until it begins to descend.

Let us now consider some of the observations which have been given to the world in disparagement of the musical powers of that general favourite the skylark, whose cheerful melody has been the theme of poets and lovers of nature for centuries. The strains of the skylark are characterised by Mr. N. Wood as "harsh, incoherent, and unmusical!" Again, "even considered as a song bird, I by no means think the skylark a fit object of the *bird fancier's fancies*, its song appearing to me *harsh and monotonous in the extreme.* It usually springs up from a clod of earth, rises to an immense altitude, hovers for a considerable time at the portals of heaven, and then slowly descends, generally in a perpendicular line, but sometimes in a slightly oblique manner, employing the wings less than in the ascent, leaving them motionless towards the close of the heavenward journey, expanding the tail, and at length alighting on the ground in a sloping manner, as with the pipits, in order to break the downward impetus which must necessarily have been acquired in descending from so great a height. One would imagine that all this was labour enough of itself; but our aerial chorister makes nothing of it, and, during the whole of the manœuvre, pours on the ravished earth a continuous strain of melody, frequently remaining a full hour on the wing. But, splendid a theme as this doubtless forms for the poet, I am far from willing to chime in with the unbounded and extravagant praise bestowed on the notes, on account of their supposed melody. If you go into the fields wholly unprejudiced, and devoid of any pleasurable associations (though I by no means wish to *deprive* any one of these), I think you will agree with me in considering them harsh and monotonous." This is the opinion of the author of the *British Song Birds*, who has included the

chirping sparrow amongst the birds of song: but I should imagine he will obtain but few converts. The joyous hilarity of spirit which appears to incite the rapid melodious lay of this bird in his upward course will never fail to excite admiration, and a reciprocal feeling of joy, in the bosom of the most "ordinary" (a favourite term of the author) of listeners. A child, who cannot be supposed to be influenced by associations, will listen with delight to the melody of the lark, which appears to shed a beam of happiness on his heart, as he earnestly gazes on the quivering wings that bear the bird higher and higher in the air above his head.

With respect to our author's observations on the caging of skylarks, on account of their upward flight, I would only observe, that, as he has no objection to "caging most of the individuals included in the warbler and finch families" (and it is well known that the individuals of the first-named family have an instinctive desire to leave this country when their peculiar food is no longer to be found here), his tender feelings towards the skylarks must be rather strained. It is surely as cruel to cage a bird that takes an extensive flight in migrating to a foreign country, as it is to preserve in confinement one that remains here the whole year. But, however we may sympathise with the caged skylark in being deprived of its freedom, yet I think it more desirable that the hard-working artisan and citizen should be familiar with the melody with which a beneficent Creator has endowed the birds of the air, than that the author's prejudice should prevail, in a city at all events. The skylark, with care and attention, as the author acknowledges, will sing as blithely, or nearly so, when in a cage, as in the open country, and will soon become contented with its lot.

It has been the custom of Mr. N. Wood to rob many poor birds of their eggs; in some instances to replace them by others of a different bird, and in others to place in the nest small stones, about the size of the eggs removed, covered with coloured paper, as an *experiment* on the natural sense of the bird. In some instances the author has succeeded in deceiving the bird, who has thus been made to expend its care and attention on the offspring of another; but, in others, the bird has been driven from its nest by the intrusion of the curious naturalist. Perhaps this might have been avoided, if the author had put in practice his favourite study of phrenology, and examined the bird's skull before he meddled with its teeming eggs. It is a high offence for a child to rob a bird of its eggs; but, when a *naturalist* does the same thing, the offence is overlooked. In the account of the woodlark, the

author states that he had observed a nest of this bird, built on a mossy bank in Sudbury Park; and, although labourers had constant occasion to pass quite close to the site of the nest, the bird never quitted her charge on such occasions. "This confidence," he continues, "was, however, but ill requited; for I one day found, much to my regret, that the nest had disappeared; and, on making enquiries, learned that it had been robbed by one of the labourers' children, who had certainly far better have been under the care of the village pedagogue, even though it had been to learn the Greek verb!" Another nest of the woodlark was *taken by the author himself:* there were five eggs in the nest; "and I regret," continues the tender-hearted naturalist, "that they were *so nearly ready to hatch* as to render it utterly impossible *to blow them.* It might have been imagined that the sympathies of our author had been excited towards the bereaved bird, by the circumstance of the eggs being so nearly ready to be hatched; but no, it was his own loss (for it appears that he was anxious to procure some of these eggs for his museum) that caused the deep regret. Another instance of cruelty practised by the author is related in the following words:— "In a large ivy-clad tree, in a garden behind a house belonging to a friend of mine, was found the nest of a chaffinch. I was in the habit of repairing to this little domicile every day, but, after about a week, discontinued my visits. One day, I went out shooting with my friend; and, seeing a bird on a tree, just within gun-shot, shot at it: it was a female chaffinch. Nothing was thought of this, and we walked on. A few days afterwards, I was informed that the male chaffinch had been found dead in the nest in the ivy tree. At first I was considerably surprised at this occurrence; but, recollecting that the female had been shot within fifty yards of the nest, it soon struck me that we must have killed the female that was sitting in the ivy tree; that her mate had waited on the nest, and, finding that she never returned, *pined to death.* The parent was perfectly stiff and dry, and had *four young birds under its outstretched wings.*"

These few observations may be sufficient to show that, whatever opinions the author may have given in his *Ornithologist's Text-Book*, on the works of others, his own compositions are open to criticism. His book is, however, an interesting book, and a useful one; and I trust that, ere a second edition appears, the author will feel it necessary to give it a careful revision, in order that it may be rendered more free from blemish, harsh taunts, and phrenological references.

ART. III. *Notice of the Arrival of Twenty-nine Migratory Birds in the Neighbourhood of Thetford, Norfolk; together with some of the scarcer Species that have been met with in the same Vicinity, during the Years* 1834 *and* 1835, *and the Spring of* 1836; *with Observations, &c.* By JOHN D. SALMON, Esq.†

*** The nomenclature made use of in this sketch is in accordance with that invaluable work, the *Illustrations of British Ornithology*, by P. J. Selby, Esq., 2 vols. 8vo, second edition, which ought to be in the library of every lover of natural history.

Systematic and English Names.	Dates when first observed.		
	1834.	1835.	1836.
Colúmba Œ'nas Linn., Stock dove -	Feb. 13	March 6	Feb. 14
Charàdrius Hiatícula Linn., Ringed plover	16	Feb. 5	15
Vanéllus cristàtus Meyer, Lapwing -	2	Mar. 13	March 4
Làrus ridibúndus Linn., Black-headed gull	March 9	15	15
Saxícola Œnánthe Bechst., Wheatear -	15	29	19
Œdicnèmus crépitans Temm., Norfolk plover	27	15	28
Motacílla flàva Linn., Yellow wagtail -		20	29
Tótanus óchropus Temm., Green sandpiper	April 14	4	27
Sylvia Tróchilus Lath., Yellow wren -	15	April 8	April 10
Cùculus canòrus Linn., Cuckoo - -	22	21	24
Charàdrius Morinéllus Linn., Dotterel (spring migration)	26	21	24
Hirúndo ripària Linn., Sand martin -	6	8	15
rústica Linn., Swallow - -	16	14	19
Salicària phragmìtis mihi, Sedge warbler -	24	24	May 9
Phœnicùra Ruticílla Swains., Redstart -	19	20	6
Cýpselus murària Temm., Swift -	26	May 1	11
Hirúndo úrbica Linn., Martin - -	27	15	11
Currùca cinèrea Bechst., Whitethroat -	24	3	5
Atricapílla Bechst., Blackcap warbler	19	6	10
Philomèla Luscínia Swains., Nightingale -	19	3	April 24
Saxícola Rubètra Bechst., Whinchat -	May 3	4	29
Muscícapa Grísola Linn., Spotted flycatcher	21	21	May 20
Yúnx Torquílla Linn., Wryneck -	5	April 18	9
Caprimúlgus europæ'us Linn., Fern owl -	23	May 21	28
Tótanus hypoleùcos *Temm.*, Common sandpiper	23	not seen	17
Tótanus hypoleùcos *Temm.*, Common sandpiper (autumn migration)	Aug. 12	Aug. 16	
Charàdrius Morinéllus Linn., Dotterel (autumn migration)	Sept. 2	28	
Charàdrius pluviàlis Linn., Golden plover	Nov. 3	Nov. 22	
Carduèlis Spìnus Steph., Siskin - -	1	Oct. 29	
Córvus Córnix Linn, Hooded crow -	Oct. 25	18	
Mérula pilàris Ray, Fieldfare - -	25	Nov. 2	

† A few copies have been printed, and privately distributed among the friends of the author.

Stock Dove (*Colúmba Œnas* Linn.), which in all works upon natural history is stated to be only an inhabitant of woods, abounds in this neighbourhood during the spring and summer months, upon our rabbit warrens and heaths, to which it annually resorts for the purpose of nidification; and it is, in general, the first that arrives in this district for that purpose. The situation which it selects for its nest differs materially from that chosen by its congeners, the ring and turtle doves (*C. Palúmbus*, *C. Túrtur*), the nests of which are always placed either upon trees or bushes: this species, on the contrary, occupies the deserted rabbit burrows upon warrens; it places its pair of eggs about a yard from the entrance, generally upon the bare sand, sometimes using a small quantity of dried roots, &c., barely sufficient to keep the eggs from the ground. Besides such situations, on the heaths it nestles under the thick furze bushes (*Ulex europæa*), which are impervious to rain, in consequence of the sheep and rabbits eating off the young and tender shoots as they grow, always preferring those bushes that have a small opening made by the rabbits near the ground. A few pairs occasionally breed in the holes of decayed trees: this is of rare occurrence in this district. It generally commences breeding by the end of March, or the beginning of April; the young ones, which are very much esteemed, being ready for the table by the commencement of June. Towards the end of October they all leave this neighbourhood, none remaining during the winter.

This species is decidedly not the origin of our common blue dovecot pigeon, as is clearly shown by Mr. Selby; it being deficient in the *double line of black across the wings, and the white rump*, which is the distinctive character of the rock dove (*C. Lívia Linn.*), and from which, in all probability, is derived the dovecot pigeon.

Ring Plover (*Charádrius Hiaticula* Linn.), better known here by the provincial name of *stonehatch*, is generally supposed to be a permanent resident, *breeding only upon or adjoining the sea coast.* In support of this opinion, in opposition to its migratory movements, the author of the *Feathered Tribes* says, "It is described as a bird migrating from the British shores to breed, in the edition of *Bewick's Birds*, dated 1832; where, as every body (save the common compilers of books, who most ingeniously contrive to know less, or less accurately, than any body else) knows, if the shores are adapted to its habits, it breeds in all parts of the coast from Kent to Shetland." Had this author investigated this subject more closely, he would have ascertained that a portion of these birds do migrate into the interior of the country at certain

seasons of year, as it is very abundant upon all our warrens during the breeding season, and is the first bird that gives us notice of its arrival in the spring, by its low plaintive whistle whilst on the wing, and garrulous note of satisfaction when it alights upon the ground. These notes are peculiarly pleasing at this early season of the year upon our warrens, where hitherto silence has reigned for several months, only interrupted by the occasional whistle of a flock of golden plovers as they sweep past you; but, as the season advances, its notes are too melancholy for the freshness of spring. It commences its nidification very early, as I have found them sitting upon their eggs on the 30th of March. It merely scrapes a slight cavity in the earth, at the bottom of which it sometimes places a number of small stones about the size of peas, upon which it deposits its four eggs; at other times upon the bare sand. I never saw a nest lined with grass, as stated to be the case by some authors. The old birds display great anxiety for the safety of their nest, more particularly when they have young ones; when they will employ all sorts of manœuvres, feigning lameness, &c., to draw the attention of intruders from them. After having reared their offspring, they all take their departure, by the middle of August, for the sea coast, where they remain throughout the winter.

Lapwing (*Vanéllus cristàtus* Meyer.)—This species does not remain with us during the winter months, generally making its appearance in the spring, in small flocks, which soon disperse themselves in pairs over the warren and adjoining fields, &c. They are at present tolerably numerous, although of late years very much decreased, in consequence of their eggs being so successfully gathered, to a very late period, during the breeding season, by persons who are adepts in discovering their nests. So expert have some men become, that they will not only walk straight towards the nest, which may be at a considerable distance, but tell the probable number of eggs it may contain, previously to inspection, generally judging of the situation, and number of eggs, by the conduct of the female bird; which, on being disturbed, leaves its eggs, and flies off to a considerable distance, without uttering any note of alarm. The male bird evinces great courage in the defence of the nest. Stationed upon a slight eminence in its vicinity, he no sooner espies a rook, hawk, or any bird, however large, approaching in the direction of his nest, than he immediately makes up to it, and, by a series of buffetings, compels it to alter its course. Towards the autumn, they assemble in flocks, when they leave this district. A white variety of this species, a female, has resorted to the warren

for the last two seasons, having the usual markings clearly depicted by light and dark shades.

Black-headed Gull (*Làrus ridibúndus* Linn.).—A colony of these gulls has for many years annually bred round a small piece of water at Stanford Warren, adjoining the road; and, in consequence of their eggs being very good to eat (being free from the fishy taste which is peculiar to all this genus that breed near the sea coast), they are collected for sale: this has, of late years, very much decreased their numbers; and, should this practice be carried to the same extent as heretofore, they will, in all probability, cease to resort to this locality. This bird ought to be especially protected for its invaluable services to the farmer: no one can have passed by a field that is being ploughed in the spring, without observing with what assiduity it follows the plough, picking up earth-worms, larvæ of the cockchafer, and other coleopterous insects, that may be exposed on the surface. The farmers in the neighbourhood of Scoulton, where there is a very extensive colony of these birds, have very properly estimated their value, they having made interest with the proprietor of the mere to discontinue gathering the eggs for this season. I understand that, on the 1st of June, it was calculated that not less than fifteen thousand young birds had already been hatched off, and with every probability of this number being doubled. The immense supply of aliment that would be required for the support of this numerous progeny would, of necessity, very much stimulate the exertions of the old birds in the acquisition of food, and, of course, to the destruction of every description of worm, insect, &c., in whatever stage they might be found. Although a few pairs arrive so early as stated in the table, it is several days before the main body makes its appearance; and then not to continue during the night, as they always leave on the approach of evening, for the first ten days or a fortnight, after which they remain throughout the night. The usual time of nidification is about the end of April, or the beginning of May: the nest, which is composed of withered grass and rushes, is loosely put together, and generally placed upon the tops of hassocks (*Càrex paniculàta*), that grow abundantly round the piece of water. The usual number of eggs is three in each nest: this is rarely, if ever, exceeded. About the middle of August, they take their departure; but, in consequence of the dryness of the two past summers, they have left a month earlier.

Wheatear (*Saxícola Œnánthe* Bechst.) is very abundant on the warrens, &c., during the breeding season, which commences generally by the beginning of April; it then usually

selects a deserted rabbit burrow, in which it places its nest at some little distance from the entrance: it is composed of dried roots intermixed with feathers, rabbit's down, and other light substances; and it generally contains six light blue eggs. The nest is easily detected by a little observation; for, in such situations, the old birds amass a considerable number of small pieces of the withered stalks of the brake (*Ptèris aquilina*) on the outside, at the entrance of the burrow: by noticing this circumstance its nest is sure to be discovered. They all take their departure, by the end of August, for the Sussex and Dorsetshire downs, where an immense number is annually caught for the London market, they being esteemed a great delicacy. It appears from Pennant, that the number of these birds annually ensnared in the neighbourhood of Eastbourne, Sussex, amounted to about 1840 dozens.

Norfolk Plover (*Œdicnèmus crépitans* Temm.) is very numerously distributed over all our warrens and fallow lands, during the breeding season, which commences about the second week in April; the female depositing her pair of eggs upon the bare ground, without any nest whatever. It is generally supposed that the males take no part in the labour of incubation: this, I suspect, is not the case. Wishing to procure for a friend a few specimens in their breeding plumage, I employed a boy to take them for me. This he did by ensnaring them on the nest; and the result was, that all those he caught during the day proved, upon dissection, to be males. They assemble in flocks previously to their departure, which is usually by the end of October; but, should the weather continue open, a few will remain to a much later period. I started one as late as the 9th of December, in the autumn of 1834.

Pied Wagtail (*Motacilla álba* Linn.).—A few pairs remain with us during the winter, which are considerably increased by arrivals in the spring. On the 7th of May, 1834, in the evening, I disturbed a flock of more than fifty individuals, from among a bed of reeds, on which they were roosting. I am not aware of having seen so many of this species congregated together before; and, from the circumstance of their being so collected, they had, in all probability, only recently arrived in this district. Its congener, the *Grey Wagtail* (M. *Boárula* Linn.), very sparingly visits us in the autumn, and remains during the winter months; but on the approach of spring it departs to the northward, for the purpose of nidification: whereas the *Yellow Wagtail* (M. *flàva* Linn.) arrives with us in the spring, although not very plentifully, and, after having performed this office, departs in the autumn.

Green Sandpiper (Tótanus *óchropus* Temm.). Although this

bird, which is here termed the summer snipe, is seen at intervals, from its appearance in the spring, throughout the summer months, frequenting the sides of our rivulets, ponds, &c., still its nest has never been met with in this neighbourhood, nor is there any authenticated account of its having been found breeding in this country, unless its eggs have been confounded with those of the snipe, which breeds in many of our fens and marshy grounds in this district. I have the following entries of disturbing this bird during the summer of 1835:—June 21st, a single bird; July 19th, a pair; July 29th, three pairs, all together; August 3d, a pair; and September 8th, a small flock of several individuals; and during the present spring, April 15th, 20th, 29th, and May 18th, only a single bird at each time. Judging from these circumstances, I suspect it breeds in our immediate neighbourhood. It is easily distinguished by its uttering a clear shrill whistle, and showing its white rump, which is very conspicuous when the bird is flushed.

Lesser Pettychaps (*Sylvia Hippolàis* Lath.) and *Wood Wren* (*S. sibilàtrix* Bechst.) are both decidedly very rare in this immediate neighbourhood. I have neither seen nor heard a single individual of the former during the two past summers; and I have only met with one instance of the latter within the same period, and that at Shadwell Lodge, on the 19th of June, 1835, when I discovered a pair of old birds feeding a nest of young ones.

Dotterel (*Charàdrius Morinéllus* Linn.) does not breed with us, although it annually arrives in small flocks on our warrens and heaths in the spring, but has of late years very much decreased in number, in consequence of the incessant persecution it undergoes from our gunners during the short period it remains, which generally does not exceed three weeks or a month, after which it takes its departure northward for the purpose of nidification, which hitherto has not been supposed to be in this country. "At a meeting of the Members of the Zoological Society, held in January last, Mr. Yarrell presented a case of dotterel, containing a pair of old birds, one young one, and an egg: they were taken from the Skiddaw Mountain, last summer, by T. C. Heysham, Esq., of Carlisle." This interesting fact clearly proves that, at any rate, a few pairs, if not the whole body that visits us in the spring, do remain to breed in this country; and I have no doubt, when the Grampians, and other like situations, are thoroughly examined by practical ornithologists, it will be found breeding there also. This species, during its autumnal migration, again makes its appearance in this district about the end of

August, or the beginning of September. After remaining a short period, they depart to climes more congenial to their habits.

Reed Warbler (*Salicària arundinàcea* mihi) rarely visits this district. I have only met with it near Euston Bridge, amongst the reeds adjoining the river; from which I took a most beautiful nest, suspended between four reed stalks, and containing four eggs, on June 30th, 1834. Since that time, I have not seen this bird in that locality. The *Grasshopper Warbler* (*Salicària Locustélla* mihi) is totally unknown in this neighbourhood.

Lesser Whitethroat (*Currùca gárrula* Briss.).—Although not inserted in the preceding list, this is most certainly one of our spring visitants; as two nests of this species, taken in the neighbourhood, were brought to me last summer; but, from its retired habits, I am not able to state the precise periods of its arrival, which, in all probability, do not vary materially from that of the whitethroat (*C.* cinèrea *Bechst.*). I cannot state anything with certainty relative to the *Garden Warbler* (*Currùca hortènsis* Bechst.), as not a single specimen of this species that has been captured in this neighbourhood has come under my notice; and I imagine that, from some local circumstance, it does not visit this district.

Common Sandpiper (Tótanus *hypoleùcos* Temm.).—Like the dotterel, it only visits us during its periodical migrations; but it is not so numerous, as we rarely see more than a pair or two in the spring: these remain but a very few days before they take their departure for their breeding haunts, and return for a short period, in the autumn, in small flocks of about half a dozen individuals.

Redwing (*Mérula iliaca* Ray).—Although its congener, the fieldfare, visits us in large flocks throughout the winter, I have not been able to detect this species among them; and, therefore, I presume it is not a periodical visitant in this neighbourhood.

Ring Ousel (*Mérula torquàta* Ray).—A solitary specimen of this unusual visitant in this district was shot at Brandon, April 26. 1834.

Snow Bunting (*Plectróphanes nivàlis* Meyer).—A flock of fifty individuals visited our warren on the 18th of November, 1834, but remained for a very short period: many of them had already assumed their winter dresses.

Cinereous Sea Eagle (*Haliæ'etus Albicílla* mihi).—[A very fine specimen, but in the plumage of the Fálco Ossífragus of authors, was shot at Buckenham, on the 6th of December, 1834: It weighed 9 lb., and measured 3 ft. from the

point of the bill to the extremity of the tail, and 7 ft. 2 in. from tip to tip of the wings. It appears that all the individuals previously noticed as having been captured in this and the adjoining county (Suffolk) were taken during the months of December and January, and invariably with immature plumage. From this circumstance, and in the absence of any notice of the capture of an adult bird, I suspect that the young birds alone are migratory, and that this noble bird, when in perfect plumage, is of rare occurrence in this part of the country.

Bohemian Waxwing (*Bombycílla gárrula* Bonap.).—A specimen of this most beautiful bird was shot at Snare Hill on the 12th of January, 1835; and on the 21st another individual was taken here; and during the following week three other specimens were captured in the neighbourhood. Their crops were full of haws (*Cratæ`gus Oxyacántha*). From the accounts in the papers at that time, it appears that several individuals were captured in various parts of the county, more particularly towards the sea coast, where eight or nine were shot in the neighbourhood of Burnham. I have no doubt that their visit to this part of the country was owing to the severe and stormy weather which then prevailed, and which, in all probability, drove them out of their usual line of migration.

Rough-legged Buzzard (*Bùteo Lagòpus* Flem.).—A very fine female of this species was caught upon the warren on the 17th of February, 1835. It weighed 2½ lb., and measured 22 in. in length; the breadth from the extremity of each wing was 4 ft. 6 in.; the irides were inclining to a *brownish* yellow, rather than a *gamboge* yellow, as stated by Mr. Selby. On the 10th of April following, a male bird of this species was trapped in the same locality, not differing very materially, as to weight and size, from the female; but the plumage was generally much lighter.

Peregrine Falcon (*Fálco peregrìnus* Linn.).—Several specimens of this species have been annually caught, during the months of February and March, upon the warren, where they commit great havoc amongst the rabbits. The majority of those caught have been females, and in an immature stage of plumage; and, from their periodical arrivals at this season of the year, this species must be migratory with us, as none, of course, remain to breed in this neighbourhood.

Shoveller (*Spathùlea clypeàta* Flem.).—A pair of this most beautiful species of duck has hitherto annually bred amongst some green rushes on the warren at Stanford.

Hoopoe (*U`pupa E`pops* Linn.).—A specimen of this rare and beautiful bird was killed at Riddlesworth, on the 28th

of August, 1835, but, unfortunately, too much injured to be preserved.

Bittern (*Botaùrus stellàris* Steph.). — During the three past winters, two or three specimens of this bird have been annually captured. It is considered a bird of rare occurrence, although formerly rather plentiful in this district. But little appears to be known of its nidification, as there is no authenticated account of its nest having been found in this country of late years.

Ash-coloured Shrike (*Lànius excùbitor* Linn.). — A fine male specimen of this rare winter visitant was shot in the month of February, 1836, at Buckenham, in this neighbourhood. Although a few pairs of the *Red-backed Shrike* (*L. Collùrio* Linn.) annually visit this neighbourhood in the spring, for the purpose of nidification, yet it must be considered of rare occurrence, as I saw one pair only last summer, and during the present season I have not seen a single individual.

Great Bustard (*Otis tárda* Linn.). The last instance recorded of this noble bird's having been seen in this district was in the autumn of 1832. Since that period, it seems to have totally deserted this neighbourhood. There can be but little doubt that, ere long, this bird will share the fate of the pride of the north, the capercalzie (Urogállus vulgàris *Flem.*), which has for many years become extinct in that part of the country.

Fern Owl (*Caprimúlgus europæ`us* Linn.). — An individual residing in this town succeeded in rearing a pair of these birds from the nest, and carried them through the winter in perfect health, until the April following, when they were disposed of. They were fed principally with bread soaked in milk, and occasionally a fly, or any other insect that could be procured. They never attempted to take their food alone, but had to be fed by hand. When food was offered them they made a sudden dart, so as almost to swallow the finger and thumb.

Thetford, June, 1836.

ART. IV. *Notice of a Congregation of Moths found in the Interior of a Tree of the False Acacia* (*Robínia Pseùd-Acàcia* L.). By J. O. WESTWOOD, Esq., F.L.S.

EXCEPT in those species of insects which retain their social qualities throughout their whole existence (and in which we find a sexual modification taking place in a great body of the community, so as to fit them for performing the social duties of the assembly, by at the same time unfitting them for the

necessary cares originating in the education of their own offspring, or, at least, in the preliminary duties of coupling and depositing of eggs), there are very few instances recorded in which the sociality of insect life continues longer than the early portion of the larva state; and the reason of this is very obvious: in the former, food is obtained from a distance, not by the objects themselves which are benefited thereby, but by the winged neuters; whereas in the latter, where the insects are compelled to seek their own food, the supply in the immediate vicinity of a brood is soon consumed; and then each insect, goaded by its own urgent wants, which supersede the mere circumstance of its having been reared from an egg placed in immediate conjunction with a mass of other eggs, becomes its own provider, and finds its way to the most congenial spot. But this is not the universal case, since there are many caterpillars which have the instinct to enclose themselves in a common awning of silk, and in which they remain for a great length of time, making excursions to various parts of the tree or plant upon which they are found.

In respect, therefore, to the circumstances connected with their social habits, insects found associated together may be divided into two groups: —

1. Those in which the duties of the community consist in the education of the young progeny; these duties being performed by neuters.

2. Those in which the only social tie consists in a community of habitation, and in which a share of the duty of constructing such habitation falls upon each individual.

In the first of these groups we find, as might be at once expected, a more perfect moral economy, if we may employ such a term; the habitation being generally of a most beautiful and regular construction, and the cells in which the young are placed and educated, contiguous to each other, and *generally closed*. This latter circumstance will be sufficient to show that the insects, during their early states, must necessarily be confined, and incapable of any thing else than a kind of preparation for a social state, being reared in the midst of their future associates; and for this end we find an adaptation of structure possessed by these immature insects: being destitute of legs, they are unable to make any escape from the place of their birth until their acquirement of organs of flight. In the second group of social insects the reverse of all this takes place: for the very support of the community, it is requisite that each individual should, throughout the continuance of its social state, be provided with locomotive organs, without which, of course, it would be impossible for it to assist in the construction and

maintenance of the common abode. But the possession of these locomotive organs by insects which, nevertheless, remain confined to a single "local habitation," although unfettered by cares for a future offspring, indicates, as it appears, an equally strong propensity towards sociality with the insects of the former group: and this brings to our notice another feature in the economy of these social species of insects; namely, that, whilst the social principle is not exhibited by the insects of the former group until their arrival at the imago state, it is observed in the individuals of the latter group only during their preparatory states. It must be borne in mind, however, when treating of social insects, that there are many species which are found in great swarms without any common tie. Thus the vast armies of locusts, the sportive clouds of gnats and midges, or the whirling assemblies of the Gyrìnus natàtor, exhibit a species of sociality, but of a very slight nature. Born in the same locality, and having no other object than obtaining a supply of food, or performing the great object of their existence, these insects may be dismissed from our notice, as may also the species composing the former group, of which such ample details are given in those parts of the works of Reaumur, Kirby and Spence, &c., which relate to the ants, wasps, hive bees, humble bees, &c.

Of the insects which associate together, in their preparatory states, for the construction of a common abode, many are of very common occurrence. The webs of the caterpillars of the lackey moth (Clisiocámpa *Neùstria*) may be mentioned as affording a good example of this kind of sociality. These handsome caterpillars are very voracious, and the numbers of individuals composing one of their assemblies contrive, in a few days, to strip the branches of our fruit trees of their leaves. They continue to reside in society, and to increase the size of their nest until full grown: but here their sociality ceases; each departs, and selects a distant situation for undergoing its change to the pupa state; and the same proceeding is adopted by the majority of tent-making caterpillars, such as the gold-tail moth (Porthèsia chrysorrhæ`a) and brown-tailed moth (P. auríflua), &c.

It is, however, of very rare occurrence, that, in this group of social insects, the pupæ are gregarious; or rather, perhaps, more properly speaking, that the caterpillars do not, previously to assuming the pupa state, quit the common abode. Reaumur, indeed, tells us, in his account of the caterpillars of the processionary moth, "C'est dans leur nid que ces chenilles doivent perdre leur forme et devenir chrysalides;" and that

those of the Yponomeùta Evonymélla, the very common little ermine moth, construct their cocoons "à un des bouts de leur dernier nid." In the first part of the *Transactions of the Entomological Society*, I have published an account of a gregarious species of Mexican butterfly, in which the chrysalides are arranged within the nest formed by the caterpillars, and which very nearly resembles that of some of the wasps; and in a memoir upon the pomegranate butterfly of the East Indies, not yet published, I have shown that the chrysalides are placed in society inside the fruit, although the larva must, immediately previously to assuming that state, have made its way to the outside of the fruit, and then returned. But the following particulars, communicated to me by Mr. Denson, relate to a species of moth which not only retains its gregarious habits during the caterpillar and pupa states, but also arranges its cocoons so compactly together, that it seems difficult to imagine how the moths, on arriving at the perfect state, could make their escape. Mr. Denson forwarded to me a mass of spongy-looking matter, wrapped in a piece of paper, in which a number of dead moths were also enclosed. The former measured about 5 in. in length, and 2½ in. in diameter. It was discovered in May, 1835, in a locust tree, or common, or false, acacia (Robín*ia* Pseùd-*Acàcia L.*), which stands upon the lawn in the private botanic garden of Mrs. Canham (formerly of Isaac Swainson, Esq.); and Mr. Castles, the curator of the garden, by whom it was found, thinks that the tree may be 70 or 80 years of age. It is in the condition of life and growth mixed with decay and disease. At the base of the stem, at a point of aspect nearly north-west, is a largish opening to a hollow in the tree, which extends up the stem for more than a foot from the ground; and the wood of the interior of the tree, which bounds the hollow, is in a decayed state. It was in this hollow, and at about one foot from the bottom, and attached or contiguous to the decayed wood of the tree, that two masses were found, the one above described being the larger of the two. Mr. Castles broke the smaller mass open, and found it to contain chrysalides. The latter he preserved entire, and from it the moths subsequently burst forth. On opening the larger mass, a very great number (between 200 and 300) of cocoons, containing the exuviæ of chrysalides, were found closely packed together, each being about an inch long. These cocoons were not arranged in order, some being transversely, and others longitudinally placed. The chrysalis is of the ordinary conical form. The moth is the Ilithyìa Latr. sociélla *Linn.*, a

species of comparative rarity, and which differs so much in the sexes, that the females were considered as a distinct species by Linnæus, which he named Colonélla; both names evidently evincing his acquaintance with their social habits. The caterpillar is stated to feed on honey in the nest of the humble bee (Bómbus lapidárius) and its allies; and, hence, it is not improbable that the congregation of moths discovered by Mr. Castles had entirely destroyed and usurped the place of a nest of the humble bee. I have seen a nearly similar compact congregation of the cocoons of the honey moth (Gallèria cereàna), which feeds in the hive of the honey bee, subsisting upon the honey.

ART. V. *On the Solar Eclipse of May* 15. 1836; *with Observations upon the attendant Phenomena.* By J. G. TATEM, Esq.

I HAD indulged the hope that some one of your astronomical correspondents would have given to your readers the report of his observations of the solar eclipse which happened on the 15th of May last; which, as it approached nearer to total obscuration than any that has occurred for some years, and was, in some places, annular, has excited considerable interest. In the absence of others, I have forwarded the notes made by myself, trusting it may induce other observers, more competent, to favour us with their remarks.

My attention was chiefly directed to the reduction in the temperature, the decrease of light, and the effects produced upon animal and vegetable nature. The exact moment of the moon's shadow entering upon the sun's disc I did not see, having left the garden in consequence of some light clouds collecting and obscuring the sun. On my return, at 1 h. 51 m., the clouds were dispersed, and I found the eclipse had begun, the barometer being then at 30° 28′, and the thermometer, in the shade, standing at 70° 50′. The sky was then perfectly clear. Between 2 h. 20 m. and the period of the greatest obscuration, 3 h. 20 m., a thermometer, placed so as to receive the direct rays of the sun, had fallen from 78° to 65°. At 3 h. 30 m. this thermometer began to rise, and continued rising until the eclipse was over, when it stood at 73° 50′. The thermometer in the shade fell only 3°, and remained very steady. The barometer was but little affected, the depression being but one hundredth of an inch. It is not a little extraordinary, that the fall in the thermometer above stated, of 13°, exactly coincides with the one noticed by the late Mr.

Adams, of Latymer's School, Edmonton, in 1820, when the sun was eclipsed, on the 7th of September, and is referred to by his son and successor, Mr. Charles Henry Adams, in his letter respecting the late eclipse, and published in the *Literary Gazette* on the 14th of May. Now, it would be very satisfactory to learn, from other observers, whether such a change of temperature was noticed by them; and, should the same variations be found to occur during future eclipses, it might give reason to conclude that such a reduction of temperature always takes place at the greater eclipses of the sun.

Much disappointment was very generally experienced at the trifling decrease of light, many persons having anticipated a degree of darkness approaching almost to that of night; instead of which, small print might be read in rooms on the northern side of the house with the utmost ease. The greatest change produced by the eclipse, connected with light, was the peculiar tinge given to every object: a thin haze appeared to fill the air; but it would be difficult to describe the colour of the light, in which grey, faint purple, and pale orange seemed to be blended; and persons looking towards the sun appeared, to those standing in an opposite direction, of a ghastly or cadaverous hue. The planet Venus was seen by the naked eye; and the darkness was sufficient to cause the domestic poultry to retire to roost, and the rooks to return home: but all sallied forth again when the eclipse was ended and the gloom had disappeared. The tulips closed their cups; but they did not open until the next morning. Seldom has an eclipse been seen under more favourable circumstances, the sky being free from clouds during the whole time.

Wycombe, August 19. 1836.

ART. VI. *Observations on the Causes which occasion the Variation of Temperature between Spring and River Water.* By J. R.

THE difference in temperature between river and spring water, which gives rise to the query of your correspondent Indigena (p. 491.), may be the result of many causes, the principal of which is, however, without doubt, the interior heat of the earth. It is a well known fact, that this heat increases in a considerable ratio as we descend, making a difference of several degrees between the temperature of the earth at its surface, and at depths of 500 or 600 ft.; raising of course, the temperature of all springs which have their source at even moderate depths, and entirely securing them

from the effects of frost, which, it is well known, cannot penetrate the earth to a greater depth than 3 or 4 ft.

Many instances might be given of the strong effect of this interior heat. The glaciers of the Alps, for instance, frequently cover an extent of three or four square leagues, with a mass of ice 400, 500, or even 600 ft. deep; thus entirely preventing the access of exterior heat to the soil; yet the radiation of heat from the ground itself is so powerful as to dissolve the ice very rapidly, and to occasion streams of no inconsiderable size beneath the ice, whose temperature, in summer, is, I believe, as far as can be ascertained, not many degrees below that of streams exposed to the air; and the radiation of heat from the water of these streams forms vaults under the ice, which are frequently 40 ft. or 50 ft. above the water; and which are formed, as a glance will show, not by the force of the stream, which would only tear itself a broken cave sufficient for its passage, but by the heat which radiates from it, and gives the arch its immense height, and beautifully regular form.

These streams continue to flow in winter as well as in summer, although in less quantity; and it is this process which chiefly prevents the glacier from increasing in size; for the melting at the surface is, in comparison, very inconsiderable, even in summer, the wind being cold, the sun having little power, and slight frosts being frequent during the night. It is also this melting beneath the ice (subglacial, suppose we call it) which loosens the ice from the ground, and occasions, or rather permits, the perpetual downward movement, with which

> "The glacier's cold and restless mass
> Moves onward day by day."

But more forcible and striking evidence is afforded by experiments made in mines of great depth. Between 60 ft. and 80 ft. down, the temperature of the earth is, I believe, the same at all times and in all places; and below this depth it gradually increases. Near Bex, in the Valais, there is a perpendicular shaft 677 ft. deep, or about 732 ft. English, with water at the bottom, the temperature of which was ascertained by Saussure. He does not tell us whether he used Reaumur's or the centesimal thermometer; but the result of his experiments was this:—In a lateral gallery, connected with the main shaft, but deserted, and, therefore, unaffected by breath or the heat of lamps, at 321 ft. 10 in. below the surface, the temperature of the water and the air was exactly

the same, $11\frac{1}{2}°$; or, if the centesimal thermometer was used, $52\frac{4}{5}$ Fahr.; if Reaumur's, $57\frac{1}{6}$ Fahr.

In another gallery, 564 ft. below the surface, the water and air had likewise the same temperature, $12\frac{1}{2}°$, either $54\frac{1}{2}$ or $60\frac{1}{4}$ Fahrt. The water at the bottom, 677 ft., was 14°, $57\frac{1}{2}$ or $63\frac{1}{4}$ Fahr. The ratio in which the heat increases, therefore, increased as we descend; since a difference of 113 ft., between the depth of the bottom of the shaft and the lowest gallery, makes a greater difference in temperature than the difference of 243 ft. between the lowest and upper gallery. This heat is the more striking, when it is considered that the water is impregnated with salt: indeed, Saussure appears inclined to consider it accidental, perhaps occasioned by the combustion of pyrites, or other causes in the interior of the mountain. (*Voyages dans les Alpes*, tom. iv. c. 50.) All experiments of this kind, indeed, are liable to error, from the frequent occurrence of warm springs, and other accidental causes of increase in temperature. The water at the bottom of deep lakes is always found several degrees colder than the atmosphere, even when the water at the surface is warmer: but this may be accounted for by the difference in the specific gravity of water at different temperatures; and, as the heat of the sun and atmosphere in summer is greater than the mean heat of the earth at moderate depths, the water at the bottom, even if it becomes of the same heat with the earth, must be colder than that at the surface, which, from its exposure to the sun, becomes frequently warmer than the air. The same causes affect the temperature of the sea; and the greater saturation of the water below with salt renders it yet more susceptible of cold. Under currents from the poles, and the sinking of the water of low temperature, which results from the melting of the icebergs which float into warmer latitudes, contribute still farther to lower the temperature of the deep sea. If, then, the temperature of the sea at great depths is found not many degrees lower than that at the surface, it would be a striking proof of the effect produced by the heat of the earth: but I am not aware of the results of the experiments which have been made on this subject.

We must, then, rest satisfied with the well-ascertained fact, that the temperature of the earth, even at depths of a few feet, never descends, in temperate latitudes, to the freezing point; and that at the depth of 60 ft. it is always the same; in winter much higher, in summer considerably lower, than that of the atmosphere. Spring water, then, which has its source at a considerable depth, will, when it first rises, be of

this mean temperature; while, after it has flowed for some distance, it becomes of the temperature of the atmosphere, or, in summer, even warmer, owing to the action of the sun, both directly, and reflected or radiated from its bottom. Besides this equable temperature in the water itself, spring or well water is usually covered; and, even if exposed, if the well is very deep, the water will not freeze, or at least very slightly; for frost does not act with its full power, except where there is a free circulation of air. In open ponds, wherever bushes hang over the water, the ice is weak. Indigena's supposition, that there are earthy particles in river water, which render it more susceptible of cold than spring water, cannot be true; for then the relative temperatures would be the same in winter and in summer, which is not the case; and, besides, there are frequently more earthy particles in mineral springs, or even common land springs, than in clear river water, provided it has not been fouled by extraneous matter; for it has a tendency to deposit the earthy particles which it holds in suspension.

It is evident, also, that the supposition of Mr. Carr (Vol. V. p. 395.) relative to anchor frosts, that the stones at the bottom acquire a greater degree of cold, or, to speak more correctly, lose more heat, than the water, is erroneous. J. G. has given the reasons at p. 770.; and the glaciers of Switzerland afford us an example. When a stone is deposited on a glacier of any considerable size, but not larger than 1 ft. or 18 in. in diameter, it becomes penetrated with the heat of the sun, melts the ice below it, and sinks into the glacier. But this effect does not cease, as might be supposed, when the stone sinks beneath the water which it has formed: on the contrary, it continues to absorb heat from the rays of the sun, to keep the water above it liquid by its radiation, and to sink deeper into the body of the glacier, until it gets down beyond the reach of the sun's rays; when the water of the well which it has formed is no longer kept liquid, and the stone is buried in the ice. In summer, however, the water is kept liquid; and circular wells, formed in this manner, are of frequent occurrence on the glaciers, sometimes, in the morning, covered by a thin crust of ice.

Thus, the stones at the bottom of streams must tend to raise, rather than lower, this temperature. Is it possible that, in the agitation of a stream at its bottom, if violent, momentary and minute vacua may be formed, tending to increase the intensity of the cold?

Herne Hill, Sept. 2. 1836.

ART. VII. *Abstract of a Paper read before the Members of the British Association at Bristol, August* 26. 1836, *entitled "On some Fallacies involved in the Results (relating to the comparative Age of Tertiary Deposits) obtained from the Application of the Test recently introduced by Mr. Lyell and M. Deshayes."* By EDWARD CHARLESWORTH, Esq., F.G.S.

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

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

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

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

The author next enters upon an enquiry respecting the course which should be adopted, in obtaining the relations of analogy presented by the fossils of different deposits to one another, or to the races in existence at the present period. The effect of the method now made use of is, to class as con-

temporaneous those deposits which respectively furnish the same per-centage of extinct forms, without the slightest reference to the greater or less degrees of approximation which these forms exhibit when compared with living types. The conchologists who agree with Dr. Beck cannot, by means of the per-centage test, express the difference in the amount of approximation presented by the testacea of the crag and London clay to those now existing, because they would consider all the fossils of both these formations extinct, and, consequently, refer them both to the *eocene* division.

In this instance, the relations of analogy can only be obtained by a general estimate of the amount of resemblance borne to existing species by the entire series of crag or London clay fossils, taken collectively. This mode of procedure may, at first, appear only a different adaptation of the numerical plan adopted by Mr. Lyell. It will, however, be found an important modification of his principle; for, when applied to the fossils of those formations which, from the presence of living species, can also be subjected to the per-centage test, it will, under some circumstances, furnish results that clearly establish a fallacy in one of the two methods. For instance, Deshayes finds that the fossils of the red and coralline crag contain equal proportions of extinct species, and consequently, if tried by the per centage test, these separate deposits present an equal degree of approximation to the Testàcea now inhabiting the German Ocean. But, taking Dr. Beck as the authority, the per centage test cannot be applied, and these fossils are, therefore, examined with reference solely to the totality of analogy which each entire series presents. Now the forms *most remote* from existing species occur in the coralline crag; this bed will, therefore, appear the older.

The author then changes his line of argument, and, assuming that there is a general agreement among conchologists as to the characters which should be depended upon in discriminating species, and also that the per-centage test is the true method of obtaining relations of analogy, he proceeds to enquire whether the association of organic remains in fossiliferous deposits implies their previous contemporaneous existence. The evidence drawn from this source appears to the author to be by no means so conclusive as it has been generally considered; and his opinions have been formed principally from an attention to the causes now in operation upon the earth's surface.

* "The small portion of this island occupied by the crag formation is intersected in one spot with several estuaries,

* The portion between inverted commas is given at full length.

which have completely removed this generally superficial fossiliferous stratum, the bed of the estuary being formed in an older formation. Along the banks of the Deben, which flows through a part of the coralline crag, in some spots the fossil shells line the shore in greater numbers than the recent Testàcea; and, during the period in which this estuary has been formed, prodigious numbers of these fossils must have been swept down into the German Ocean, and there indiscriminately mingled with the *reliquiæ* of existing species of Mollúsca. It is not merely the extent of surface at present occupied by these estuaries which has thus been denuded of the crag; considerable tracts of marsh land formerly connected with them, but from which the water has since been shut out, have also lost this original covering. Within a very short distance of the Deben, another estuary, the Stour, flows through a lacustrine deposit belonging to the *newer pliocene period;* and here, in addition to the shells, is a considerable stratum of mammalian remains, which at one period evidently extended as far as the opposite bank of the river, a distance of about a mile and a half or two miles.

"I must now look forward some few thousand years, and anticipate the time when, by the recession of the sea, or the elevation of the land, the deposit forming at the mouths of these estuaries has become accessible, and is made the subject of geological investigation. I must also assume that the geologists of that remote period have followed the same course of induction that has recently been pursued, and have arrived at similar conclusions respecting the course to be adopted in ascertaining the relative antiquity of tertiary deposits. The age of the formation in question is about to be tested by comparing its organic remains with the *then existing species*. Of what will these fossils consist, and whence will they originally have been derived? The bones of such animals as are now drifted down the rivers Deben and Stour will be mingled with those of the extinct Mammàlia of the *newer pliocene period*. The living species of Mollúsca now inhabiting the German Ocean will be found associated with the extinct Testàcea of the *newer pliocene*, *older pliocene*, and perhaps even *miocene*, epoch. Yet this deposit, in which the organised beings of different geological periods shall be found thus indiscriminately mingled, will be one exhibiting every appearance of regular stratification; a deposit in which a large proportion of Testàcea will be found naturally grouped, and in which there will be the clearest evidence of their having become entombed on the spot which they had long previously inhabited. That the influence of causes now in operation is

really producing such an effect as the one just described, admits of almost actual demonstration; for the fossil shells of the crag are thrown up along various parts of the Suffolk coast, several miles from the spots in which they have been carried down.

"It may be said that these older shells, entering into the new deposits, carry with them evidence of the stratum from which they have been derived; or that, at all events, their worn appearance would distinguish them from the more recent Mollúsca with which they are associated. This is so far from being the case, that considerably finer and more perfect specimens of the Volùta Lambérti can be picked up on the sea shore, where they have been dashed by the waves upon a shingly beach, than can ever be obtained from the beds of the crag formation itself. In fact, this gradual process of degradation appears, in many instances, to be of all others the most favourable for detaching organic remains from the matrix in which they are embedded; and, with respect to the evidence that might possibly be supposed to arise from a difference in lithological character, it should be remembered, that, even if such indications did exist, by the time these new deposits become accessible, every vestige of the crag will have disappeared. There will, consequently, be nothing to excite the slightest suspicion that the crag species are not contemporaneous with all the organic remains associated with them. In adopting this line of argument, I am, of course, supposing that the geologists of a future epoch have the same amount of information respecting the history of the tertiary deposits of those days that we have of our own, and not that a geological record of events has been continued up to that period.

"To a certain amount, then, this admixture of fossil with recent shells, even in regularly stratified deposits, cannot be denied; but it may be urged that it takes place only under peculiar circumstances, and to such a limited extent as would never interfere with the accuracy of general inductions founded upon extended research and careful practical observation.

"If, however, we enlarge our field of observation, we shall find that a process has been going forward, attended with similar results, over a tract the superficial extent of which far exceeds that occupied by the whole of the crag formation. The bed of the ocean, all along the coasts of Norfolk, Suffolk, and Essex, and probably as far as Kent on the one side, and Yorkshire on the other, is strewed with multitudes of the bones of extinct Mammàlia. These remains have been taken up twenty miles from the shore; and, in dredging for oysters, the fishermen have suffered considerable inconvenience

from the number of elephants' bones and teeth which become entangled in their nets. Mr. Woodward supposes that the grinders of at least 500 elephants have been fished up off the oyster-bed at Happisburgh *; and, from the numbers which I have seen, I have no reason to think this calculation is exaggerated. I do not now propose enquiring whence this prodigious accumulation of fossils has been derived, or to what geological epoch they should be referred: it is sufficient for my present purpose to feel satisfied that they are the remains of beings belonging to a remote era, which are becoming entombed, covered with the balani and zoophytes that now inhabit the German Ocean. These are facts which, I presume, will not be disputed; and yet so entirely has the operation of existing causes in this respect been overlooked, that Mr. Lyell fully concurs in the assumption that, in undisturbed stratified deposits, the embedded organic remains must necessarily have existed contemporaneously; and, upon this evidence solely, important conclusions have been formed respecting the bones of elephants, associated with the shells of existing species of Mollúsca, in a deposit in Yorkshire." †

The next point adverted to in the paper is the presence of *secondary* fossils in the *upper* or *red crag*. During the formation of this deposit, causes similar to those now in existence appear to have been in operation; and effects have there been produced which exactly correspond with the author's deductions, as to the nature of the formations at this time in progress round some parts of the British coast.

This introduction of secondary shells in the tertiary beds of Norfolk and Suffolk has been detected solely by an attention to lithological characters; and the evidence derived from this source is no longer available, when there is reason to suspect an admixture of organic remains belonging, *exclusively*, to rocks of the supra-cretaceous series.

The species which are *common* to the chalk and red crag are very few, when compared with those which are common to the *red crag* and to the subjacent *tertiary* strata. In the latter case, however, we have no means of ascertaining whether these individual species which occur in separate formations

* A village on the Norfolk coast, between Cromer and Winterton.

† "That these quadrupeds, and the indigenous species of Testàcea associated with them, were all contemporary inhabitants of Yorkshire (a fact of the greatest importance in geology), has been established by unequivocal proofs, by the Rev. W. V. Vernon, who caused a pit to be sunk to the depth of more than 200 ft. through *undisturbed* strata, in which the remains of the mammoth were found embedded together with the shells, in a deposit which had evidently resulted from tranquil waters." (*Lyell's Geology*, vol. i. p. 96. edit. 1.)

existed throughout distinct periods, or, like the fossils of the chalk, were, by the natural process of degradation, removed from their original matrix, to be again entombed with the races of a more recent epoch. Unless this difficult problem be solved, it is clear that the application of the per-centage test may be attended with the most fallacious results. To what extent erroneous conclusions may already have been formed, from the general neglect of those considerations so obviously necessary in the examination of the *crag*, must be a subject for future investigation.

The author lastly notices some questions which have already been discussed, by Professor Phillips, in the *Encyclopædia Metropolitana*.* The most important of these is, the physical relation existing between any one fossiliferous deposit, and the locality in which the living types of its fossil species occur.

ART. VIII. *Short Communications.*

THEORY of Lamarck, "*Vis formativa*," *&c.*—Almost all our English naturalists imagine that they exhibit great piety in abusing that greatest of French naturalists, Lamarck. He is, in particular, condemned in the *Bridgewater Treatises*, for ascribing the production of new structures in animal bodies "to a new want, which continues to stimulate, and to a new movement which that want produces and cherishes." Now, the venerable Mr. Kirby, whose orthodoxy few can doubt, indulges this very same notion; for, in his *Bridgewater Treatise*, vol. ii. p. 40., he says, "We have seen the same tendency in the Annelidans to approach or imitate terrestrial forms, as if the marine and aquatic animals were anxious to quit their fluid medium, and to become inhabitants of the dry land. The animal living on shore and in the woods at St. Vincent, taken for a molluscum by Mr. Guilding, appears almost like a creature that had succeeded in such an attempt!" Now, I ask if Lamarck himself could have expressed himself more strongly in favour of a "vis formativa?" I trust, therefore, that this admirable naturalist, although a Frenchman, will henceforward be mentioned in terms indicative of better taste, and more *Christian charity*, than our English naturalists have hitherto shown on the subject. If Mr. Kirby says, as no doubt he will say, that it is a mere "façon de parler," and that he meant to insinuate nothing against the power of the Creator; surely, the detractors of poor Lamarck ought to allow the same excuse for a person who unfortunately cannot now defend himself. — *An Admirer of Lamarck.*

* See art. Geology.

[We strongly recommend our correspondent to read the whole of Mr. Kirby's *Bridgewater Treatise;* for, without meaning to pass any opinion upon the general merits of the work, we feel sure that he may acquire from its perusal such a quantum of information as will prevent his again confounding the "vis formativa" of Lamarck, with the relations of analogy exhibited throughout various groups in the animal kingdom to one another. — *Ed.*]

Birds.—*Nests of the Woodcock in England.*—Ornithologists have for some time been convinced of the fact, that the common woodcock occasionally breeds in England; but the instances have been rare, and, generally, a single pair of birds, without others in the neighbourhood to evince that the stay was entirely a voluntary one. This spring, however, the nests of three pairs were found in one wood belonging to Francis Hurt, Esq., of Alderwasley, near Derby. The nests, when discovered, all contained eggs, the old birds being then sitting. I wrote to Mr. Hurt on April 29., requesting him to procure for our Society a nest with eggs; and, two or three days after, he kindly sent me the nest, with broken shells of four eggs, which, as well as those of other nests, had been hatched even at that early period of the year. Two of the young broods, with the old birds leading them about, have been seen by the gamekeepers of that gentleman, who remarks in his letter, that, on going to the nest, the old bird did not rise until he had approached within the distance of a yard. They were all in dry warm situations, amongst dead grass and leaves, without any attempt at concealment. The nest sent was wholly composed of dead leaves, chiefly of the common fern, loosely laid together, and without any lining. The underwood was thin, and of not more than from seven to ten years' growth.

The singular circumstance of three broods occurring in the same plantation would seem to imply that the birds had remained from choice, and something attractive in the situation, rather than necessity. Mr. Hurt met with one woodcock in the same woods last summer, towards the end of June; and his gamekeeper caught another in a trap set for blackbirds amongst some gooseberry bushes: from which he imagines they have bred there in previous years. — *William C. Williamson, Curator to the Natural History Society, Manchester, June* 21.

The Woodcock. — During summer, the woodcock is found in Lapland, Norway, and Sweden; and in the markets of the latter country their eggs are exposed for sale. Like the eggs of the lapwing in England, those of the woodcock are

considered a great dainty by the wealthy Swedes, and on this account the number of these birds is very much reduced. Many woodcocks are lost on their passage from one country to another. Mr. Travers of Cornwall observed, when at a great distance from land, where the feathered tribes are seldom met with, a bird hovering over the ship. When first discovered, it was high in the air; but gradually descended, at length alighted on the deck, and suffered itself to be taken up by the hand: it proved to be a woodcock. In 1799, a couple of woodcocks, in a gale of wind, alighted upon the deck of the Glory man-of-war, as she was cruising in the Channel. (*The Sportsman. Doncaster, &c., Gazette*, April 17. 1835.)

Periodical Regularity with which Rooks commence Building.—We have heard the remark made, that, were a naturalist to be cast into a profound sleep, for a long and indefinite period, so as to be totally unconscious of the lapse of time, whenever he awoke, he would at once be able, on merely walking abroad and viewing the natural objects around him, to state with accuracy, not only the month of the year, but almost the very day of the month, on which he roused from his slumber; so regular and constant, for the most part, are the operations of nature, and the various occurrences of the seasons. The above remark was forcibly brought to my mind this spring, on referring to my calendar for the last few years, and observing the *punctuality* evinced by the rooks in commencing the work of building their nests. By *commencing the work of building*, I would be understood to mean, their actually collecting and carrying sticks, &c., for that purpose: for it is well known, that, long before a single stick or particle of other material is carried to the rookery, the rooks themselves, with much ceremonious clamour and cawing, are in the daily habit of paying regular visits at stated hours to the trees they are about to occupy; on which occasions, we may presume, they hold council, select their sites, and form their plans and calculations, as do other builders. It is only from the year 1831, inclusive, that I have particularly noted down the day of the month on which these birds commence their operations; and, in these five years, I find there is a variation of only three days. Twice they began to build on the 9th of March, twice on the 10th, and once on the 8th: viz. in 1831, on March 9.; in 1832, on March 8.; in 1833, on March 9.; in 1834, on March 10.; in 1835, on March 10. It should seem, therefore, that, in the case of the rooks at least, the business of nidification is only in a very slight degree either hastened or retarded by the forwardness or backwardness of the season. The earliest date above recorded occurs in the spring of 1832, which was a

backward season. — *W. T. Bree. Allesley Rectory, May* 12. 1835.

Martin's Nest occupied by a House Sparrow. — A pair of martins have built a nest to the upper cornice of Lansdown House, one of the highest houses in Cheltenham. A sparrow, envying them their situation, this morning took possession of the nest, to the great annoyance of the poor martins, who for some time in vain endeavoured to expel the intruder. At length the sparrow got his neck entangled in a straw; and the martins, taking immediate advantage of the circumstance, succeeded in throwing him out of the nest. Not being able to free himself from the straw, his efforts to liberate himself only accelerated his fate, and he is now hanging by the neck about a foot below the nest, quite dead; a fearful warning to all burglars. — *Samuel Moss.* 149. *High Street, Cheltenham, July* 16. 1836.

Redstart, the Nature of its Food, &c. — This species lives a good deal on the grubs of beetles, to obtain which it often enters the hollows of trees, to examine the decomposed wood. It also captures insects in the mode of a flycatcher; descends to the ground, and swallows moderate-sized worms, together with beetles of considerable magnitude, the shards of which it afterwards disgorges. In autumn, or, rather, at the close of summer, it likewise feeds upon currants and raspberries, the seeds of which may then be commonly found in its stomach: still, it cannot be considered a pilferer to any extent: most undoubtedly, it does not rob the vines. I used formerly to keep this species in confinement, and have many times watched the wild birds through a glass; but I could never perceive the horizontal movement of the tail, so generally spoken of, which, I am convinced, is not the case. The motion is very different from that of a wagtail's tail, it is true; but still it is perpendicular: the movement is either small and quick, as I have also noticed in *Phœnicùra Tèthys*; or the tail shakes, as if quite loose, and ready to fall off. The redstart is an extremely tame bird in captivity, and becomes remarkably attached to those it knows; its manners are pleasing, and very robin-like, and its disposition confiding and familiar.

There is a bird called by Selby and others the blue-throated redstart, which has no claim whatever to be ranged in this genus. This I have also seen alive; and a very interesting species it is, approximating a good deal to the *Motacillinæ*. Like them, it moves by an alternate use of the feet, and runs very quickly; whereas the redstart hops like a robin. It continually spreads its tail open wide, like a fan, from which peculiarity it has been proposed to name it the blue-throated

fantail; a name which has already met with partial adoption. As yet, I have seen but one species that can rank with it, a bird from the Himalayas, remarkable for having much yellow in its plumage, though its markings correspond with those of the European bird. The Accéntor Calliope of M. Temminck is closely allied to it. — *E. Blyth. Sept.* 4. 1836.

Insects.—*Polyómmatus Argìolus.*—I have, on three or four occasions, taken this small butterfly at the end of July and in August, but never observed it to be as plentiful as in the spring. — *E. Blyth. Sept.* 4. 1836.

Acetate of Strychnine useful to Entomologists. — I lately received, at Gibraltar, a hint from my friend Mr. Goldsworthy, Assistant Surgeon, Royal Artillery. He had been collecting fine specimens of Ph. Pavòni*a* màjor, and tried various modes of killing them, with the hope of finding a method whereby he should avoid injury, and, at the same time, lengthened pain. He accidentally tried acetate of strychnine, and was agreeably surprised to find that, when inserted beside the pin, it produced a slight flutter, with death never protracted beyond half a minute. I should be much gratified with knowing the result of this experiment in other hands. I therefore request that any of your correspondents who may be induced to use it would favour us with the result of his trials. — *R. Templeton. Woolwich.*

Geology. — *Important Discovery in Ireland.* — A shark's tooth was lately found by Mr. Whitla in the greensand near Belfast. This is the first instance of such an organic remain having been met with in Ireland. (*From a Correspondent.*) [In Dale's *Antiquities of Harwich*, the author, in treating of some fossil teeth of a large species of Carchàrias, remarks that, "when Mr. Ray wrote his *Topographical Observations*, he had never heard of the Glossópetræ being found in England; *how he mist them is greatly to be admired.*" — *Ed.*

Art. IX. *Queries and Answers.*

[*The Mole, Carrion Crow, Nightingale, Serpent, Toad: do they occur in Ireland?* (p. 482.)] — The first, according to Mr. Bell (see account of the animal in *British Quadrupeds*), does not: wherefore, as it is pretty uniformly distributed over Britain, from Sunderlandshire to Cornwall, we can only account for its non-occurrence in the sister island, by assuming that the origin of the species, or, at least, its diffusion over Britain, must be dated subsequently to the existence of the intervening sea, though prior to that gradual irruption of,

most probably, the Northern Ocean, which separated Britain from the main land: an order of events which is entirely borne out by geological data. The mole, for various reasons connected with its economy, would be incapable of crossing from Britain to the shores of Ireland, even were the proximate coasts much nearer than at present: but it does not hence follow, that various other quadrupeds, that are common to the two islands, as stags, foxes, &c., may not have accomplished the passage, as many of these have been known to perform surprising feats of swimming. The fauna and flora of Ireland present many curious phenomena to the attention of the naturalist; and it is reported that, ere very long, we are to expect a publication of the former. One of the most interesting features of this is the occurrence, in both islands, of the red ptarmigan (*Lagòpus británnicus*); a species which, so far as is known, is not found elsewhere, and which is extremely unlikely to have crossed the ocean, and, all circumstances considered, not very likely to have been introduced. I have never heard, however, that specimens from the two islands have been minutely compared, but should decidedly recommend those who have the opportunity to do so. A correspondent of your Magazine observes (IV. 452.) that the red ptarmigan is found in Ireland, "in floes" [marshes, or morasses, uncut and undrained, covered with heath, bog myrtle (*Myrica Gàle*), and different kinds of mosses], "remote from hills or mountains: it is also found in the mountains in abundance." The limited range of this inland species to these islands, and the fact of its occurring alike in both, are circumstances much more worthy of attention than they seem generally to have been considered.

The carrion crow, it is said, does not occur in Ireland, neither is it known in the north of Scotland. What the extent of its distribution may be along the west of Britain, I cannot say, but suspect that it is every where of rare occurrence in the mountainous districts.

The nightingale, I think it will be found, occurs nowhere, save as a rare and accidental straggler, much to the westward of, at most, the third meridian of western longitude, in the British Islands, a line which, it will be observed, just cuts off Devonshire and Cornwall, all Wales and Ireland, together with the greater portion of Scotland: exactly the districts wherein the species does not occur. It appears to migrate nearly according to the lines of longitude, deviating but a very little indeed either to the right or left. Thus, we find that some ascend along the eastern coast of Spain, others by Sardinia and Corsica; some of which, converging very gra-

dually in the course of their progress northward, are probably those which annually visit above Mantua, in France, to the south of which town they are said not to be found. The species is unknown in the Channel islands (Jersey, Guernsey, &c.), and, I believe, throughout Brittany, unless a few may sometimes be met with in the eastern districts of the last named province. It seems that Portland is the westernmost point where they arrive in Britain, and wherefrom they appear to continue their journeys northward, hardly spreading at all toward the west. I believe that one or two have been captured in East Lothian, within the boundary line above prescribed, these being the only instances of the species occurring in North Britain; though in Sweden it proceeds much farther. Of course, it can hardly be expected to occur in Ireland.

The brittling, or slowworm (*Anguis frágilis*), is common in Ireland, as is also the *Lacérta ágilis*; but I have not heard of either the common snake or of the viper being there met with. The common toad exists there, as does also the natterjack toad (*Bufo Calamita*); the former being generally designated *black frog*. — *Edward Blyth. Sept.* 4. 1836.

Is any Species of Bat known to fly about in the Daytime? — At 11 o'clock A. M., on one of the hottest days of the summer of 1835, in the parish of Offton, Suffolk, I observed a bat fluttering backwards and forwards near some very lofty walnut trees. After watching it for some time, it gradually ascended, soaring above the trees in the full glare of the noonday sun, till it attained an elevation at which it was no longer visible. I did not witness its descent; but, about five minutes after I had lost sight of it, I observed it skimming the surface of a small pond, and distinctly saw it touch the water while upon the wing, and apparently take something (probably an insect) from its surface. My curiosity being much raised, I endeavoured to shoot it, and succeeded. It was a very small bat; but, observing no other peculiarity about it, I did not preserve the specimen, which I now regret. Can any of your readers inform me what species it probably belonged to? — *E. C. Burstall Hall, Suffolk.*

In Answer to the Question (VII. 515.), "*Do not Rooks, every Spring, in building their Nests, use Part of the Materials of the old Nests?*" — I can with certainty say that in many instances they do so. I was bred near to a large rookery, and had many opportunities of seeing this fact verified; for, when a boy, I was generally among the first to climb the trees in search of eggs, to lay up a store against May-day, to add to the decorations of the May-pole. I recollect finding, in several instances, the lower parts of some of the nests in a state of

complete rottenness, while the upper parts were constructed with new materials.

I do not know the age to which rooks live; but I believe that the same pair will build and rear their broods, for several years together, in the same nest, with some little addition. This fact appears to me to be proved by the rooks often, in large numbers, visiting their rookeries once or twice before the time of building, as if to reconnoitre, lest any intruders should have taken possession of their domiciles. When the time of building arrives, frequent disputes occur, and long and violent is often the contest. Two instances I have witnessed, in which one pair of rooks took possession of a nest which was disputed by another pair, and a furious contest ensued; and, in both instances, the claimants, finding they could not obtain possession, or drive off the intruders, actually carried away every stick of the nests, and constructed their own with them.

Sparrows' Nests built in a Rook's Nest. While on the subject of the nests of rooks, I will just mention what appeared to me very remarkable at that time. I was then about twelve years of age. On my climbing up to a cluster of rooks' nests (nine or ten, all built, as it were, *en masse*), I was agreeably surprised to find two sparrows' (*Passer domesticus*) nests, one containing four eggs, and the other six: the latter were in a forward state of incubation. I have since heard further instances of the same kind. On another occasion, I found a *blackbird's nest*, nicely placed in the forks of the branches upon which were built five or six rooks' nests. So near was the blackbird's nest to the rooks, that I could scarcely pass my hand into it. It was the most compact nest I ever saw of the species, and contained four young ones, all nearly fledged. As the blackbird generally builds in retired situations, and near the ground, I was much surprised on finding one built in so lofty a situation; and, on mentioning the circumstance to the gardener of the gentleman upon whose premises I found the nest, he in some measure accounted for it (assuming these to be the birds he alluded to) as follows:—He said he had been greatly annoyed by a pair of blackbirds, which had built three nests in the shrubbery, all of which he had destroyed, as he counted the blackbird a great enemy to his cherries. At last, he said, he had driven them out of the shrubbery, and he supposed they had taken advantage of the rookery.

The Rook not the only Bird that uses the old Materials in the Construction of its Nest. In the summer of 1828, a wren built her nest between the rafters and the ceiling of a stable that stood in my kitchen-garden, there being sufficient room for the birds to pass in and out over the door when

it was shut. The young brood consisted of four birds, which remained with their parents till the following spring, when they all disappeared. The old birds began to build in 1829, in a rustic arbour in the garden; but, their labours being so often interrupted by that unwelcome guest in human shape, they forsook the task, after having laid the foundation. Finding day after day that the little habitation did not make any progress, I anxiously watched the active and bustling motions of my two tiny friends, and soon discovered them busily engaged in refitting or repairing their old nest in the stable. It underwent considerable alteration, both internally and externally, so that the size became considerably increased. In this safe retreat they reared their *second brood*. I was very careful to preserve the nest untouched, hoping that, on a future occasion, I should see the third brood reared in the same nest; but, unluckily, a boy, who was playing with my own children, caught a glimpse of the nest, and soon destroyed it.

The Magpie also uses the old Materials in the Construction of its Nest occasionally. Only one instance of this kind is in my recollection. My father had a large orchard, of about two acres, in the centre of which was a pond, which was surrounded with the white thorn, hazel, &c., some of which had grown up to good-sized trees. One, a whitethorn, was particularly bent in the stem, and projected its bushy head nearly over the centre of the pond. A pair of magpies took possession of this tree, built their nest, reared their brood, and departed, only visiting us occasionally. The next year they took possession of the same tree, and began to repair their old nest, in which they reared their second brood: thus did they continue for six successive years. The fifth year, an old cat, which had long watched their motions, at length ventured to intrude upon their domain, but met with a very unwelcome reception. Mag, it appeared, was fearful of a second visit from poor puss, for she actually constructed such a barrier, at every entrance of her mansion, as to defy admission to any object larger than herself. Puss was accordingly kept at bay: but whether she ever made a second attempt I do not know. However, in the sixth year, the pair again took possession of their airy mansion, for by this time it was more than double its original size; but they still added to its bulk, so that it presented a very formidable appearance, and became an object of great curiosity. But, like most pets of the fancy, it met an untimely fate: a violent storm arose, which bore down trees, buildings, &c., and laid this noble structure, with its callow brood, level with the earth.

I once knew a Bullfinch build its second clumsy Nest upon

the old Foundation of the first Nest; but, as if dissatisfied with the production, it did not so much as deposit a single egg in it. — *W. H. White. Old Kent Road, Dec.* 10. 1834.

What is the best Method of preventing the Decomposition of the Sheppey Fossils? — I have observed in two or three Numbers of your Magazine some queries respecting the best mode of preserving the interesting fossils found in Sheppey and at Folkstone. A method which I believe to be perfectly effectual is, to keep them entirely immersed in water. I have some fragments of fossilised wood which have been bottled in water for, I should think, nearly twenty years; and they are as perfect as on the day they were first put up. They were obtained from the London clay, are fossilised by the white iron pyrites, and would unquestionably have long since fallen to pieces if they had been exposed to the action of the atmosphere. I would, therefore, suggest to those who have the opportunity of procuring the interesting fruits of the London clay, at the localities alluded to, always to keep them in bottles filled with water. Such a collection would be very valuable, and not quite so expensive as one of succulent fruits preserved in similar vessels, but in spirits of wine.

The pyrites collected in Sheppey, by exposure to the atmosphere, passes gradually to the state of sulphate of iron (copperas). The mass is lixiviated; and the water, thus impregnated, being evaporated in proper vessels, the copperas becomes crystallised. — *J. S. Henslow. Cambridge, Sept.* 2. 1836.

ART. X. *Retrospective Criticism.*

DARK-LEGGED Pettychaps, or Chiffchaff (Sylvia lòquax Herbert, *Hippolàis of Latham and Montagu, but not of Linnæus and Temminck): the Migration of this Species partly doubted by Mr. Neville Wood.* (p. 485.) — I can safely assert that by far the great majority migrate. In confinement, the erratic impulse is very powerful; and I have known numerous instances of their settling, during the spring and autumn, on the rigging of vessels passing the Channel. The few that remain resume their monotonous double note early in the year, usually during fine weather in February, precisely as also happens in confinement; so that there is little chance of the species being then overlooked by ornithologists. I have only twice met with it in early spring, and have generally remarked that the mass of them arrive much later than is commonly stated. A few are mostly heard about the close of March; but the ma-

jority certainly do not come over till April, when the song pettychaps also arrives in abundance. In the *Field Naturalist's Magazine*, there is a case recorded of this latter species staying the winter in one of the western counties: I have heard it sing weakly in November. Those chiffchaffs which are heard previously to the month of March have, undoubtedly, passed the winter with us; but their number is extremely few, or their notes could not escape observation; all the sylviadous birds being in full song long before their arrival in their summer haunts. I cannot consider, too, the dark-legged pettychaps to be so shy a species as Mr. Wood describes it, more particularly at a time when the woods are bare of leaves. Even in summer it is much less hideling than the blackcap and other fauvets. When not in song, it has a weak faint chirp, a sort of *wit, wit*, which it, indeed, has in common with the warbling species. Occasionally, this is also heard in summer. I have noticed that it affects hilly districts more than the song pettychaps; whereas the latter is much more abundant in valleys: neither of them, however, being at all confined to their respective localities. There is a peculiarity in the song of the dark-legged pettychaps, which does not appear to have been generally noticed: its common note, *tick tack*, is known to all; but, after repeating this seven or eight times in monotonous succession, it frequently alternates it with another sound, resembling *crah crah*, or *cruh*; reminding one of the harsh tones of the Salicàriæ, or reedlings. The reason that this is so overlooked is, that it sounds so very different, that few could imagine that it proceeds from the same bird: indeed, it generally seems to come from another direction. This, also, is repeated several times in succession, and then the common note is resumed without stopping. Both the dark-legged and song pettychaps are very quarrelsome little birds; a trait of character which I have never noticed in the S. sibilans. In autumn, the young will frequently take their stand on an old pollard, to watch for passing insects, and will dart at and attack much larger birds that venture within their domain. Last spring, I was walking under some tall elms, from the top of which a chiffchaff was, at intervals, repeating his double cry. A large common, overspread with furze, lay in one direction, where thousands of the song pettychaps were warbling merrily. At length, one of these settled on a bush close under the trees, and began to sing; whereupon down came the little chiffchaff from above, and I witnessed a long-sustained battle between the two, both warbling their diverse notes in defiance, and by turns attacking and pursuing each other. Each, indeed, seemed to consider the other an an-

tagonist of its own species, for it is seldom that different species quarrel, though a few will drive away all intruders from the vicinity of their abode. There are, however, several nearly allied species which cannot endure each other's presence. Thus, a robin will attack a redtail, and the latter will quarrel in confinement with a whin or stone-chat, though it will be quite peaceably inclined towards other birds less closely allied to it. On the same principle, the different species of pettychaps are very apt to quarrel in confinement. Other species, on the contrary, will live quite amicably even with their own kind, and such do not quarrel with their congeners.—*Edward Blyth. Sept.* 4. 1836.

Migration of Hawks. (IX. 462.)—Mr. Jesse says "hawks appear to be migratory and gregarious," and adduces as confirmation of this, that a large quantity of them settled on the rigging of the Nymph frigate, while stationed in the port of Boston. Sir Humphry Davy observes that "hawks are seen in great quantities in the month of May, coming in to the coast of Europe, after quails and landrails." (See *Gleanings in Natural History*, third series, p. 149.; and *Salmonia*, p. 16.) I have remarked that during the winter no kestrels are seen about the northern suburbs of London, and some one (I forget who) told me that at that season they frequent the sea side and prey on fish, mice being then more scarce on land, and one species in a state of torpor.—*J. H. Fennell. Sept.* 8. 1836.

Canary losing its Voice. (IX. 487.)—Perhaps the circumstance arose from its having injured its singing organs. Bechstein, indeed, says that some male canaries, "especially in the pairing season, sing with so much strength and ardour that they burst the delicate vessels of the lungs, and die suddenly." (*Cage Birds*, p. 233.)—*J. H. Fennell.* [*Received on Sept.* 10. 1836.]

The Glaucous Boat Fly (*Notonécta glaúca*).—In a paragraph in p. 492., Mr. Fennel states that he has often very freely handled these insects, without suffering the least pain from so doing; from which circumstance he discredits Ray's assertion of their being capable to inflict wounds. (See Vol. VII. p. 259.) In reply to which, I take the liberty of stating that they are capable of inflicting severe wounds with their rostrum; severe at the moment when inflicted, but not of very long continuance; though, from having very frequently handled these insects myself, and only once received a wound, I am inclined to think that it is somewhat unusual for them to do so. The position in which I was holding the one that punished

me was between my thumb and finger; and, therefore, it must, to prevent its escape, have sustained a slight pressure, which was, I imagine, the cause of its then inflicting the pain. A short time after this, a gentleman, with whom I had been capturing some water insects, in taking one from the net which we were using for that purpose, received a wound from it in a similar manner. It is also stated, in vol. i. of Curtis's *British Entomology*, at the back of p. 10., under N. maculàta, that the adult insects are capable of inflicting severe wounds, &c.; and, as there is but a slight difference between the N. maculàta and N. glaúca, and that principally in the markings, I should say it is applicable to the present species also.—*W. H. Baxter. Bayswater, September* 6. 1836.

Notonécta glaúca capable of inflicting a Wound (p. 492.).—I can speak positively to having received a very painful sting from the Notonécta glaúca, the *Nèpa* cinèrea, and another common water beetle, whose name I forget at the moment. This happened to me when I was a boy, and before I became aware of the power which the insects possess of inflicting such a wound, which your correspondent seems to doubt, though I believe the fact is well known to entomologists. A little time seems required to enable them to insert their slender mouths into the skin; and perhaps, like other insects capable of annoying man, they produce a greater effect upon some persons than upon others. —*J. S. Henslow. Cambridge, Sept.* 2. 1836.

Ophiùra figured at p. 427., *its Specific Name.* — In the last Number of your Magazine, you inserted an article of mine on some new species of Ophiùra, to one of which I had neglected to attach a specific name: I have called it Ophiùra loricàta, from the arrow-like arrangement of its protecting plates. If you would note this in your Magazine, you would much oblige me. — *W. C. Williamson. Manchester, Sept.* 27. 1836.

ART. XI. *Instances of Man's Progress in the Extension of his Knowledge of Natural History.*

BRISTOL Museum and Philosophical Society.—Attached to the thirteenth report of the proceedings at the Annual Meeting, held February 11. 1836, is a general memoir of the present state and progress of the Bristol Institution, from its commencement in 1823. This Institution is well known to the scientific world, from the valuable collection of organic remains contained in its museum; the interest of which is doubly

increased, from their having originally been in the possession of that indefatigable observer and original genius, Müller. The following observations in the memoir, relating to the museum and its late curator, will be read with interest: —

"The accumulation of the scientific stores of the museum, through the influence of the public spirit excited and fostered by the Institution, and, in its turn, giving impulse to those who have conducted this branch of its objects, is beyond all the anticipations of its early friends. When, at the beginning of 1823, those members whose names continually appear as contributors, presented the fine fossil skeleton of the Ichythyosaúrus commùnis, which constituted the foundation stone of the noble collection, it was under the condition (as stated in the minutes of the committee), that it should be received back '*if no museum be formed.*' At the same time, Professor Buckland and Mr. Conybeare presented a series of bones from the Kirkdale Cave; and, in the course of the year, the promise of valuable deposits, — by Mr. Bright, of a series of German rocks formed at Freyburgh, under the inspection of Werner; by M. Müller, of his extensive collection of organic remains; and by Dr. Gapper, of his collection of British birds; with the offer of a collection of South American birds, by Mr. W. E. Acraman, — all of which eventually became the property of the Institution; together with contributions for the preparation of cabinets for the reception of specimens in natural history; placed the formation of a museum out of doubt.* From that time, by the especial support and direction of the dean, Mr. Conybeare, and Mr. Bright, in some departments, and of Dr. Gapper, and afterwards of Dr. Riley, in others; by the active and efficient services, and the scientific knowledge and reputation, of M. Müller, and, since his death, of Mr. S. Stutchbury, in the office of curator; by the valuable cooperation of the museum committee and its successive secretaries, among whom Mr. W. Sanders has long given his aid with honourable zeal and perseverance; and by the contributions extensively made, through the successful efforts of Henry Bush, Esq., and others, for the preparation of cases; the museum has essentially contributed to raise the Institution to its pre-

"* The committee, in their report for the following year, presented to the Second Annual Meeting, speak of the great exertions of M. Müller for the museum, 'to whose zeal, intelligence, and activity,' they say, 'they must refer, as one of the main causes of its actual progress,— altogether unexampled as that progress has been in the history of any similar Institution of such recent origin.'"

sent station, and to render it, what it has been justly designated, 'a treasure to our city at home, and a credit to it abroad.'

"Resting its claims on this station, and supported by those of the eminent geologists whose presiding influence was experienced at every step of its commencing progress, and by the importance and interest of its provincial geology and mineralogy, the Institution presented its application for a visit from the British Association, at the Cambridge anniversary in 1833, and again at Edinburgh, in 1834. This was renewed last year at Dublin, accompanied by invitations from the corporation of the city, and the Society of Merchants; and, the round of universities having been completed, the Society decided that its anniversary of 1836 should be held in this city.

"To detail the progress of the museum, or the names of those who have contributed to its treasures, is out of the present scope; but some remarkable stages may be recorded, in addition to those already noticed. In 1824, Dr. Daubeny presented a series of specimens illustrating the geology of Sicily. The foundation was laid, in the conchological department, by the donation of the late Dr. Lovell's collection; and, in the early part of the year, a rich collection, formed by Joseph Blisset, Esq., and pronounced, by competent judges, to be at that time unrivalled by any public museum out of the metropolis, was purchased by a number of members at the low price of five hundred guineas, for which the proprietor had offered it, and by them presented to the Institution. The specimens in this collection, and the others possessed by the museum, were, two years afterwards, arranged by Mr. Henry Stutchbury, on Phillips's system, as given in the third edition of his *Introduction to Mineralogy*. In the same year (1826) a very fine specimen of Ichthyosaúrus tenuiróstris, the most complete then known, was presented by the joint contributions of individual members; and by subsequent additions, of actual specimens, or of well-executed casts (two of the latter presented by the Right Honourable Viscount Cole), a beautiful and interesting suite of this remarkable class of extinct animals is now possessed by the Institution. In 1830, Mr. Cottle presented the whole of his large collection of animal remains from the Oreston Caves, near Plymouth; and in the following year, by liberal contributions from various individuals, aided by the proceeds of Dr. Riley's lectures on zoology, and Dr. Carpenter's lectures on astronomy, the late curator's collection of fossils, shells,

and minerals was purchased for 730*l.*, and afterwards presented to the Institution.

"M. Müller had been introduced to the Institution, at its origin, by honourable testimonials from Mr. Conybeare, and from Professors Jameson, Buckland, and Sedgwick. 'To an active and strong understanding,' to use the words of the committee in their report to the eighth Annual Meeting, 'he united patient accuracy of observation and research, and an ingenuity of discovery founded on both, the valuable fruits of which are recorded in publications which will honourably perpetuate his name in the annals of natural history.' His work on the Crinöidea has given him a high rank among the scientific contributors to the knowledge of nature; and it was one strong inducement to secure his collection, that it contains the specimens on which his system is founded. The appeal to the friends of the Institution, signed by 'Henry Beeke, Richard Bright, vice-presidents, and S. S. Wayte, honorary secretary,' rested further, on the freedom of access which the Institution affords to all who desire to inspect its stores, the extensive and important nature of its mineralogical department, and the completeness which, by such an accession, this will attain;' and it concluded by expressing the opinion, 'that the depositing of such a collection, as a whole, in an Institution with which M. Müller had been connected, would be a deserved honour to a scientific naturalist, and an encouragement to those who are engaged in similar pursuits.'

"M. Müller died May 25. 1830, having filled the office of curator from April 30. 1823. In the August of 1831, it was intrusted to Mr. Samuel Stutchbury, who had long been connected with the museum of the College of Surgeons; and by skill in preparing osteological and other specimens, discriminative accuracy, talent for lucid arrangement, clearness and precision in elucidation, and zealous interest in the objects of his trust, he has been enabled to promote the welfare of the Institution, and to carry on its purposes, to the full satisfaction of the body with which he is connected. In various instances his name appears among the contributors to the museum—a short time ago, in connexion with a very interesting, rare, and instructive specimen of the recent pentacrinite; while, by his connexions with other scientific persons, he has contributed to that intercommunication which is so serviceable for the purposes of knowledge. One of his provisions for the resources of the Bristol Institution should be noticed, as likely to be useful to other similar establishments. The commercial relations of this city, and the spirit of many of

its mercantile captains, have contributed greatly to the wealth of the museum: to promote this object, Mr. Stutchbury drew up a set of brief instructions for collecting and bringing home objects of natural history, which was printed by the Institution; and dredges for procuring shells, boxes of bottles, &c., have been prepared, to be given to captains of vessels, and others, who might undertake to bring contributions from distant countries.

"It would be vain to attempt even a general survey of what has been added to the museum for the last five years: indeed, the great difficulty has been to provide cases and other suitable accommodations for the varied and valuable donations. In the department of organic remains, especially the Crinöïdea, its collection has most the character of completeness; and to those who have contributed to its fossil remains of fish, which, at the request of the Rev. Professor Buckland, were submitted to M. Agassiz, it will be interesting to notice, that this celebrated naturalist pronounced thirty of its specimens to be of species hitherto unknown, engravings of some of which will appear in his splendid work on *Fossil Fishes*. In recent ichthyology, in entomology, and even in ornithology, the museum is very imperfect. Its greatest deficiency, however, is in the Mollúsca. Besides its minerals, arranged, as already noticed, by Mr. H. Stutchbury, the Mammàlia and reptiles have been catalogued by the curator; and W. Raddon, Esq., has devoted considerable time to the preservation and scientific arrangement of the insects. In botany, little has been attempted till of late, though J. L. Knapp, Esq., early presented a series of specimens illustrating his work on the *British Grasses;* and miscellaneous contributions, of much interest, were occasionally made. Recently, however, Mr. Rogers, surgeon, of this city, has presented to the museum his own collection of local botany, which he is interweaving with general specimens, and thereby forming a very valuable and acceptable basis in this department of natural history."

The committee notice in their report a considerable diminution in the income of the past year; which, however, has not arisen from any decrease in the number of subscribers, but from the small amount produced by the lectures of the last session; the delivery of which has usually been an important source of pecuniary advantage to the Institution. It appears that, since the close of 1835, those lectures, of which a share of the profits only is given up, have produced a clear profit of 600*l.* 6*s.* 8*d.* to the Institution, five only having caused deduction; and the lectures, the proceeds of which have been entirely given to the Institution, have produced 592*l.* 17*s.* 9*d.*;

of which Mr. Estlin's yielded 92*l.* 10*s.* 6*d.*, Mr. Worsley's 98*l.* 1*s.* 0*d.*, and Dr. Riley's 198*l.* 7*s.* 11*d.* The greatest net receipts were from Dr. Spurzheim's course, producing 160*l.* 7*s.* 6*d.*, one half to the Institution; Mr. Thelwall's double course of 1829, producing 160*l.* 13*s.*, yielding 60*l.* 13*s.* to the Institution; Dr. Carpenter's course of 1830, producing 109*l.* 2*s.*, one third to the Institution; and Dr. Riley's, of 1831, producing 93*l.* 3*s.* 5*d.*, wholly for the Institution. The profit derived from the exhibitions (including the payments from the Society of Artists, and from the recent exhibition of Danby's Opening of the Seventh Seal) has amounted to nearly 1,140*l.* The *recorded* pecuniary donations for specific objects (not including 100*l.* from the corporation in 1834) have amounted to above 2,500*l.* The annual income from the subscriptions of members and nominees appears to be about 730*l.*

Belfast Museum.—The eighth Public Meeting of the Natural History Society was held in the museum, on Wednesday, the 25th May; about one hundred and twenty members and visiters being present.

The council, in laying before the members a report of the present session, observe that it is one whose course has been attended by the same unanimity among the members, and the same progressive increase of their number, which have so justly formed a subject of congratulation on former occasions: but it is one which has not been marked by any unusual or remarkable event, such as distinguished the two preceding sessions. In one of these, a debt of nearly 800*l.* had been discharged; in the other, the unfinished portions of the building had been completed. Our history, during the past session, has not been of embarrassing circumstances overcome, or of serious difficulties surmounted, but is one of cheerful and prosperous advancement — less eventful, but not less gratifying — furnishing less to record, but not less on which to frame our pleasing recollections of the past, and our happy anticipations of the future.

During the session, seven public papers have been read:—

1st. By the President, on the 21st Oct., on "the various Contrivances for diffusing Seeds, observable in Cryptogamic Plants," illustrated by numerous magnified drawings.

2d. By Mr. Robert Patterson, on "the Insects mentioned in Shakspeare's Plays," being a continuation of several former papers.

3d. The same subject was resumed by Mr. Patterson, at the request of the Society.

4th. Read by Mr. Grattan, on "the Busts of Sir Walter

Scott, Lord Byron, and Thurtell, the Murderer of Mr. Weare, with a Phrenological Analysis of their Characters."

5th. Delivered by Dr. Thomas Henry Purdon, "on some Proofs of Design observable in the Animal Kingdom."

6th. Read by Mr. James Bryce, jun., A.M., "on the Mineral Resources of the North of Ireland."

7th. By Dr. Andrews, "on the Constitution of Electro-Magnets," illustrated by experiments.

The aggregate number of members and visiters present on the several public nights exceeded, this year, one thousand persons.

The regular meetings, which are distinguished from the preceding by the name of "private nights," have been continued without interruption. At these, 16 papers have been read, and between 400 and 500 members and visiters have attended. Of these papers, 5 were on various branches of zoology, 2 on botany, 3 on geology, 3 on natural history, 1 on physiology, 1 on general statistics, and 1 on the topography of Ireland. Some of these papers have since been published in the scientific periodicals of the day.

During the last session, the council has caused one of the rooms on the first floor of the building to be fitted with cases for the reception of part of the collection. This, it is intended, after some time, to devote to Irish specimens. Meanwhile, it contains the collection of Irish antiquities, of which the very valuable donation from James Gibson, Esq., of this town, formed the commencement.

The present income derived from subscriptions of members may be stated, 90*l.*; the amount received for admission of visiters to museum, 20*l.*; making a total of 110*l.* This leaves, after payment of rent and other regular charges, a surplus of 25*l.*, applicable to the purchase of cases, the preparation of specimens, and to the general purposes of the Society.

Sixth Meeting of the British Association for the Advancement of Science, held at Bristol, Aug. 22. 1836.—The proceedings at the late meeting of the British Association at Bristol are so exceedingly voluminous, and the public have access to them through so many channels, that we do not propose their introduction in this Magazine. We may, perhaps, notice some of the subjects which relate to zoology and geology.—*Ed.*

THE MAGAZINE

OF

NATURAL HISTORY.

NOVEMBER, 1836.

ORIGINAL COMMUNICATIONS.

Art. I. *On the modern Nomenclature of Natural History.* By J. O. Westwood, Esq., F.L.S.

If the study of natural history had remained stationary since the days of Linnæus; if naturalists had contented themselves with the possession of no farther knowledge of an animal than could be summed up in its *legitimate* twelve-worded specific character; or, if the number of animals described in the *Systema Naturæ* had received no increase; perhaps no plan could be suggested, more perfect, for the diffusion of a knowledge of natural history, than that of Linnæus; no further generic characters would be necessary, no further description requisite. Fortunately, however, the scene has completely changed: the study of natural history has reached the rank of a science, for the attainment of a knowledge of which a high degree of attention is requisite; and naturalists feel that they have not obtained a sufficient knowledge of an animal, until every portion of its organisation has been submitted to a rigid investigation.

Hence, although the length of descriptions of groups of insects, or rather of those particular species which have been selected as the types of such groups, has been ridiculed by Mr. Swainson, under the name of generic chapters, "so complicated and prolix, as to occupy half a page," (*Pref. Arct. Zool.*) yet the student who would wish to possess a knowledge of the entire structure of such types, instead of that superficial acquaintance conveyed by those short definitions which are termed specific or generic *characters*, as distinguished from specific or generic *descriptions*, has repeatedly to lament the shortness of such generic chapters. Thus, in Curtis's *British Entomology*, the description of the genus Oryssus occupies an entire page: in Latreille's *Genera Crustaceorum et Insectorum*,

it fills 4 pages; and yet it has been complained that some important characters have been omitted.

Again our museums teem with overwhelming masses of undescribed animals, notwithstanding all the efforts made by naturalists to keep down their numbers. Hence the old genera have become perfect magazines, where new species are joined to those known to Linnæus, in the proportion of at least 100 to 1.

Hence, for the sake of convenience, divisions and subdivisions have been introduced, for the purpose of collecting together such species as possess a greater or less degree of relationship with each other; to which divisions, at the first indicated by *sectional marks* only, naturalists of the present day are nearly united in assigning *names:* no fixed rule, however, appears to have been adopted, either as to the retention of the old generic names, or the proposal of new ones.

Various plans have, indeed, been proposed for the nomenclature of these dismembered groups. Dr. Leach, for this purpose, employed the *different synonymes* of the old generic name as the names of the subdivisions: thus, where Latreille had divided the genus Scutéllera into three sections, Dr. Leach raised them to the rank of three genera, to which he applied the synonymous names of Scutéllera, Tetỳra, and Thyreócoris, The inconvenience and impropriety of this plan need not be dwelt upon.

Mr. Swainson has adopted a different method, having employed the *specific name* of an insect, which he considered the type of a subgenus, as the name of such subgenus, giving at the same time a new specific name to the species in question: thus the *P*apílio Podalírius of Linnæus is the Podalírius europæ`us of Swainson. This plan has certainly the advantage of at once calling to mind the resemblance of any new or additional species, placed in such subgenera, to that of the old typical species; yet there are several objections against its adoption:—1. the confusion thereby introduced in the nomenclature of species; "Nomina trivialia nunquam absque summa necessitate mutanda sunt:" (*Fabricius Phil. Ent.*) 2. the injustice thereby done to the original describer of the species, whose name is thus supplanted: and, 3., the impossibility of following up this plan in other groups. In the butterflies it may be generally adopted, because their names have almost become, as Mr. Swainson has elsewhere well remarked, an index to the heathen mythology: but it would scarcely be correct, for instance, to detach Calosòma scrutàtor or Chrỳsis cyànea, as subgenera, with the names of Scrutàtor americànus or Cyànea vulgàris: and, even amongst the butterflies, the plan

is objectionable, as the names thus employed are totally destitute of signification.

A third plan has recently been proposed by M. De Laporte, in Silbermann's *Revue Entomologique*, in which the original generic name is compounded in all the subgeneric ones: thus, the subgenera of Colàspis are termed Colaspòïdes, Colaspídea, Colasposòma, &c. This plan has certainly the merit of calling to mind the higher group from which all these minor ones have been derived; but it would be evidently impossible to bring it into general adoption.*

In all these cases, however, one material point is absolutely requisite to be observed, and one respecting which it seems most essential that naturalists should adopt some fixed and uniform principle: I mean the application of the old generic name for some one or other of the dismembered groups.

If, in establishing named sections in an old genus, we look at the latter with a view to its natural distribution, it cannot be questioned that the animal which peculiarly possesses, in the highest degree, the natural characters of the group ought to retain the old generic name. Mr. Swainson has adopted this principle, but has at the same time shown the difficulty of its application; having, in the 23d and 133d folios of his new series of the *Zoological Illustrations*, considered the wide geographical range of a form as indicating typicality; although, in an intermediate folio (95.), he opposes this principle, by considering the preeminently typical form of the butterflies to exist in a group of confined geographic range, since all the species belong to the old world.

It is impossible, however, from our present limited knowledge of the more obscure groups of insects, to follow up these higher views of natural classification; whilst, at the same time, it will not be denied that, for convenience's sake, the sections should be named, and that some principle should be laid down as to the old generic name.

I will not here enter into the question of the propriety of considering sections as entitled to the rank of genera, and old genera as of a still higher rank; nor the propriety of giving to the names of sections a peculiarity of nomenclature, which shall at once distinguish them from the group of higher rank from which they have been dismembered; and I will only express my full concurrence in the propriety of the views so ably laid down by the Rev. Leonard Jenyns in this Magazine, as to the propriety of maintaining a distinction between the relative

* Dr. Burmeister has rejected this plan; having, in vol. ii. of his *Introduction*, substituted the name of Hydroéssa for that of Microvèlia, which I had proposed for a subgenus allied to Vèlia.

value of the two kinds of groups: neither will I here enter into any attempt to show the impropriety of the practice, adopted by some authors, of employing the old generic name for the *most common* species of the genus; a practice which must be considered exceedingly vague and indefinite.

I have elsewhere endeavoured to show the advantages likely to result from the uniform practice of considering, as entitled to the original generic name, that particular species which, from having been placed at the head of a genus, we cannot but suppose was considered by its founder as more especially possessing the generic character of the group; or that which, in many instances, is expressly stated to have been employed as such type. In this enquiry, moreover, I think that we are bound to resort, on all occasions, to the original establishment of the genus, notwithstanding the modifications which it may have subsequently undergone, even at the hands of its original founder. This principle I would, at all events, more particularly insist upon in groups where the generic and subgeneric synonymy is in a state of confusion. Perhaps the more effectual manner of pointing out the necessity of the adoption of the above-mentioned principle will be, to show the confusion which has originated in consequence of its non-adoption: this I will do as shortly as possible.

The dipterous genus Xylòta was separated by Meigen from the great genus Sýrphus, the *Músca pípiens* of Linnæus being placed as the first species, forming, in fact, the first section. On minutely investigating the genus, this species was found to possess characters to warrant its establishment by St. Fargeau and Serville (who have been followed by Mr. Curtis) as a separate subgenus. Instead, however, of retaining the name Xylòta for the *Músca pípiens*, it has been improperly, as it seems to me, conferred upon the other species; whilst the real type of Xylòta has been termed by them Syrítta. In Mr. Stephens's catalogue the name Xylòta is correctly applied to *M. pípiens*, the remainder of the species being placed in a distinct, although unnamed, genus; and for which (as it will be improper to employ Syrítta otherwise than as a synonyme for the true Xylòta) a new generic name must be still proposed.

In like manner, the confusion which has arisen in the generic, or rather subgeneric, nomenclature of the various sections of the Tachydrómidæ is very perplexing, and would occupy too much time at present to unravel. The same observation may be likewise applied to numerous other groups. The only other instance which I shall therefore notice is, the genus *Pemphrèdon* of Latreille, one of the sections of which has

been published by Mr. Curtis, in his last number of the *British Entomology*, under the name of Diodóntus.

The genus *P*emphrèdon was established by Latreille in his *Précis des Genres*, 1796; and in his *Gen. Crust. et Insec.* he expressly refers to the *P*emphrèdon minùtus *Fab.* (or *P*em. pállipes of Panzer) as constituting the type of the genus *P*emphrèdon in the former work; whilst, in his *Hist. Nat.*, vol. iii. (1802), he states the mandibles to be unidentate; which Fabricius confirmed by his typical characters of *P*emphrèdon, in 1804. In 1806, Jurine proposed the name Cemònus, giving as synonymous the *P*emphrèdon of Latreille and Fabricius, and placing in this genus both *P.* lùgubris and *P.* minùtus (or pállipes). He placed, however, the former, which has bidentate mandibles and a long peduncle to the abdomen, at the head of the genus.

More recent observers have considered these two insects, lùgubris and minùtus, as the types of two distinct genera; and Dr. Leach, in accordance with his usual plan, considered the two generic names Cemònus and *P*emphrèdon as synonymes, and gave the lùgubris as *P*emphrèdon, and the minùtus as Cemònus. Mr. Curtis, deeming the two generic names as strictly synonymous, and consequently that the second in date ought to be expunged, has employed *P*emphrèdon for the typical Cemònus of Jurine, and for the typical *P*emphrèdon of Latreille he has proposed a new genus, Diodóntus.

If, however, the principles which I advocate are worthy of adoption, we are at once enabled to solve the difficulty, and obviate the confusion, in this and hundreds of the like cases.*

In conclusion, I may be allowed a few words upon the nature of the names of insects; and first, with respect to such generic names as have been objected to on account of their length extending beyond three syllables. Every language, as it has been said, consists of two classes of words; these are, the technical and the ordinary: now, although from the poverty of our language, and the discovery of various remarkable animals, it is possible that a few technical words may occasionally come into general use, it is absurd to expect ever to see the series of technical names of the various sciences becoming household words. There are comparatively but very few objects which the generality of mankind ever even see; and it is rather too much to suppose

* Scarcely a work upon entomology is published in which numerous fresh instances of this confusion are not to be found, and by which many of the best known species (*ex gr.*, the locust, bed-bug, sacred beetle of the Egyptians, &c.) are not given, in the works of English, French, and German authors, under two, and often three, different generic names.

that they will take much pains to learn these names. Hence, technical names are for the few; and, if for the purposes of science, and in order to obtain an expressive name, a word is formed of more than three, or even four syllables, I feel inclined to support it. Moreover, how is it possible to form a name derived from several Greek words, and confine it always within the bounds of three syllables. How, for instance, could M. Chevrolat (whose memoir, we have read this evening) employ a name expressing a small insect living in wood, shorter than Microxylòbius. I will not deny that I prefer an expressive name having some meaning, be it ever so long, to a nonsense name, be it ever so short. As to specific names, I have made various observations relative thereto in No. 13. of the *Zool. Journal*, some of which have been recently reiterated: but there is a practice respecting them, which has lately sprung up in France, which deserves notice; I allude to the manner in which the specific names of insects dedicated to distinguished entomologists have been written, without any Latinised termination: thus we have Pàphi*a* Franck, Cetònia Hope, &c. The custom of forming specific names from the name of the captor or possessor of a new species, although considered as a fault by a recent anonymous author, has been sanctioned by every naturalist since the days of Linnæus. It is an honourable testimony of the opinions of fellow-labourers. It may, perhaps, be considered that no classical rule can be applied for such formations: all that we can do is, to adopt the style of the Latinity of the middle ages. Hence we obtain such genitive names as Davís*ii*, Waterhoús*ii*, &c. (not Dàvis*i*, Waterhoús*ei*, as the author above alluded to has misstated), derived from the Latinised names of Davisius and Waterhousius, and not Davisus and Waterhouseus. To lay down further rules than this, would be as absurd as to say that these commemorative names should be at once translated into Latin; whereby we should have Drepanócerus Spèi, in honour of our treasurer, and Hemiptarsénus Aquæ Domûs, commemorative of our curator.*

ART. II. *Reply to C. J.'s Remarks on Mr. Neville Wood's British Song Birds.* By NEVILLE WOOD, Esq.

I HAVE just perused the observations of C. J.; and, as he has been kind enough to point out what he considers defects in my *British Song Birds*, I will endeavour to perform the same friendly office with regard to his paper. As the title of the

* This memoir was read before the Entomological Society.

book is the first thing that is found fault with, I may mention that the whole work was written before the title was fixed on; and that it was then given as the *least* objectionable that could be devised, without excluding several birds, which I by no means wished to do; desiring, if possible, rather to adapt the title to the work, than the work to the title. If your correspondent will name a better title, it shall be adopted. If C. J. has not met with "country folk so totally ignorant of ornithology as to mistake a house sparrow for a hedge sparrow," perhaps he will believe me when I assure him that *many* instances of this have fallen under my immediate observation. I have not only known the hedge dunnock, but also the whin (or common) linnet, mistaken for the house sparrow; and have fallen in with individuals who did not recognise the house sparrow when shown to them. N. B. These persons were "country folk," and not "town residents." I could easily multiply instances, but refrain from doing so, lest I should not be believed. C. J. says, "In a note at the foot of p. 39., the name of an original observer in natural history is introduced in a somewhat petulant and unbecoming manner, which might have been avoided." I beg to inform your readers (for they certainly never could guess it) that this "*original* observer" is Professor Rennie. The title of original is quite a new acquisition to the professor, and it is certainly the last epithet that could properly be applied to him. This, I believe, is agreed to on all hands; and the "pettish and unbecoming manner" in which many of our first naturalists (amongst whom I may mention Dr. Latham, Mr. Swainson, and Mr. Mudie,) have thought fit to allude to his compilations, has evidently had its effect, in preventing Mr. Rennie from pursuing his old habits, and may still be of service in hindering others from following in his steps. It will be observed that every other naturalist whose name is introduced at all, is spoken of in the true spirit of science; and, however I may have differed from them in opinion, I have carefully abstained from acrimony or personal abuse.

The mistake noticed at the bottom of p. 516. had previously escaped my observation; and I am glad C. J. has mentioned it, as it gives me an opportunity of thus publicly acknowledging it. The question regarding the song of the skylark is merely one of taste; and I shall, therefore, only observe that I still consider the notes (with a few melodious exceptions) harsh and monotonous.

With regard to the caging of birds, I may remark that it is cruel to cage the skylark, because its misery can only terminate with its life; whereas the migratory members of the

finch and warbler families, if treated with common care, are only sufferers as long as their migratory impulse lasts, which is about a fortnight in the spring, and the same period in autumn. But it would be best of all, for persons residing in the country, not to cage any birds whatever. Your correspondent informs you that "it has been the custom of Mr. N. Wood to rob many poor birds of their eggs;" and farther observes, "it is a high offence for a child to rob a bird of its eggs; but, when a *naturalist* does the same thing, the offence is overlooked." To say that a person has been in the custom of robbing birds of their eggs, seems to imply that he is a confirmed birdnester; a charge to which I can by no means plead guilty. In robbing the few nests which I have robbed, I have done it with a view of making myself more intimately acquainted with the operations of nature; and the nests selected for my experiments are always those which, from their situation, are most likely to become the prey of the schoolboy; and thus, in nine cases out of ten, my experiments have been destroyed. Viewing the matter in this philosophic light, it *is* a high offence* for a child to rob a bird's nest; and the same deed may not only be overlooked, but encouraged, in the naturalist. In the anecdote of the chaffinch, quoted at p. 519., of course I did not foresee what would be the fate of the unfortunate male; and therefore this should not have been cited as an instance of cruelty. Perhaps, however, the cruelty lies in my having so far taxed the organ of benevolence of my readers, as to have related the anecdote at all. C. J. appears to suppose, from the manner in which I have spoken of the works of others in the *Ornithologist's Text-book*, that I imagined myself capable of writing a book wholly free from blemishes. But that this is far from the case, is proved by the following passage, from the preface to the *British Song Birds*: — "*Of course it* (the book) *contains numerous errors*, which I shall gladly acknowledge and correct, when pointed out to me." I will now take leave of C. J., thanking him cordially for his strictures, and assuring him that they will be attended to. He may, however, rest satisfied that the second edition of my book will not be "rendered more free from phrenological references." Depend upon it, C. J. has either not looked into the science of phrenology at all, or he has viewed it with a prejudiced mind; and the time will assuredly come, when an anti-phrenologist will be looked upon as a rare and strange being.

Campsall Hall, near Doncaster, Oct. 7. 1836.

* Every one must, however, be aware that the child *means* no offence. The other day I asked a boy if he was in the habit of robbing birds' nests,

ART. III. *On the Habits of the American Flying Squirrel* (*Ptéromys volucélla* Cuv.). By D. W. C.

For the last few years I have kept the American flying squirrel in captivity, and consequently have had some opportunity of watching the habits of this interesting little animal, an account of which I send you; hoping that you will only insert it in your Magazine, if you think it sufficiently interesting to deserve a place in that very amusing publication.

The first pair of flying squirrels I had, I obtained from my brother in Liverpool; and when I received them they were perfectly tame, as they had been in my brother's possession for some time; and he had often amused himself with them in an evening, when they were playing about the room in which he was sitting.

They are almost always asleep during the day, curled round, with their tails covering their noses; but, in the evenings, and through the whole night, they are in constant motion. The moment I opened the door of their cage they jumped upon me, and generally crept into my waistcoat or coat pocket: indeed, more than once, after I had roused and fed them in the day time, I have found, to my surprise, some hours afterwards, that I had been carrying one in my pocket-handkerchief; sometimes even when on horseback I have felt one there.

It was my amusement to let them out every evening to run about the room; and I had constant opportunities of seeing them jump, or (as it has been called) *fly* across the room: there is, in fact, no flying motion of the expansion of skin from the fore to the hind legs.

When about to spring, they jerk the head up and down three or four times, as if to take their distance, and increase the power of rising. They generally sprang from some height down to an object they had selected to reach. Their power of rising appears to be very limited, as, indeed, will be obvious, when I state that the expansion of skin only acts as a parachute. They gradually fall, forming a curve in the air, the body being kept perfectly horizontal. They do not descend headlong or sideways, as Landseer's spirited etching in the *Fauna Borealis* would lead one to suppose. Their legs are stretched out, and the under part

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his answer was, as might be expected, in the affirmative; and, on my enquiring if he thought the parent birds liked this treatment, "Yes," was again his reply. This was an intelligent lad, about twelve years of age.

of the body appears a little hollowed, like the palm of the hand with the fingers nearly expanded. I do not mean to assert that, in a wild state, they never descend except horizontally; but they certainly do not do so in a general way. I have seen my squirrel come down from the cornice of the room (12 ft. high) upon the table; and, in his descent, finding that, if he continued in the direction in which he started, he would fall upon the lighted candle, he has suddenly thrown his body sideways, and thus turned about a foot out of the first direction; but he never appeared to have the power of turning much more than that. I can, however, easily conceive that, in a wild state, descending from a great height, from some tree, they may, in some measure, guide themselves by this power of turning sideways, and be carried to great distances by the power of the wind, and appear, as Bewick says, like numerous falling leaves.

Like all the squirrel tribe, they are in the habit of hiding all the food they do not immediately want to eat; and I had many opportunities of observing their recollection of the places in which they had concealed their nuts, &c. My brother told me, that one evening they amused themselves with hiding the nuts he had given them in the creases of his trousers, under his knees, as he was sitting; and, after four days, he let them out of the cage again, when they directly examined all the creases of his trousers for their hidden treasures. I found that whenever they were abundantly supplied with food, they were not easily satisfied with the quantity they were allowed to take, but would continue to fetch and hide it till all had disappeared.

My friends were often amused with watching the squirrels sitting quietly on the cornice of the room, over the curtain, till tea was brought in, when down they would come, one after the other, either upon my head, or upon the table, and steal lumps of sugar so quickly that we could seldom catch them. We were often obliged to place a saucer on the top of the basin, to keep any sugar for ourselves. They would then watch their opportunity, and take small pieces of toast or butter, which they carried to the cornice, and ran round till they thought they had found a secure place to hide them in, when they used to scratch with their fore feet, push the food down with their mouths and noses, and then stamp upon it.

On one occasion, when my room was going to be painted, we found eighteen pieces of sugar, besides toast and lumps of butter, in the corners of the cornice. Of course, during the painting, the squirrels were not permitted to have their

evening run; but, after three weeks' or a month's confinement, they were allowed to come out again, and we were much amused at the constant running round, and the anxiety they were in, when they found their stores gone. As soon as tea was brought in, they again stole the sugar, but hid it in the corners of the room, under the carpet, and behind the books.

In March of the second year, I found, one day, just after the squirrel's cage had been cleaned, one young one: whether there had been more, which had been thrown away, I do not know; but that one we reared, and he lived for some years. I then had an opportunity of procuring two more pairs, which, after some fighting, lived very contentedly with the three already in possession of the cage.

I found the males were often inclined to be amorous, but the females only appeared to be so in the spring. The males certainly did not seem to be very exclusive in their attentions, nor can I say that they ever were really paired, though I thought the females seemed to have their favourites. Whether they really pair in the wild state, I do not know. I found that as soon as the female was pregnant, she would not allow any one to approach her; and as the time went on, she became more savage, and more tenacious of the part of the cage which she had fixed upon for her nest, which she made of hurds put in for the purpose. Two of the females produced young last spring. I think the period of their gestation is a month; but of this fact I am not certain. The young are blind for three weeks after their birth, and do not reach puberty till the next spring. I never obtained more than two young ones at a time, nor more than one kindle in a year from the same female. The young were generally born in March or April. The female has five teats on each side, which appear through the fur some time before she brings forth. One of the females produced two young ones without making a distinct nest, or separating herself from the rest; but the consequence was, that they disappeared on the third day.

If on any occasion we disturbed the young in their nest, the mother removed them to another part of the cage. The common squirrel of this country is said to remove her young in the same manner, if disturbed. Finding this the case, we often took the young squirrels out of their nest, for the purpose of watching the mother carry them away, which she did by doubling the little one up under her body with her fore feet and mouth till she could take hold of the hind thigh and the neck, when she would jump away so fast that

it was difficult to see whether she was carrying her young one or not. As the young increased in size (which they soon do) and in weight, the undertaking became more difficult. We then saw the mother turn the young one on its back, and, while she held the thigh in her mouth, the fore legs of the young one were clasped round her neck. Sometimes, when she was attempting to jump upon some earthen pots which I had placed in the cage, she was overbalanced, and fell with her young one; but, as soon as she was near the ground, she would drop the young squirrel, so as to prevent her own weight from crushing it, which would have been the case if they had fallen together. I have seen the young ones carried in this manner till they were half-grown.

The eye of the flying squirrel is of a most beautiful black, large, and very prominent. The crystalline lens is nearly a perfect sphere, and occupies at least two thirds of the whole ball. It is of a very firm consistence; and pressure, even less than sufficient to cut it through with a sharp knife, renders it quite opaque: greater pressure causes it to assume exactly the appearance of spermaceti. I have found that pressure on the lenses of others of the Rodéntia, and of some fish (perhaps of many other animals), will produce the same appearance, though in different degrees.

The processes attached to the fore legs, to assist in expanding the wings, are cartilaginous in the full-grown young squirrel; whether it becomes bone in the aged, I have not had an opportunity of ascertaining. The flying squirrel is apt (like the monkey in confinement) to lose portions of the tail. I fed my squirrels on milk, sugar, nuts, and any kind of grain. I am sorry to add that this summer I have lost all but one by some epidemic.

Birmingham, Oct. 3. 1836.

ART. IV. *Notice of the Occurrence of Dreissèna polymórpha* Vanbeneden *in Northamptonshire.* By the Rev. M. J. BERKELEY, M.A. F.L.S.

THE *Mytilus* polymórphus *Pallas* was first recorded by Mr. J. D. C. Sowerby, in 1824, as naturalised in the Commercial Docks on the Thames, where it was probably brought on timber. In 1834 Mr. Stark communicated to the Wernerian Society the discovery of this species in the Union Canal, near Edinburgh. During the present month (July) it was found in considerable abundance, by the Rev. J. Streat-

field and myself, on the piers of the bridge which crosses the Nen at Fotheringhay; and again, a little higher up the same river, on the stones of a small overfall at Tansor. I have every reason to believe that its establishment in the Nen is of recent date (subsequent to 1828), and that it was introduced from Wisbeach on timber. I have formerly, with my friend Mr. Lowe, examined the stream carefully for several successive years, both above and below the spots where it occurred, but never detected a single specimen.


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No species of the order Mollúsca appears to be so indifferent to locality, as it is now found in almost every part of Europe, in inland seas, marshes, canals, tanks, and running streams. A new genus, whose characters are very distinct from those of *Mýtilus*, having been proposed for this species by Dr. Vanbeneden, whose observations are given in the *Annales des Sciences Naturelles* (vol. iii. p. 193. n.s.), it may not be uninteresting to such conchologists as have not access to the paper to copy its characters:

DREISSE'NA* Vanbeneden. (*fig.* 73.)

Animal. Mantle entirely closed, with the exception of three apertures, one of which is furnished with a siphon; anterior extremity of the body bifurcate, and including between the segments the anterior transverse muscle (which is attached to the septa); abdomen depressed; extremities of the branchiæ free through their posterior half.

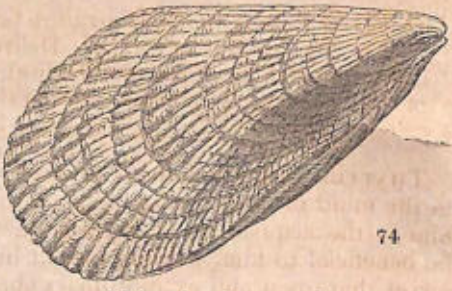
Shell regular, equivalve, inequilateral; beaks terminal, furnished within with a septum; muscular impressions three, of which the central is simple and linear.

The principal differences between this genus and *Mýtilus*, as indicated by the generic character, are as follows:—In *Mýtilus* the mantle is open; in Dreissèna closed. In the former the retracting muscle is divided into several bundles, each of which has its proper attachment to the shell; while

* So named after M. Dreissens, its first discoverer in Belgium.

in the latter these muscular cords are united into a single bundle, which has only one point of attachment. In *Mýtilus* the branchiæ adhere through their whole length; in Dreissèn*a* the extremities are free, and float upon the posterior transverse muscle. The differences in the shells are obvious; other points of comparison will be found in the memoir.

[In the third Report of the British Association for the Advancement of Science, Mr. Charles Wilcox, Curator of the Museum of the Portsmouth and Portsea Literary and Philosophical Society, states that when His Majesty's ship Wellesley was docked at Portsmouth, in July, 1824, he discovered on the lead of the cutwater, and under the keel, a great number of *Mýtili*, which, on examination, proved to belong to the species named crenàtus. The Wellesley was launched at Bombay about February, 1815, and came into this harbour in May, 1816, where she remained for upwards of eight years previously to her being taken into dock. The same species of *Mýtilus* has, however, within the last twelve months, been found by Mr. Wilcox among groups of *Mýtilus* edùlis, on the fore part of the keel of several ships, on being taken into dock, which proves their naturalisation in a climate apparently uncongenial to their nature."]



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Art. V. *A few Observations on the Aurora Borealis visible at Kensington on the Evening of Oct. 5.* 1836. By John Morris, Esq.

The phenomena of Aurora Borealis were visible in our neighbourhood this evening. I observed its commencement when passing over Wormholt Scrubbs about 7 o'clock; at which time an arch of dull light was visible, extending from N.E. to N.W., above the fog-bank of the horizon, with a few streamers passing from it, those on the east side larger and more defined than the rest. At 5 minutes past 7 the upper part of the easterly streamers had changed to red; at 10 minutes, the whole of the streamers more red, especially to the N.W.; at the same time the easterly ones became less distinct; at 15 minutes, the northerly streamers becoming more dull, those of the N.W. more red, and two or three dark streaky clouds

now visible nearer the horizon; at 20 minutes, redness disappearing, one bright streamer directly north, more distinct than the others; at 25 minutes, no redness visible, the northerly streamer still distinct, with a dull white light more westerly; at 30 minutes, no streamers visible, the whole changing to a confused dull light, and gradually dying away; soon after which the phenomena ceased.

The evening was cold and clear, with the exception of the mists covering the low grounds. Upon my return home the barometer and thermometer stood thus: external therm., 49° Fah.; internal do., 57°; barometer, 29·80.

Kensington, Oct. 5. 1836.

ART. VI. *A Lecture on the Mineralogy [and the Geology] of Nova Scotia.* By Mr. TITUS SMITH. Delivered on March 5. 1834, before the Halifax Mechanics' Institute, and printed by order of the Institute. [Communicated to this Magazine by R. G.]

(*Continued from* p. 375.)

THAT curiosity which the Author of our being has implanted in the mind of man, undoubtedly with a view of stimulating him to the acquisition of knowledge which must ultimately be beneficial to him, will not permit him to rest when he observes that great and extraordinary changes have taken place in the world which he inhabits, without attempting to learn how these changes have been effected. When he has discovered a considerable number of facts which bear upon the subject, and has so familiarised his mind to them, that he can take them all in view at once, he will perceive that there are other facts, which are necessarily implied by those he has discovered, and a greater number which he will think are rendered probable by those which he knows to be certain; and in this manner, before he is well aware that he has such a design, he will have framed a theory of the whole subject. These observations are introduced as some apology for the following hypothesis, which I should almost believe, did I know that the rocky parts of the earth generally resembled the little that I have seen.

The tradition of a "golden age," of a period in which there was no change of seasons, so generally spread through all ancient nations, is in some degree supported by the fossil remains of antediluvian animals and vegetables, which give no indication of a difference of climates. The Mosaic account of the creation and deluge favours the same opinion. "The Lord had not caused it to rain on the earth;" "A mist went

up and watered the ground:" vegetables alone were given to man for food. "Fourteen cubits of water" were sufficient to cover all the hills. "It rained for forty days and forty nights." "The fountains of the great deep were broken up." After the deluge, the rainbow is mentioned as a new thing; a proof that it had never rained before. Permission is given to man to eat animal food, without which he could not inhabit the polar regions. Summer and winter, cold and heat, are now first mentioned. The life of man is remarkably shortened.

The tremendous showers of rain that attend the eruptions of Vesuvius are stated to exceed in violence, and in the immense quantity of water which falls, any thing observed upon any other occasion; and the floods which they have produced appear, on some occasions, to have done more damage than all the other accidents attending the eruption. Undoubted volcanic remains prove that, at some period prior to the date of history, subterranean fires must have prevailed in a greater degree than they have been known to do since. If these eruptions were simultaneous with the deluge, and what is meant by the "breaking up of the fountains of the great deep," they would be sufficient to account for the shock given to the earth, by which the parallelism of its poles with those of the equator was destroyed, and a rotation of seasons necessarily introduced. Such a shock must have caused all the water of the ocean to roll over the earth with a force sufficient to have produced our present mountains, by removing the soil that covered them, and, for a time, presented an appearance resembling the allusion of the prophet to this event: — "The windows from on high are open, and the foundations of the earth do shake. The earth is utterly broken down. The earth is clean dissolved. The earth is moved exceedingly. The earth shall reel to and fro like a drunkard, and shall be removed like a cottage."

I have seen a piece of shallow plough-land resting on a sloping rock, which had the earth partly washed off in a heavy shower. The most elevated parts of the rock were naked, with a few large stones upon them, often resting on pebbles; the hollows of the rock filled with loose stones, which covered a portion of the gravel; here and there, where a whirling eddy had been formed by the position of the stones, small hillocks of the earth formed; the earth which had been carried off disposed in layers, varying in fineness and in the proportion of small stones which they contained. Such is the general appearance of our mountainous districts upon a larger scale. The rounded form of the stratified gravel everywhere indi-

cates that these fragments of stone have been subjected to a violent motion. Thousands of boulders of granite *, lying on hills of naked rock, rest upon rounded pebbles. The valleys between these hills are covered with broken stones. The gravel, where deep, lies near the lower parts of the hills. The whole suggests the idea, that an immense volume of water, rolling over these rocky districts, has carried off the soil which once covered them. The charcoal so frequently to be found in the sandstone, proves that it was once on the surface of the earth; and stems of trees, in a position at right angles with the layers, and sometimes passing through many of them, indicate that the layers were deposited nearly at the same time, and probably prevented from adhering together by slight depositions of vegetable matter not susceptible of petrifaction.

None of our rocks can be called "primitive," if this term designate such as have lasted from "the beginning," for they all contain rolled and angular fragments of other stones. The township of Halifax rests chiefly upon granite, and is the only place that I have seen, in the province, where a considerable plain can be found upon this kind of rock. Near Dover and Prospect, the granite contains a very large proportion of rolled stones, of ironstone slate, and whinstone, varying in size from 4 ft. to 2 in. in diameter. The proportion of these embedded fragments increases as we approach the sea shore, where they are so abundant, as to impress the idea that this mass was originally a portion of disintegrated granite mixed with rolled stones, which was deposited in its present situation

* As the supposition that these blocks of granite have lasted for so long a time in their present position may seem to border too much upon the marvellous, it should be observed, that they cannot have been completely exposed to the open air for any considerable time. Naked rocks are soon covered with the crustaceous lichens. The minute leafy kinds are attached thickly to this crust, and soon followed by the larger kinds, commonly called paper mosses. As they are bad conductors of heat, they preserve them in some degree from the effects of sudden changes of the temperature of the air, as well as from the mechanical action of rain and wind. They answer the same useful purposes upon the stems of trees, most of which are known by the colour of the crustaceous lichens which cover them, and not by that of the bark, which in many trees, of which the beech is one, is entirely covered with them.

Among the abundance of lichens which are found on our hills of rock, there are some which will be found useful when this becomes a manufacturing country, and which may now, perhaps, pay for exportation. The linen with which the piece of flannel attached to this paper is dyed would, it is conceived, if brought into common use, save half the indigo used by our countrywomen in dying blue, as it is not liable to fade like logwood colours, nor does the operation of dying with it injure the cloth. A brighter colour might have been given; but the cheapest materials (urine and a little lime) were purposely used to extract the colour.

at the time when the innumerable boulders of granite which rest on our hills of naked rock were fixed in their present position: the time when the surface stones of every kind were thrown southward of the mass from which they were broken: the time when so many large portions of the surface of the solid hills of slate and whinstone were ground smooth, and marked with north and south lines by the attrition of the stones which the current of the deluge rolled over them. From the granite of this plain having its felspar very frequently stained with yellow oxide of iron, as well as from its forming a plain, so very uncommon in a granite district, I have been led to believe that it is but of inconsiderable depth, and that it rests upon slate. It should be observed, that this embedded stone differs much from the masses of ironstone slate which are at a distance from granite, but very little from that which is contiguous to it: it contains a larger proportion of mica, and sometimes a few grains of felspar. I have often observed that a piece of ironstone slate of 10 lb. weight has communicated a yellow stain to the felspar of the rock in which it is embedded for the distance of half a yard. Wherever granite is much broken, rounded and angular pieces of a finer-grained granite may be observed, holding a greater than common proportion of mica. I conceive that these embedded fragments were not originally granite, but that, by means of an internal motion in the rock, the material which forms mica and felspar has been introduced from the adjoining granite, and that the period may arrive when they will be no longer perceptible.

I am aware that this supposition must appear absurd to many, as the growth and changes of rocks are so slow, that we have not the same kind of evidence of their certainty that we have of those in the vegetable kingdom. But all our large masses of rock are in some degree pervious to water, and must be more so to aerial fluids: and that the elements of rocks can readily assume an aerial state, any person may convince himself by rubbing two pieces of quartz, hornblende, or fetid limestone smartly together for a few seconds; when he will not only perceive a strong smell, but also that he can distinguish the different kinds by their peculiar smell.

We all know that the external parts of stones are liable to decay and change from an exposure to the weather, but have generally, it is believed, an idea that the internal part is a dead inert substance in which there is no motion, being at present in exactly the same state that it will be at a future period. Closer observation will convince us that this idea is not always correct. Blocks of whinstone are often met with contain-

ing veins of quartz, varying from 2 in. in thickness to an eighth of an inch, and less: they have the appearance of having been cleft and again united by the seam of quartz. It appears to be necessary to the formation of the quartz, that the external air should be partially excluded. In the woods, when the mossy turf is removed from a cloven whinstone rock, if the fissure should not be more than 2 in. broad, the opposite faces of the rock will often be found covered with quartz; sometimes with very small, glittering, sharp-pointed crystals; often with larger, more opaque, and less perfectly formed crystals; often both faces are covered with solid quartz, and in some places united by it; while in others a small space remains, and points of crystals cover the opposite faces of the quartz. The first crystals that are formed are nearly at right angles with the face of the rock; but, before the fissure is entirely filled up, some are often found in other directions. This circumstance may be caused by the fires which occasionally destroy the turf with which the rocks are covered; when the fissures being exposed, the crystals become opaque, and sometimes shivered: and, being on their surfaces in a state of decay, are not continued when a new coat of turf is formed, but new crystals grow from their surface, some of which, being attached to the beveling planes of the points, they form a mass of prisms which are not parallel to each other.

These veins of quartz occur also in granite and slate. When the veins are 6 in. or more in width in this latter rock, they usually contain embedded broken pieces of slate. There are several other minerals which occasionally fill up veins and cavities in rocks; but it should be observed, that these minerals are always component parts of the rock in which they are formed. Thus common slate has its fissures united by pyrites; broad veins of felspar are found it granite; calcareous spar forms veins in limestone, sometimes so numerous as to give the idea that it has formerly been cleft into minute pieces like half-slacked lime. There is a pebble approaching to jasper, rarely met with, composed of concentric layers of alternate yellow and brown, which has the same appearance, being very thickly veined with quartz. Near akin to this pebble are those rounded depressed lumps of yellowish claystone, sometimes found embedded in sandstone, which always contain a blackish nucleus in the centre, at times so much resembling a piece of iron rust as almost to give the impression that we may be surveying the remains of an antediluvian implement, which, changing to rust, had petrified the surrounding clay, in the same manner that I have seen a somewhat similar

stone formed about the head of an old axe which had been long buried in the ground.

The black limestone on the Cape Breton side of the Gut of Canso contains veins of beautiful violet purple spar.

The precipitous ledge of Cap Dore, which contains native copper, has some of its fissures united by veins of jasper and chalcedony. The amygdaloid, of which some fragments are found embedded in the ground near Halifax, and large blocks on the basin of mines, appears to the eye to be the same stone as the lava of Teneriffe; but this last contains empty vesicles like blacksmiths' cinders; while in our amygdaloid the vesicles are filled either with earthy chlorite (painter's mountain green), or with balls of opaque lime spar (steatites) composed of crystallisations which radiate from a common centre, and generally coated slightly with mountain green.

This amygdaloid appears to be very ancient lava, the vesicles of which have been filled up by the crystallisation of a portion of its material.

There are in this province masses of coarse gritty calcareous rock, which contain abundance of cockle shells in their natural situation. Upon breaking this rock, most of the pairs will be found to have the space which was formerly occupied by the animal partly filled with transparent glittering crystals of lime spar. A very small number are empty, and a small number filled completely with an opaque stone, finer-grained and lighter-coloured than the external rock; the shell itself having changed its appearance, and become more like the rock in which it is enclosed. The appearance of the whole indicates that these shells will finally disappear, and the rock appear, and be a homogeneous stone. On the barren part of the southern coast of the province, masses of conglomerate rock occur, composed of the common slaty gravel cemented by yellow oxide of iron derived from the slate. In other places may be seen similar conglomerates; but the yellow oxide has become red. The whinstone gravel and smallest pieces of slate are also red. The large pieces of slate still retain their colour. Another stone is all red; the form of a few large pieces of slate are visible; the small pieces are no longer to be seen, but a few very transparent specks of quartz appear, occupying interstices between some of the fragments of stone contained in the original mass.

In the eastern part of the province, large masses of puddingstone are frequently met with. They are composed of rounded pebbles of white, red, and blue stone, mostly siliceous, cemented, generally, by quartz, which fills the interstices: in a few instances the cement is sandstone. As these pebbles are the

same in appearance as those in the beds of many rivers, it is probable that they were rolled by the action of water into their present situation, where the external air being excluded by a covering of earth, they were united by the crystallisation of a portion of the siliceous earth they contained.

A large collection of conglomerates, that is to say, of stones composed of earth and broken stone cemented with quartz, lime, oxides or carbonate of iron, &c., would go far towards proving that many masses of rock were at some former period collections of the debris of various kinds of stone thrown together promiscuously, which, petrified either by oxide of iron from some contiguous mass of pyrites, or by the crystallisation of a small portion of the silica or lime contained in the mass, had since gone through certain changes (by means of an internal motion in the mass), which had made most of their peculiar distinguishing marks disappear, and changed a considerable portion of the mass into a homogeneous stone. Fragments of felspar appear to be never affected by these combinations any farther than taking the colour of oxides of iron, and mica usually retains its natural appearance. The cavities which abound in conglomerates at first are, by degrees, occupied by a growth of transparent crystals, which are either siliceous or calcareous, in proportion as these earths predominate in the mass. It is most probable that the matter which forms these crystals is dissolved in an aerial fluid. For it is proved, by the appearance of those which are of several colours, that they increase, like trees, by additional layers formed upon their surfaces; and it is inconceivable that the small quantity of watery fluid borne by capillary attraction to the cavities could be distributed over their surface in such a regular manner in any other than a gaseous state. Many appearances in stones render it probable that a part of these transparent crystallisations finally become opaque, and, by degrees, acquire the nature of the rock in which they are embedded. Among the fragments of porphyries and porphyroids which are generally spread over the province, some specimens occur containing small spherical nodules of reddish brown jasper, or a stone approaching to jasper, which are generally solid; but there are some which have a cavity in the centre lined with pellucid spar. Nodules containing similar cavities are sometimes found in the common fetid limestone, which are liable to produce dangerous explosions when thrown into the fire.

During the decomposition of pyrites, a portion of the rock in which it is embedded is frequently decomposed. When this rock holds a considerable proportion of silica, crystals appear to form with great rapidity. I have seen, in the front of a perpen-

dicular rock, a cavity, equal perhaps to six cubic feet, which seemed to have been exposed to the air for several years, by the falling off of a part of the rock which had covered it. This cavity appeared to have been not long before occupied by a mass of pyrites. The greater part was decomposed, and lay at the bottom, a blackish grey powder, strongly impregnated with vitriol. Mixed with this powder there were several pieces, of the weight of 1 lb. or 2 lb., of the common granular pyrites, which is generally completely decomposed by an exposure of twenty years to the air; yet the roof of this cavern, and the sides as far down as the pyrites had fallen off, were completely covered with crystals, some of which were half an inch long. Collections of crystals generally seem to be connected with stones in a state of decay. In the granite district of the township of Halifax, there is a tract where specimens of crystallised quartz are frequently found, part of which is of a light purple colour. It is generally attached either to a kind of conglomerate formed of granite partially decomposed, cemented by quartz, or to a mixture of quartz with felspar in a state of decay, containing small cavities filled with China clay.

The appearance of the large masses of rock seems to indicate that the veins of every kind found in them were once fissures, and have since been filled by metallic ores, or some other mineral substance which formed a part of the general mass; and which, dissolved in a fluid or in a gaseous state, and impelled by that kind of attraction which causes the union of particles of matter which are all of one kind, have filled up these vacant spaces; thus forming collections of many substances useful to man, by drawing their materials from a mixed mass.

In referring to attraction for the explanation of certain combinations, I wish it to be understood that the term is used, not to cover, but to avow my ignorance. It might be defined to be a law which governs certain physical actions of which we do not know the causes. All kinds of attraction are, doubtless, effects as well as causes; but they are mostly the effects of causes which man has not discovered. Thus a lie made from the ashes of wood which grows near Halifax, or on any other vitriolic soil, will be found to contain potash, and another salt now called sulphate of potash. This last cannot be dissolved in less than sixteen times its weight of cold water: the potash will dissolve in less than its weight of water; consequently, by evaporating the lie, the sulphate of potash may be crystallised and separated, while the potash remains dissolved. This might be explained by saying, that, when this salt formed

the seventeenth part of a solution, the attraction of its particles for each other was stronger than their attraction for water; but this would convey no more information than saying in plain words, We know that this salt will crystallise when it forms a seventeenth part of a solution; but we do not know the cause, any more than we do why potash will *not* crystallise until it forms more than half of a solution. Thus it is in every scientific pursuit: we presently come to bounds which prove that our mental powers are very much limited. We *may* learn that there is a necessary connexion between the mineral, vegetable, and animal kingdoms; that many things which we had viewed as nuisances were in their proper place, and answered useful purposes; and that the care and wisdom displayed in preserving and continuing what are accounted the most insignificant plants and animals are so manifest, that we shall not be disturbed by dreams of the soil of our continents being washed into the ocean, or our planet displaced by the shock of a comet. But we shall learn, at the same time, that the number of things of which we have little or no knowledge is much greater than we were aware when we commenced our studies.

In traversing the dreary barren shore which extends from the mouth of the north-west arm, nearly to Margaret's Bay, some persons of good sense, who have thought little upon the subject, are tempted to exclaim, Why were those barren wastes created? This question will be answered by referring them to the quantities of fish caught on the barren shores of Newfoundland and Labrador; while, on the shores of the ocean, no place is found where fish are caught in abundance upon the coast of a very fertile district; and the inhabitants of Halifax would be poorly compensated for the loss of their fish-market by having their townships covered with a fertile soil.

During the season of vegetation, a very fertile soil, whether in a state of nature or of cultivation, strikes every eye as a beautiful object: but a rusty slate soil, where the spaces between the stunted spruces and hacmetacs are occupied by trailing juniper, kalmia, mayflower (Epigæ`a rèpens *), and a little starved grass, is so associated in our minds with the ideas of sterility and poverty, that the first sensation it produces is far from pleasing: yet the naturalist, whose thirst for knowledge compels him to search a little deeper, will even here find sources of information and amusement. He will learn that this despised soil contains stores which may be useful to

* The Epigæ`a rèpens, or mayflower, was introduced into Scotland by the Countess Dalhousie, who was supplied with it by Mr. Smith. — *R. G.*

future generations; and that it must have been as valuable to the aboriginal inhabitants as the more fertile districts, during that unknown number of ages which preceded the (to them) fatal period, when, "their times being fulfilled," that power was guided to the American shores, which "devoureth, breaketh in pieces, and stampeth the residue with its feet."

Upon turning our attention to the slates, we shall, with the little knowledge we possess, be able to perceive that they are useful to man, and that they have not been "created in vain."

To render the purpose for which the specimens of this stone are collected intelligible to those who have paid no attention to chemistry, it is necessary to observe, that all slate which is covered with a coating of rust (technically called brown or yellow oxide of iron) either contains, or has contained, pyrites, a mineral which has a metallic lustre, and which varies in colour from white to yellow; that the pyrites in the common slate is principally composed of sulphur and iron; that, with the exception of the species called marcasites, which is crystallised in regular figures, it is always decomposed by exposing it to the action of the air for a few years; the sulphur, by attracting oxygen from the atmospheric air, becoming sulphuric acid, dissolving the iron, and forming the salt called sulphate of iron (the common green copperas of commerce); the pyrites, during the process, losing its lustre, and either falling to a powder, or becoming a soft blackish stone.

This salt, dissolved by the water absorbed by the rock, sometimes forms chalybeate springs, but more frequently rises in small fissures to the surface of the rock by the power of capillary attraction, where it forms those white lines which may always be observed upon slate rocks after a few fair days in summer.

When a solution of copperas is exposed to the air, it is soon decomposed by new combinations. This decomposition is accelerated by its coming in contact with vegetable mould or peat earth. The oxide of iron separates in a light bulky state, giving the water a thick oily appearance and ochraceous colour; a state in which it may often be observed in ditches on the peninsula. This substance, on poor soils, soon hardens, encrusting the stones, and often cementing the gravel and forming large masses of conglomerate rock, such as composes the bank on the south side of the Governor's Farm, and in several places on the shore of Dartmouth. Even on fertile soils, fragments of slate may be found, which have doubled their bulk by petrifying a portion of the contiguous soil.

Slate stones, therefore, which have a strong brown crust,

make an excellent material for roads, as the copperas they form is slowly changing a portion of the soft soil to stone.

The vitriolic slate which lies under peat earth is never encrusted with oxide of iron, or petrified earth; on the contrary, the stones frequently have a worm-eaten appearance, the spaces near the surface, which were once occupied by pyrites, being empty.

Whinstone, in the same situation, appears to be in a state of slow decomposition, the surface resembling a soft white sandstone. The same effect is produced upon these stones by remaining for a considerable time under heaps of stable manure, and also, in some degree, by the covering of the turf of old woods. This proves the absurdity of the practice, still too frequent near Halifax, of repairing roads occasionally with soil from the ditches; as a material is introduced in the rich mould formed from the manure washed from the road, which not only serves to make dust in summer, and mud in the spring and autumn, but also to dissolve a portion of the stony part of the road.

It appears, therefore, that peat earth must be useful to the agriculturist upon vitriolic soils, which are too gravelly, as it will change a part of the stone to earth, although it will not, like carbonates of lime, change it to a fertile soil. The beds of bog ore found under peat swamps have probably originated in the vitriol of the slate. Small beds of this ore, in a quantity too inconsiderable to be worth working, may now be found near Halifax; but, as it appears to be necessary to its rapid formation that the ground should be exposed to the sun, I conceive that it will be more abundant hereafter.

Where a barren slaty soil is covered by a growth of firs two or three hundred years old, the surface is usually overspread with a layer of turf from 6 in. to 12 in. in thickness. Beneath this turf, which excludes the external air, the slate appears more free from rust, more solid, and holding more bright pyrites near its surface, than that which has been for a considerable time exposed to the air. Yet there is always at the bottom of the turf a considerable quantity of charcoal, which, together with an abundance of raspberry seeds, proves that the ground was open previously to the growth of the firs. It seems, therefore, that the pyrites is reproduced after the turf becomes so thick as to exclude the external air in a considerable degree.

The oxygen of the oxide of iron and sulphate of potash probably unites with the charcoal, while the iron and sulphur again form pyrites in the cavities where it formerly existed. It would follow from this supposition, that, while a country is

inhabited by a race of savages who carefully preserve the forest, the formation of iron ores (useless to them) is retarded. But that when they are replaced by a civilised race, whose habits lead them to destroy the forest, the ores of this (to them) most useful of metals are rapidly accumulated. As many of our hills of common conglomerate contain a very considerable proportion of iron, some of them might be worth the trouble of an essay intimating the manner in which they must be smelted in large furnaces. It is to be observed, that iron ore is valuable rather for the good quality, than the large quantity, of metal which it gives; for, as iron is a combustible metal, it is always found necessary to add to rich ores a large quantity of some kind of stone or sand, partly for the purpose of forming a covering of glassy cinders to protect it from burning, by excluding the air. The late Mr. Pernette showed me a piece of cast iron which he had melted from the common conglomerate. By his assay it had yielded a fourth part, or 25 per cent.

Slate usually stands vertically, and runs in a direction a little north of east, and south of west. It is almost always rent with fissures for a considerable depth, most of which cut obliquely across the natural line of cleavage of the slate. Some of these fissures are united by veins of pyrites; others open, with opposite faces coated with oxide of iron. The varieties to be found in the common slate are numerous, although, in general, the difference between them is not great. When the rock is naked and smooth upon the surface, the layers which mark these varieties are very visible: a few of them are siliceous, and nearly as coarse as whinstone. Very rarely a thin layer occurs, which will split like roofing slate. The greater part of the slate in which the pyrites is mostly decomposed splits easily, though not with regularity. There are some layers which show no disposition to cleave like slate: the most remarkable of these are, a kind of limestone in very thin layers, which usually are of small extent. It is extremely hard and heavy; strikes fire with steel; is of a slate colour generally contains pyrites, and sometimes granite of the colour of rosin. Like many other kinds of limestone, it decays when exposed to the air, forming a black rotten stone. It burns to a dark sandy lime. I conceive that a portion of the materia which forms slate has been introduced into this stone since it has been in its present situation, and that it was originally a common limestone; for I have in a single instance observed a rolled piece of this limestone in common slate, and think it very probable that it was originally of the same kind with that of which many rolled pieces (with the figure of paving stones)

are found in whinstone, now scarcely distinguishable from the whin, but which have probably had a portion of hornblende and silex introduced into them since they were embedded in their present position, which is the cause of their giving a dark sandy lime.

Another kind, which will not cleave, often forms layers of considerable size: it is as hard and fine-grained as the limestone, contains a larger portion of pyrites, but will not burn to lime, and is usually encrusted with rust. Upon working a few feet into the rock, this variety sometimes changes into a stone resembling the Norway rag, with an undulating grain like that of wood, and coated on one side with a thin layer of fine alum slate. I have seen a single instance in which a cylinder of this slate, composed of concentric layers of grit about as thick as the grains of ash, and surrounded with a thin bark of alum slate, formed such an exact representation of a log of wood, that it might have been mistaken for a petrifaction, had no more of the same variety in a different form been seen. The specimen marked alum slate is taken from the cylindrical block above described. Although fine-grained alum slate like this specimen is very common in Halifax, I have not seen a vein more than 1 in. in thickness. When first broken from the rock, it will mark paper like black lead; but it soon becomes hard by exposing it to the air. But there are other varieties, in very broad veins, which will yield alum. One rule may be given to distinguish them all. Every slate which gives a blue mark when rubbed upon a piece of the same kind, will, by skilful management, yield considerable alum. The property of marking blue seems to originate in a partial decomposition of the slate itself, that occurs during the decomposition of the pyrites. In most situations where peat bog rests upon slate, shallow beds of blue clay occur, apparently formed from slate decomposed by the peat. This is a very tenacious clay, dries hard in the sun, but crumbles to dust if burnt or long exposed to the air. From this clay alum can be made with less expense than it can from slate. Should any one be disposed to try the experiment, it would be necessary to observe that the substances which yield alum will also generally yield copperas; that copperas is composed of iron, dissolved in sulphuric acid; that alum is composed of pure clay or alumine dissolved in sulphuric acid mixed with a portion of fixed or volatile alkali (in most specimens of alum, with both); that, if alkaline salt should be added to a solution of iron in sulphuric acid, a portion of the iron would be instantly separated, but that the acid dissolves clay most readily when mixed with a certain proportion of alkali. Were alum

slate from uncultivated ground, or clay from the common, to be exposed to the air for a year under a shed which protected it from the rain, and frequently turned, it would, upon lixiviation, yield copperas; but clay from the side of a cellar wall, or alum slate from the streets of Halifax, in the same situation, would form alum, because it would have imbibed a portion of alkali from the wash of the yards. As these clays differ in quality, being formed from different varieties of slate, it is customary, previously to establishing alum works, to ascertain by experiments the kind, and the exact quantity, of alkali that will make the clay most productive. Some clays are mixed with peat, dried and burnt; others are placed under sheds, and frequently turned, sprinkling them with urine till the proper quantity has been added. Both wood ashes and urine are found necessary for some. It is also necessary to pay attention to the season in which the clay is lixiviated; for alum forms most readily in the hottest season, while other salts are formed from the same materials in the cooler part of the summer.

Some of the clay near Halifax that I have tried has become so highly impregnated with alum as to present a glittering appearance by candle-light or in the sun, the surface being half-covered with crystals of alum. As our barren soils contain the materials in abundance, it is probable, that, at a future period, there will be extensive alum works in this province.

Besides the slates, there are other matrices of alum in the province. I have observed alum formed from the soil of some of the meadows on the Souiac, which contain salt springs, and lie contiguous to gypsum. It is formed, also, in the decayed portions of the fine-grained, hard, grey rock which alternates with the sandstone at the Joggins, near the Cumberland coal mines. The band of slate upon which the town of Halifax is built, after running westward five or six miles, meets a mass of granite, where it ends. Eastward, it may be traced as far as Petpiswich, varying from one to two miles in breadth. Upon the north side of this band there is a breadth of about 100 yards of pale siliceous slate, part of which is harder and heavier than whinstone. South of the Halifax slate, the band of whinstone extends in breadth southward five or six miles; part of a band of slate appearing again near the po'nt on the west side of the entrance of Cole Harbour. Northward, the band of whin extends from the three-mile house at the basin, where it commences, to the sixteenth mile on the Windsor Road, where a considerable band of slate occurs. Where these bands of slate join the granite on the west, they become

ironstone slate, a singular variety, of which the distinguishing marks are, that it is heavier than any other stone in the province; that it is harder than common slate, and some portions of it harder than granite; and that it generally contains a large proportion of small oval grains, so exactly resembling the gravel formed from the debris of coral rock in figure and size, that I have conceived it to have been originally a shell gravel like that of Bermuda, Florida, &c., which had, since it was embedded in its present position, by the introduction of a portion of the iron and hornblende of the rock, changed its colour, and, in some degree, its nature, without losing its original figure. Although, from its resemblance to the stone in which it is embedded, it is scarcely perceptible in some specimens when first broken, yet it is often perfectly visible upon the surfaces of the same specimens; for, as it frequently decays when exposed to the air, either with greater or less rapidity than the stone in which it is contained, the surfaces will sometimes appear eroded with small oval cavities, while in other specimens they are overspread with the gravel in the form of the roe of fishes.

The hardest and heaviest ironstone is frequently separated into flags, which show no disposition to separate again. It rings like metal when struck, and contains abundance of small crystals of hornblende, extremely hard, branching through in every direction. It is very dark-coloured, and has the smell of hornblende: perhaps it ought to be called a hornblende slate. I have observed that where the west end of the whinstone joins the granite, it differs little from the ironstone, becoming heavier than common whin, and containing coral gravel. In the few places where I have seen the rock naked at the line of junction, the ironstone appears to dip under the granite; and, although I have seen hundreds of fragments of ironstone embedded in granite, I have not as yet met with a piece of granite in ironstone.

These embedded fragments form so large a proportion of the rocks near the shore, that the sand between Sambro and Margaret's Bay has a grey colour; and the persons who supply Halifax with white sand find it necessary to go farther westward. The islands opposite the southern shore of the township are granite rocks. Their southern sides, exposed to the open sea, are worn always, and show layers of fine-grained stone (apparently formed from fine granite gravel), mixed with common black shorl. These layers are usually about 1 ft. in thickness, and, like those of stratified gravel, form curves somewhat analogous to those of the hill above them.

Is it not probable that this rock is of later formation than

most of our granite hills? that it was a mass of the debris of granite mixed with rolled stones, which, since it was deposited in its present situation has been cemented by a portion of its material, which had, probably, assumed a gaseous or aerial state? If this were certainly demonstrated, it would appear very probable that our granite generally had, at an earlier period, been in a similar state upon the surface, and that the embedded pieces had been stones of another kind, which have since become granite. I have seen so many facts which render it probable that quartz, felspar, and mica are, in some cases, rapidly formed, that I think it by no means proved that granite never contained any organic substance because they are not now found in it.

On slaty soils, the magnetic needle is very frequently turned from its proper direction: the error does not often exceed two or three degrees, but has been sometimes observed to amount to ten. This magnetism is probably caused by iron lately precipitated from a solution of vitriol in the state of an imperfect oxide; for the bright pyrites is not magnetic, nor are those ores in which the iron is in the state of a perfect oxide; but the iron in vitriol is in the state of an imperfect oxide, like the scales from the blacksmith's anvil.

As peat earth decomposes vitriol, depositing the iron in the state of a perfect oxide, the true direction of the needle may generally be found by setting the compass in the middle of a swamp: but this rule is not without exception; for I have seen a swamp, more than twenty rods wide, in which the needle is considerably affected. Small springs of chalybeate water are always running into this swamp upon one side, and the lower, of the hill; on the opposite side are large masses of alum slate, upon which the compass has been observed to change its direction four degrees upon removing it 20 ft. In winter, the true course may often be taken from a frozen lake. This magnetism is sometimes observed on soils which rest on whinstone; but I have never observed it upon granite. I have, however, observed a remarkable affection of the needle where the surface stones were all granite, there being a mass of that rock half a mile to the northward.

The bands of slate more frequently swell into lofty hills than those of whinstone, and are therefore the worst situation for roads, except the road runs in the direction of the hills. The road through Preston to Chezzetcook follows the band of slate upon which Halifax stands most of this distance. It crosses so many high and steep hills, that it can never be made a good road; but, had it been bent a little southward at Lake Loon, at the distance of three miles from the ferry, and, fol-

lowing that direction as far as necessary, continued to the other side of Lawrencetown River, about a mile farther south than the present track, it would have been an easy road.

Where slate rises in lofty hills, it frequently appears of a pale colour near their summits, and, containing but a very small proportion of pyrites, seldom acquires a rusty coat by exposure. Most of the best hills in Preston rest upon a rock of this kind; but, upon the lower part of the same hills, the rock contains a full proportion of pyrites, and the soil is, of course, of inferior quality. The basis of some hardwood hills is a slate rock, containing a mixture of limestone, and no vitriolic mineral. As the soil on these hills is fertile, it is useful to be able to distinguish this variety of slate: it is always of a light bluish colour, without rust. The limestone, which is fine-grained, and nearly of the colour of the slate, forms serpentine veins, which give it the appearance of having been cracked into regular fragments, and cemented by the limestone. When blocks of this slate are exposed to the air, the limestone is easily distinguished, as it decays and forms a brown rotten stone.

When we become rich enough to indulge in the luxury of dry roads at those times of the year in which they are now muddy, and of smooth roads at all times, our level roads will be covered with broken slate, of those kinds which readily shiver into thin pieces. The thin flat shingles of slate always incline to rise to the surface if near it: rounded and angular pieces of stone have a tendency to sink. These observations are not founded upon theory: I have seen some small specimens of such road. M'Adam, I think, recommends worn-out hoops, and similar useless pieces of iron, for making roads firm in moist situations. Nature has furnished us with a similar material in abundance. The common conglomerate, with a mixture of rusty slate gravel, will, in moist situations, make a very firm road. I have seen a road made across a small swamp, by first covering the remains of the old pickets with a layer of 10 in. or 12 in. of stone, which was again covered about 10 in. in depth with a rusty slate-gravelly earth, mixed with about a third part of fragments of common conglomerate. For ten years this road, though considerably travelled, scarcely showed the impression of a wheel; and it is still a tolerable road, though it has not been repaired for twenty years.

Besides the slates already noticed, there is another kind, always connected with the whinstone, of which it seems to be a variety: it is of a pale colour, never contains pyrites, and is, consequently, never of a rusty colour: it may be cleft like

slate, but not easily. It has formerly been used in Halifax for hearthstones and tombstones. Small veins of it are almost invariably attached to those masses of whinstone which are of a good quality for building stone.

The reddish brown porphyries and porphyroids, which, in small fragments, are generally scattered over nearly the whole province, most plentifully in clayey soils, were probably originally all conglomerates, formed from fragments of stones of various kinds thrown promiscuously together, which have, by means of an internal motion, so mingled the materials of which they were composed, that they have now become a homogeneous mass, with the exception of the felspar and quartz. The sandstones appear generally to differ little from the sandy soil which covers them. If the one contains rolled stones, they are found of the same kind, and in the same proportion, in the other; and they always alternate with about an equal proportion of a hard fine-grained stone, as sand, upon digging deeply into it, is found to do with clay. The three components of granite never show any tendency to unite as a homogeneous mass; it is therefore probable that our granite resembles that of former periods: yet is there good reason to believe that it has been, on the surface at least, in a state of disintegration, and also that it has a tendency to penetrate and change to granite some portion of those rocks which are in contact with it; mica, during this process, always preceding the quartz and felspar.

The common slate has clefts which admit some air for many feet in depth; and it appears to have suffered considerable changes, caused by the decomposition and growth of pyrites, and also of a portion of the stone: for, in breaking some kinds of slate, small cavities are found containing an earth differing little from magnesia, and many fissures, filled with the same earth, united with a little oxide of iron, and assuming a degree of hardness approaching to stony; and in calcareous vitriolic slate, which is in a state of decay, thin veins of selenite may be found, so soft that it may be ground with the teeth when first taken from the stone: indications that, during the decomposition of pyrites, a portion of the stone in which it is enclosed is also decomposed.

The whinstone also bears strong marks of having once been in a broken decayed state, and of having again become a solid rock. While these changes have been going on near the surface, it is probable that metallic ores, and other homogeneous minerals, have, by degrees, been collected in the deeper cavities and fissures of rocks which contained a small proportion of them diffused through their mass. Sulphur, so generally con-

tained in most rocks, appears to be the principal agent in many of these operations, and particularly in the formation of veins of minerals. It often renders the oxides of metals soluble in water; and, as it very frequently assumes an aerial state, it undoubtedly, like other volatile substances, renders a portion of the earths and metals volatile also; as lead is rendered volatile by a mixture of oil of turpentine. There are many springs near to gypsum from which sulphuretted hydrogen is always rising (they also generally contain muriate of lime); and the general trouble experienced in almost all mines from fire-damp, proves that there are always processes going on in the bowels of the earth by which water is decomposed, and hydrogen, the lightest known aerial fluid, set free. Carbonic acid also exists in the earth in great quantities as a component of limestone: this always assumes an aerial state when it comes in contact with other acids. As there are, therefore, such considerable quantities of elastic fluids contained in the earth, and as it is a known property of volatile substances to bear with them, when they assume a gaseous form, a certain portion of any fixed substance with which they were combined, it cannot appear improbable, that mineral substances may, in an aerial state, change their situations in masses of rock, and that crystallisation, particularly, may have been formed from the materials dissolved in an elastic fluid.

From all I have observed, I am compelled to believe that we have no proof that any mass of rocks in this province has existed in its present state from the creation. I believe that we have fertile lands formed from materials which once were rock; that we have masses of rock which once were earth; that there have been changes within the rocks as well as on the surface; and that these changes will continue till they are brought to a conclusion by the last great change.

ART. VII. *On some Deposits containing Mammalian Remains, at Maidstone, Kent.* By JOHN MORRIS, Esq.

THE general substratum, in the immediate vicinity of Maidstone, is the lower green sand, in which numerous quarries are worked for extracting the ragstone, and other layers, used for building, repairing the roads, &c. The river Medway at this town divides the lower green sand into two ridges, flowing through a transverse valley of that formation from Yalding to near Aylesford; below which it cuts a small

section of the gault*, and afterwards passes through the chalk to Rochester. Besides the regular formations, there are some superficial deposits, varying in their mineral character, but interesting on account of their contained fossil remains: of these we may notice the deposits of loam, brick-earth, sand, rubbly chalk, and gravel. The loam is extensively spread over the low grounds and sides of the hills, to the fertility of which may be attributed the numerous hop grounds and fruit orchards cultivated in this neighbourhood. The brick-earth deposits occur on the tops of the hills on both sides of the Medway, as well as in the intermediate valley. The following is a section of one † on the west side, about half a mile from the bridge on the London road, and from 80 ft. to 100 ft. above the level of the river:—Vegetable mould, 1 ft. Gravel of ragstone and chalk-flints, with some fossils, 2 ft. Veins of fuller's earth, sand with layers of pebbles, 13 ft. Loamy sand, with calcareous nodules and shells, as Succínea oblónga, Hélix híspida, Tùpa marginàta, 6 ft. Brown clay, 12 ft.: upper containing boulders of ragstone; lower part, teeth and bones of the horse, horns and bones of the ox and deer, elephant?

This deposit does not extend over the whole of the upper beds in the quarry, but appears to fill up some trough-like cavities formed by disturbance and fracture of the ragstone, the edges of which have been rounded and worn by the action of water. The different layers are not regular, especially near the sides, gravel and sand there alternating with veins of impure fuller's earth; the latter predominating when close to the ragstone.

The brick-earth deposits on the east side of the Medway are situated in the fields behind the new prison, and afford similar mineral contents. The ragstone is quarried in the lower part, but is also disturbed, and forms cavities similar to those on the opposite side, the edges of which are also rounded. The following is a section of them:—Vegetable mould, 1 ft. Calcareous loam and sand, 40 ft., with many fragments of flint, ragstone, sandstone, and layers of calcareous nodules. Shells, similar to those on the west side, are interspersed throughout; but the bones are confined to the lower

* At this spot, the bodies mentioned in IX. 47. are very numerous, and many of the same shape as those figured. I have broken a considerable number, but could never detect any trace of organic structure. Are not many of them only the harder concretions of the gault clay?

† The Iguanodon Quarry, so called from the discovery of the remains of that animal by Mr. Bensted in 1834, which is now in the Mantellian Museum at Brighton.

part, and consist of remains of the elephant, rhinoceros, ox, deer, &c. Yellow sand, 5 ft. A layer of fuller's earth, with harder concretions, is found between these beds and the ragstone. The calcareous loam has no appearance of stratification, and contains so much gravel that it is obliged to be washed before it can be used by the brickmaker. Higher up the hill, and reposing on the green sand, is a deposit of gravel, consisting of chalk-flints, ragstone, and sandstone in ferruginous sand.

These brick-earth deposits, with calcareous nodules, but of much less thickness, may be traced for some distance about this neighbourhood, a small portion being worked at Debtling, which there reposes on the chalk.

Mammalian remains also occur in other places, as near Sandling, about one mile from Maidstone, where the following section is exposed on the side of the road near to the river: — 1. Yellow sandy clay, with few flints, 12 ft.; 2. Greenish grey sand, with bones, 1 ft.; 3. Flints, in yellow sand, 4 in. The remains are observed only in No. 2., and consist of a rib-bone, one of the pelvis, and some fragments, probably of ruminants, but so much decomposed, and falling to pieces when touched, that it is impossible to remove them.

Passing along the road a quarter of a mile is a section of rubbly chalk worthy of notice, as it occurs two miles from any chalk in situ; the upper part consisting of large and small chalk nodules, below which is a series of alternating veins of sand, comminuted chalk, rounded and angular flints, which overlie a stratum of mixed chalk and flint nodules, the latter not much rolled, and reposing on the green sand.

Lower down the river, at Bostle, is a gravel-pit above the chalk, in which numerous teeth and bones of the elephant have been found.

I have not seen any remains of carnivorous animals from the above-described deposits; but a discovery of them took place a few years ago at Boughton, near Maidstone, in a chasm of the green sand, consisting of teeth and bones of the hyæna, wolf, fox, associated with those of the water-rat, &c., embedded in a loamy sand with calcareous nodules, specimens of which are in the museum of the London Geological Society.

From the above observations, we have evidence of the deposition of lacustrine sand fluviatile strata when the physical structure of the district differed little from the present, and after a portion of the gravel beds were deposited.

The remains embedded are those of quadrupeds, and of testaceous Mollúsca which inhabit the banks of rivers and

marshy places, no decided fresh-water shell having yet been detected in them. Some of the beds afford evidence of having been tranquilly deposited; others (as those on the east side of the river) of water charged with loam and gravel; whilst the remains in the gravel-pit at Bostle may have been washed out of a prior deposition, and again entombed as the drainage of the district became lower. But it is difficult to ascertain the relative age of these deposits; and "we should doubtless err in assigning all these mutations to one and the same period. The phenomena are extremely complicated, and an appearance which may seem to have been produced at the same time, and by a single operation, may have been the result of many and varied changes." (Mantell's *Geol. S. E. of England*, p. 350.)

It is, however, an interesting circumstance connected with these deposits, that the remains of elephants have also been observed in the other transverse valleys of the North and South Downs; as in the Stour, at Chatham, near Canterbury; in that of the Mole (mentioned in IX. 46.), and also at some height above the Arun. "These remains, consisting of a tusk, bones, and several grinders of the elephant, were found in a bed of gravelly loam, situated near the foot of the Downs, and reposing on the chalk, at an elevation of about 80 ft. above the level of the Arun." (Mantell's *Geol. S. E. of England*, p. 42.)

As connected with the above communication, it may be as well to notice that, during the historical era, the Medway has gradually changed its level. Ancient documents respecting the town of Maidstone attest that it was much wider and deeper than at present, which statement is borne out by some recent excavations on the east side. The first, at Mr. Fisher's brewery, where the following section was exposed, about 100 yards from the river, and 16 ft. above its present level: — Debris of Medway, rolled fragments of ragstone, drift mud, silt, &c., 12 ft. The other, at Springfield paper-mills, a quarter of a mile below, in excavating for a new reservoir, about ten yards from the river, and about 4 ft. above its level, consisting of a loamy sand, with pebbles and numerous shells, reposing on a bed of gravel. The shells are Hèlix radiàta, horténsis, hìspida, ruféscens, pulchélla, crystállina, pùra, tróchilus; Cyclóstoma élegans; Bùlinus lùbricus; Tùpa marginàta, pygmæ`a; Carýchium mínimum; Balæ`a frágilis; Succínea oblónga; Limax agréstis, Sowérby*i*. The shells have mostly lost their colour: those of the *Limaces* are very numerous, and frequently rounded like grains of pisolite. It is a singular coincidence,

as compared with the more ancient deposits, that the above remains belong only to land Testàcea, no river shells having been found among them.

Kensington, Aug. 23. 1836.

ART. VIII. *Short Communications.*

BIRDS.—*A Fálco Haliæ'tus* L. *shot near Oxford.*—"On Saturday last, was shot, at Nuneham Park, the seat of G. G. Harcourt, Esq., M.P. for this county, by W. Molyneux, the gamekeeper, an osprey, or fishing eagle (Fálco *Haliæ'tus* Linn.). It is a bird seldom met with in these parts; though round the northern coasts of Ireland and Scotland they are not unfrequently seen; where they wander from foreign countries. Sea coasts are their favourite haunts, and fish their chief prey; but, when their appetites are keen, they do not hesitate to prey on any thing that may come within their reach. Mr. Forrest of St. Aldate's, to whom the bird was sent to be stuffed, describes it as being about three years old, and just in full beauty of plumage. It measures 5 ft. 3 in. from the tip of one wing to the tip of the other; and from the point of the beak to the end of the tail, 23 in." (*Oxford University, City, and County Herald*, Sept. 24. 1836.)

Feathers in the Gizzard of the Grebe.—I am really quite ashamed that Mr. Loudon should have had to remind me that I had not acknowledged Mr. T. Knox's very kind and handsome communication on the feathers found in the gizzard of the grebe (and I can no longer doubt but they are feathers), containing a specimen of these curiosities, which was duly received, so far back as the 3d of July. Pressure of business will, however, in some degree account for my apparent neglect. On the 8th of September, I wrote to Mr. Loudon, to acknowledge the receipt of the letter; but this, it appears, never reached Mr. L.—*Neville Wood. Campsall Hall, near Doncaster, Oct.* 6. 1836.

Singular Capture of Vespertílio Nóctula Gmelin, *at Southampton.*—A fine example of this species, measuring just 14 in. in extent of wing (the *Vespertílio altívolans* of White), suddenly alighted between the neck and coat collar of an individual who was walking along High Street, towards dusk, at the end of July last. The poor gentleman's alarm was excessive, and had almost produced fainting; when fortunately a deaf and dumb person, who was passing at the moment, perceiving the cause of so much consternation, coolly took

away the monster with his bare hands. For a time it passed into those of Mr. Ware, hair-dresser and bird-stuffer, of this town; and ultimately into my own possession. Its demeanour, after being captured, was very fierce: and, indeed, its jaws are formidably armed for defence or aggression. It appears to me to be precisely the same with a bat common at Montpelier, and of which, in company with the late Mr. Lindley Rose of Parliament Street, Westminster, I succeeded in obtaining several specimens, one evening in July, 1830, by shooting them on the wing, when engaged in chasing the gnats and other insects which swarm around the beautiful aqueducts, supplying water for the fountains on the superb Place Pérou. Where no such object exists to induce them to stoop from their accustomed sublimity, these animals usually soar beyond the ordinary range of a fowling-piece; but, if a single corn pierces the membranous expansion usually termed wings, that instant they lose the power of sustaining themselves in the air, and fall, not without much squeaking, showing of teeth, and using them, too, if occasion offers, into the clutches of the unrelenting zoologist. Their flight resembles rather the steady evolutions of some of the larger birds, than the moth-like fluttering of their more diminutive brethren, so renowned for their domiciliary visits, and the dismay thereby occasioned to old women of both sexes; an amiable trait, which the present species never indulges, as being *infra dig.* in an animal that looks for subsistence to creatures inhabiting the same elevated region with itself, and whose motto, could he choose one, would probably be, "Aquila non capit muscas." — *Wm. Arnold Bromfield, M. D. Sept.* 1836.

Egret, Pratincole, Black Woodpecker, Blackchin Grebe. — Not having seen an answer respecting the egret (*Ardea Garzétta*), p. 320., I may as well mention that I have a memorandum of one having been shot near the river Stour, at Christchurch, Hants, on Wednesday (I forgot the day of the month), in the beginning of July, 1822, by the late Mr. William Lockyer, who sold it to Mr. Barrow of Christchurch, who stuffed and still has it, I believe. I have waited thus long, hoping to have had an opportunity of seeing it; but as I have not, I will wait no longer; trusting you will publish it, or not, as you think proper, till some one has identified the truth of it. Most probably, the bird would have come into my possession had I been in the neighbourhood at the time of its being shot, as Lockyer collected insects for me; or had he thought it would have kept good till I visited that part again,

and not been tempted by the picture of his late most gracious Majesty.

At a sale of birds, &c., I attended in March 1826, at Southampton, was an egret (a fine specimen), lot 38., sold for 5*l.* 5*s.*, probably shot near that place. Lot 25., pair of willow wrens, nest and eggs, turtle dove, variety, and *prating cole*, for 3*l.* In the case of the pratincole was written, Sept. 20. 1816; and a sailor I saw in the room told me he had shot several of the birds there. I believe I saw a pratincole alive in Christchurch, about ten or twelve years ago. (*Hirúndo*) Glarèola Pratíncola, or Pratíncola austrìaca, &c.

The claim of *Pi*cus mártius (black woodpecker), to rank as a British species has been disputed by Mr. Stephens and others; although Dr. Pulteny stated, "Shot in the nursery gardens at Blandford, Whitchurch, and other places in Dorset:" and Dr. Forster states, in his *Catalogue of British Birds*, "I never happened to see this bird wild in England; but it is admitted here on very good authority." I understand specimens have lately been shot in Lincolnshire and Norfolk.

A specimen of Pódiceps hebrídicus (blackchin grebe) was shot near Langport, and is in the museum there, under the care of Edward Quebett, Esq. *A*rdea nigra was also shot in that neighbourhood, and I understand is now in a collection at Taunton. — *J. C. Dale. Glanvilles Wootton, Sept.* 21. 1836.

Insects. — *Papílio Podalírius, a British Insect.* — At p. 333. Vol. III. I gave the different authorities for considering *P*apílio Podalírius as British. Mr. Stephens chose to consider this "absurd," giving as a reason that "it was a geographical impossibility;" and he has been followed by an anonymous correspondent at p. 541. Vol. V., viz. "I know that there are grave and reverend authorities," &c.; and "I apprehend that there is hardly to be found at present, in any cabinet, a single well-authenticated native specimen of *P.* Podalírius; and that its existence as a British insect is generally disbelieved by the most competent judges." Notwithstanding all these "absurdities," Mr. Curtis has figured *P*apílio Podalírius at plate 578. of his unrivalled *British Entomology*, giving another authority (W. R. Read, Esq.), and rescuing the former ones "from the imputations cast upon them."

I lately met with a gentleman at Bristol, who, I found, was well acquainted with the late Dr. Abbot, and I asked him if he had any reason, at any time, ever to doubt his integrity? He answered me, "Certainly, he was one of the last persons he should have suspected of falsehood;" and the Rev. Thomas Skrimshire answered me to the same effect.

Dr. Abbot stated that he took, in "May last (1803), *P.*

Podalírius, and in June following *P.* Daplídice and Lathònia." I stated to Mr. Stephens that I thought I had seen *P.* Podalírius in July, 1818. He said I must be mistaken; and the August immediately following (1818), he himself took both Daplídice and Lathònia. This coincidence strengthens the other; and I believe now no person will be bold enough to doubt their existence in Britain, although we have no means of proving the impossibility of their having been blown over from the Continent in a gale of wind, &c., especially at Dover.

Mr. Stephens gives us a figure of Còlias Philódice on his first plate, and erroneously calls it Europòme (of which I have an authentic pair from Russia); in which he is followed by Mr. Wood and others, saying it had been taken at York and Brighton; and now it is said to have been taken in the south of England, &c. I now call on any person who can prove it to be British or even European, to come forward and say so; giving the dates, localities, and names of captors (which to me is a most important point); or otherwise they must excuse me for requesting an interchange of places held prior by the injured *P.* Podalírius. Mr. Raddon has in his cabinet one of this said *C.* Philódice, which certainly, as far as pin and setting go, looks more like English than any I have seen. He tells me he received it from a Mr. Grey, and that it was taken near Dudley; whence, also, he had received Deiléphila lineàta (the true species, and not livórnica). Should this meet the eye of Mr. Grey, I should be obliged if he would give particulars.

On looking over Mr. Brown's fine list of Swiss Lepidóptera, (Vol. VIII. p. 207.), I find he gives Melitæ'a Euphrósyne as frequent in spring; and, in alpine situations, in July and August. I took it, in fine condition, near the Lakes of Westmoreland, much later than in the south, where at the time they are much wasted. The late Mr. Haworth had two pale varieties taken in September, called by him Euphràsia; and I have a small variety of Selène, taken by Mr. Standish, in company with Lathònia, in the autumn. The specimen I had from Dr. Abbot, called Nìobe, I rather doubt being any more than the pale-spotted Adíppe (p. 208.); which the doctor considered it in his MS.; and I believe I have a true foreign specimen from Mr. Children, who now occupies in the British Museum the same situation held by my late friend Dr. Leach, whose death I regret to see, in the paper, near Genoa, Aug. 24. last. — A'cis (p. 214.), in May and August. I found one specimen here the end of May; but June 10., in general; and it continues on, in plentiful seasons, to the beginning of August, though much worn. Lewin took it the end of August. This last season I have only taken a single specimen, but have

received a few from near Ringwood. "A much smaller variety is found on the Alps," and other observations, show locality has an influence on many species, such as size, colour, or markings. I found three or four whitish varieties of (*Bómbyx*) plantáginis on the Alps of Westmoreland. — Eulèpia crìbrum (pl. 561.). "Very rare; one near Berne;" on Parley Heath and neighbourhood, very common. I suppose I must have given away more than 200 specimens, but have not taken any myself for several years.—Mr. Raddon has one Zygæ'na filipéndulæ without the sixth spot in the margin, and another with it nearly obliterated. — *J. C. Dale. Glanvilles Wootton, Sept.* 21. 1836.

Insect Habits. — "How singular is the comparative abundance of some species of insects in different seasons! Here we have generally a fair share of cockchafers, and a good sprinkling of Cetònia auràta. This season I have seen but one individual of the former; while scarcely a dog-rose is to be seen, in any hedge, which has not several of its flowers ornamented by the green and gold back of one of the latter, who is thrusting his unwieldy form amongst the stamens. I am quite certain that, during the first three weeks of June, I could have gathered from four to five dozen daily from a single moderately-sized *Pyracántha* bush, in my own garden, on which Hóplia squamòsa also completely swarms. There is a caprice sometimes shown by insects, which I cannot understand. That a certain species should always prefer a white rose to a red one, is perfectly comprehensible; but, in a garden, containing a great number of white rose trees, all of them separated from one original individual, and planted in exactly similar situations, why should *Bupréstis* nitídula come flying from all points of the compass, and, during many years in succession, almost invariably alight in some four or five of the white rose trees, to the rejection of all the others? On two trees, about 8 ft. or 10 ft. apart, many of them may be found, and not one on an intermediate tree. I once thought that the neglected trees might have some other plant in their neighbourhood, which might give offence; but have found that not to be the case, as they will frequent one bush, and reject another, which has exactly the same neighbours, as well as aspect, soil, &c. — *P. J. Brown. Thun, Sept.* 12. 1835.

Capture of Sphinx (Deiléphila?) nèrii at Southampton. — Mr. N. M. Priaulx of this town has a fine specimen of the above noble insect, which he obtained from Mr. Ingram, a nurseryman in Southampton, who has paid some attention to entomology, and who assured me that he captured it himself, about four years ago, near Netley, or Marchwood, but

was ignorant of its peculiar rarity at the time he parted with it to Mr. Priaulx. The specimen I have seen in this gentleman's possession, who has a considerable collection of insects from various parts of the world, and has already formed a very respectable British cabinet. — *Wm. Arnold Bromfield, M.D. Sept.* 1836.

Rearing of Satúrnia ? Hésperus (*Bómbyx Hésper.* Linn.) *in England.* — Mr. Humphreys of No. 13. New Road, Southampton, has succeeded in rearing the exquisitely beautiful South American Atlas moth (Satúrnia ? Hésperus, *Bómbyx* Hésp. *Linn.*) in this country, and in considerable numbers. The insects were brought over in chrysalis, upon his return from a surveying expedition to Brazil; and from the moths disclosed he obtained abundance of eggs; and had, when I first saw them (Aug. 11.), some dozens of young and healthy larvæ, which at this moment (Sept. 2.) are, for the most part, full grown, and approaching the period of their transformation into the pupa state. Unlike our European Satúrnia, the caterpillars of which change their colour, and even form, at every successive change of skin, those of the American species are nearly similar in respect to hue throughout this state of their existence. When full grown, they are about 4 in. long, and very thick; of a fine pea-green, with several scarlet tubercles on each segment of the body, terminating in star-like fascicles of the same colour. The sides are covered with long shaggy hair of an ash grey; and near the anal extremity, encircling the last pair of holders, is a fillet of a bright yellow colour, adding greatly to the beauty of the larva, which feeds, with Mr. Humphreys, on the leaves of the castor oil plant (*Ricinus communis*), cultivated in his garden for that purpose. The transformation from the egg to the pupa is effected within the space of about six weeks; and, what is singular, in an insect of the lepidopterous order, inhabiting a tropical climate, where the imago is usually disclosed after a few weeks at farthest, our Satúrnia does not assume its final shape till towards June of the year following that in which it was hatched from the egg.* Can this be the result of change of climate alone? If so, it is a wonderful instance of adaptation to casual circumstances, under which not one in ten thousand of the species would ever find itself placed. The moth is very active; feeds freely in confinement; and no artificial heat is requisite to bring the insect forward when excluded from the ovum. Madame Mérian (*Ins. Sur.*, tab. lii.) represents the larva feeding on the

* Madame Mérian states her caterpillars of this species to have spun up on the 18th of February; and the imago to have come forth so early as the 11th of March. (*Ins. Sur.*, tab. lii.)

orange, which is contrary to Mr. Humphreys's experience, since he tried the leaves of that and other species of citrons without success. They are kept in an attic, exposed to the sun, and have the free range of the room; but seldom quit the leaves of the ricinus, on which they feed principally at night. When about to change their skin, they can scarcely endure being touched without danger of destroying them. In all other respects they seem remarkably hardy. Madame Mérian's figure of the larva is, on the whole, correct; as is also that of the imago, though the wings are not drawn sufficiently falcate; but the cocoon, as she has depicted it, is very unlike any of the numerous examples I saw in Mr. Humphreys's possession, either of the wild or domesticated insect; the puparium being double, the outer envelope pyriform and angular; the inner oval, with an orifice at one end for the egress of the perfect insect; but not furnished with that palisade of bristles, so curiously constructed by the European species of this genus. Mr. Humphreys is now rearing the second generation bred in England; and has a numerous colony, quietly reposing in their silken tenements, which he does not expect they will quit until next spring.

Mr. Humphreys intends making experiments on the silk of this species, which he describes as being fitted for all the purposes of ordinary silk; and, it is indeed, manufactured by the Brazilians into various articles of clothing. Madame Mérian was of the same opinion, recommending its cultivation from her own experience; having, as she tells us, brought back much of it with her into Holland, where it was probably admired at the moment, and forgotten, amongst a people where enterprise is seldom indulged, except with an immediate prospect of remuneration.

I have been thus minute in detailing the history of this beautiful species, because I have never heard of its having been bred in England till now; and the promise of utility held out, should it be ultimately realised by trials of the silk upon an extensive scale, must give additional interest to this record of its introduction amongst us. — *Id.*

Plants. — *Coronilla vària a British Plant.* — I wish to draw the attention of botanists, especially of those in Devonshire, to the great probability, amounting almost to certainty, that the above plant is to be found wild in that county, and, perhaps, in other parts of the kingdom. I have for two years past had reasons for suspecting its existence; and this belief has been strengthened nearly to confirmation, by finding amongst the rocks at the Berry Head, in August last, whilst searching for the chrysocoma which grows there abundantly, two specimens of a leguminous

plant, quite destitute of flowers or fruit, which, in its foliage and habit, struck me immediately as being nothing else than Coronílla vària; a species very familiar to me from having gathered its pretty variegated heads of flowers so often on the Continent, especially in the Bois de Boulogne, at Paris, where it abounds. Unwilling to trust to comparisons from memory alone, I carefully compared the specimen, on my return, with living ones from Page's garden in this town, and found them agree exactly. I forwarded both the wild and cultivated plants, in a dried state, to a gentleman who holds the highest rank in this country as an accurate and practical observer: his verdict I have not yet received.

Last spring my attention was called by my excellent friend Captain Brine, R. N., to a plant in his garden at Boldre Hill, near Lymington, which he said had been planted there by a friend of his own, the Rev. Mr. Levett, who found it growing wild, a year or two before, amongst the rocks at Linton, in the county of Devon, and brought it thence on account of the beauty of its flowers. As these were not even in the bud when I was first shown the plant, nothing but the foliage and general habit enabled me to pronounce with confidence on the genus and species. The transmission of flowering specimens, three days ago, at my request, proved that I had not decided rashly; and convinced me more than ever that my Berry Head plant and Captain Brine's were the same. Indeed, I know of nothing amongst British leguminous vegetables which resembles Coronílla. Hippocrèpis comòsa comes, perhaps, as close as any; but it is not near so large, and the leaflets are very different in shape, as well as size. Conspicuous as Chrysócoma Linosỳris is when in flower, its discovery at the Berry Head is of recent date. And why may not Coronílla vària have been overlooked on the same spot where I stumbled on it, by pure accident, in climbing over a rocky ledge, beneath which, in a kind of nook, or recess, looking towards the land, and quite sheltered from the sea winds, I found it growing. The second specimen I left to flower and seed if it pleased: and the day was too far advanced to permit a search for more.

In looking over a small collection of dried British plants, about two years since, belonging to a friend, and which were chiefly collected in the neighbourhood of the Lakes, I was much surprised to find a specimen of Coronílla vària, and expressed an opinion, at the time, that some mistake had occurred in substituting that plant in the place of another, which it was intended to represent; but was assured that no question existed as to their being all wild specimens. I was unable to gain farther particulars respecting the Coronílla, because that with

some others, had been presented to the owner of the herbarium, who was ignorant of its localities. I may here remark that Coronílla vària is a plant whose range embraces the same parallels of latitude as the southern and midland parts of England lie under; being dispersed over most parts of Germany, Silesia, and South Russia. It occurs more sparingly in Flanders and Holland, and may well be expected in Britain. Like *Cytisus*, however, Coronílla is rather an eastern than a western genus; and is therefore likely to prove very local and rare, should its claim to a place in our flora be in the end established. — *Id.*

Myrica Gàle, *singular Disproportion between the Sexes of, in the New Forest.* — Amongst the many thousand plants of this species in that part of the New Forest contiguous to Lymington and Boldre, and occupying large tracts of bog land, to the exclusion of nearly every other shrub, it is hardly possible to find a female specimen; and, though I have carefully sought, for two years past, and at various times, over some hundreds of acres colonised (if I may so say) by this superabundant male population, it was not till the other day that I met with a few stunted berry-bearing plants, not exceeding half a dozen in all, and as sparingly producing fruit. So rare, indeed, are individuals of the *softer sex* in that part of the world, that the forest people do not appear to know of their existence. The male plants attain a luxuriance rarely equalled in the north of England, and apparently act a most beneficial part in consolidating, by their creeping and interwoven roots, the treacherous soil on which they vegetate; as may be best seen in the extensive morass below the church of Boldre, whose cemetery contains the ashes of the author of *Forest Scenery*. Although abounding in resinous matter, and, consequently, extremely combustible, I do not find that the bog myrtle is in request for fuel amongst the poorer classes in the forest, or that they ever extract the wax from the leaves, as is reported to be done in the Highlands of Scotland, and the more northern parts of Europe. — *Id.*

Beet-root Sugar. — The beet-root has become an object of cultivation at Wandsworth, and other places in the vicinity of the metropolis. At Thames-Bank, Chelsea, a sugar refinery is now erecting. After the juice of the beet-root has undergone the process of decolorisation, the sugar will be produced from it by evaporation. As the different varieties of beet are indigenous to the northern parts of Europe, agriculturists are alive to the profits of such a produce in England, which is now a source of great advantage in France.

Should government not interfere, there is no doubt but

sugar refineries will become general throughout the agricultural districts of Britain, for purifying sugar for domestic purposes.

In France, a coarse brown paper is manufactured from the refuse of the beet-root, after the saccharine juice has been extracted; and it is intended also to establish a paper manufactory at the refinery now erecting at Thames-Bank, Chelsea. A sugar refinery has lately been erected at Belfast, in the vicinity of which place upwards of 200 acres of land have been planted with beet-root. — *W. H. W. Oct.* 17. 1836.

ART. IX. *Memoir of the late Thomas Purton, Esq.* By A. B.

As a memoir of the late Thomas Purton, Esq., author of the *Midland Flora*, may not be unacceptable to some of your readers, you will perhaps be kind enough to insert in your Magazine the following information respecting him.

He was born at Endon Burnell, in the parish of Chetton, near Bridgenorth, in the county of Salop, May 10. 1768; being the youngest of eight children, the offspring of John and Mary Purton, none of whom are now living; his last surviving brother, Christopher, dying in the summer of this year. Mr. Purton was educated, first, at a preparatory school at Alveley, near Bridgenorth, under the Rev. Mr. Nechell, and afterwards at a school at Downton, near Shrewsbury; from which place he went to reside as a pupil with the late Mr. Bloxam, surgeon, of Alcester, whose daughter Anne he afterwards married. Having remained with him the usual time, he removed to London, where he practised in his profession for four years; at the expiration of which (A.D. 1795) he returned to Alcester, and entered into partnership with Mr. Bloxam, which continued until the latter, at an advanced period of his life, retired from business. Mr. Purton remained in Alcester till the year 1827; when he removed to the house which had been occupied by his late father-in-law, a short distance from the town, where he lived until the year 1831; when he left his house for the residence of one of his sons, at Hord's Park, near Bridgenorth. It was at this place that I visited him for a short period; but found him very infirm, and labouring under lameness, which prevented him taking his usual botanical walks: but his spirits were still actively alive to the pleasures of the science; and, if I mistake not, he was preparing, at that period, a complete revision of the *Fungi*, for Dr. Hooker's *British Flora*. He did not remain long at Hord's Park; but, in 1832, removed to his house near Alcester, where in the following year, after a short illness, he

died, and was buried, having nearly completed his 65th year; leaving a wife and family of seven surviving out of thirteen children, to lament his loss. Mr. Purton was always habituated to literary pursuits; and, before he commenced the study of botany, had devoted much of his time to astronomy and mathematics: the former study he entered seriously upon about the year 1805 or 1806, and soon found it a most agreeable and useful recreation, much engaged as he was in the regular practice of his profession. He had for his coadjutor his near neighbour and esteemed friend, the Rev. W. S. Rufford of Badsey, who possessed an excellent collection of dried plants, and was of great assistance to Mr. Purton in the early period of his devotion to the science. Mr. Rufford's lamented death occurred in the summer of this year.

In the latter period of his life, Mr. Purton devoted much of his time to the acquirement of several of the modern languages. A MS. which he has left behind him contains a vocabulary of words in the English, French, Italian, Spanish, German, Latin, Greek, and Hebrew languages; in the title-page of which, dated Nov. 8. 1822, is the following observation: — "As my chief purpose in forming a vocabulary of each word, is to forward me in knowledge sufficient to make out the sense of each language respectively, many words will be omitted, especially among the verbs and adjectives." The MS. still remains in the possession of the family.

Mr. Purton possessed an excellent botanical library, rich in several foreign works: those of Acharius, Fries, and Agardh. He was also in possession of that valuable work, the *Stirpes Cryptogamæ Vogeso-Rhenanæ* of Mougeout and Nestler; a work extending to eight quarto volumes, containing in each 100 specimens of dried cryptogamic plants, which were of the greatest utility to him in the satisfactory investigation of the more minute tribes of plants, to which he more particularly directed his attention. He was also much indebted to his friend Mr. Sowerby, for the great assistance rendered to him in the discovery and elucidation of many species which had hitherto been undescribed, but which were afterwards more generally made known in Sowerby's work on the British *Fúngi*. He had amassed a very large collection of well-dried specimens of *Fúngi*, lichens, &c.; which, together with an extensive though unarranged hortus siccus of British plants, have been consigned, through the liberality of his executors, to the Worcester Natural History Society, where, it is to be hoped, they will be long and carefully preserved as a memorial of his labours. Amongst his numerous botanical friends and correspondents, from whom he derived much

assistance in the compiling of his *Flora*, may be mentioned the names of the late Sir James Edward Smith; Drs. Hooker and Greville; Dr. Williams, the late Regius Professor of Botany at Oxford; and Mr. Baxter, the much-esteemed and worthy curator of the botanic garden in that university, whose death has been more than once recorded in the prefaces of some lately published botanical works; but who, nevertheless, is still actively and usefully employed, and, we trust, may long continue so, both as superintendant of the garden, and also as the well-known editor of *Illustrations of the Genera of British Flowering Plants*, now publishing in monthly numbers. Mr. Purton was also indebted for much valuable assistance in the compiling of his *Flora* to his esteemed friends, the late Rev. W. Bree of Allesley, and his son, the Rev. W. T. Bree, the present rector of that place, and your well-known correspondent, whose useful and instructive communications to your Magazine require no panegyric from the writer of this article, one who highly esteems the pleasure of his acquaintance.

Dr. Hooker, in the preface to part i. of vol. ii. of his *British Flora*, states his being indebted to Mr. Purton, "who had so well illustrated the Fungi in his *Flora of the Midland Counties*, for copious MS. notes on all the species that have come under his observation; and he would doubtless have been more indebted to him, had not his lamented death put a stop to his labours during the revision of this interesting but difficult branch of botanical research. The *Midland Flora* was published at two several periods; the first two volumes in 1817, printed at Stratford upon Avon, and embellished with eight coloured engravings, by James Sowerby. It contains an excellent and well-written introduction to the science, with a succinct detail of the most remarkable natural classes of plants; the whole taking up about 40 pages, and conveying an explanation of the primary difficulties of the science, in language not only sufficiently plain, but exceedingly interesting, even to the youngest beginners. The plants described in the two volumes are arranged after the Linnæan system, with the natural classification attached to each, and numerous and scientific notes, pointing out their medical and other properties. The number described in these two volumes amounts to 1171 species, all found in the midland counties, and the greater number in the immediate neighbourhood of Alcester; a place, from its possessing extensive woods and low meadows, abounding in numerous wild and many of the rarer species of plants. The third volume was published in 1821. It consists of an appendix, in two parts, the whole

equal to the size of the first two volumes, and contains numerous additions and corrections to them, and is embellished with thirty beautiful coloured engravings, chiefly of the cryptogamic species, from drawings by Mr. Bree and Mr. Rufford; also by his daughter, Miss F. L. Purton, and his relative, Miss M. Cooper. The additions in this volume amount to 591 species; the whole, therefore, contains a list of 1604 species, the greater portion of which, particularly the Cryptogàmia, were most accurately investigated. Indeed, the frequent quotations from its pages show the esteem in which the work is held, though it has often been objected to it, and not without some reason, that the numerous additions and corrections of the last volume make it a very inconvenient work for general reference. These were, however, inseparable from the nature of the work; for new plants are continually discovered, even upon ground trodden year after year by the most lynx-eyed botanist. Professor Lindley mentions the *U*lmus *c*arpinifòlia as being found in the neighbourhood of Alcester, on a road which must have been often traversed by Mr. Purton; and the author of this memoir has also found some not far from Mr. Purton's residence, as Galeópsis versícolor and Gastrídium lendígerum, whose localities are undescribed in the *Flora*. Were, indeed, the author alive, and able to undertake a complete revision of the work, an immense number of new plants, and habitats for rarer ones, might be added. Still it may be hoped, from the great impulse given to botanical and other natural history pursuits, at the present time, in the midland counties, particularly Worcestershire, Warwickshire, and Salop, that some one, who could give his time and attention to the labour required, would undertake a complete revision of the *Midland Flora*, comprising within the term the several counties of Warwick, Worcester, Salop, Stafford, Derby, Nottingham, Leicester, Northampton, and Oxford. Of these, the general botanical details are tolerably well known, with the exception of Stafford, which, I believe, has been generally but little investigated; though, from its comprising Cannock Chase and the remains of several ancient forests within its boundaries, it would present, I should conceive, no meagre field to an enterprising and assiduous collector. The growing interest and importance of the science need scarcely here be insisted upon, and the writer of this article may therefore be excused for quoting the following words of Mr. Purton, from the Appendix to the *Midland Flora*, words which, doubtless, many a peruser of them will heartily respond to:—

"In choosing the study of botany as a relaxation from the

duties of a laborious profession, the author has not altogether quitted the line of that profession, so closely are medicine and botany connected. It might be calling upon others to enter too much into his own feelings, were he to state how often he has found the weariness of a professional journey relieved by botanical researches. Every man in the author's situation must sympathise in those pains and sorrows of which he is the daily spectator: in these cases botany has frequently lent a soothing aid; it has often diverted from a painful train of thought a mind which, if it had been less alive to these feelings of anxiety, might perhaps have been better adapted to his profession."

ART. X. *Retrospective Criticism.*

THE late Discussion between Mr. Waterton and the Rev. F. O. Morris. — Having only just returned from the coast, I have not until now been able to look over the last Number of the *Magazine of Natural History*. I perceive therein some remarks, by Mr. N. Wood and Mr. Salmon, on the controversy which has been carried on between Mr. Waterton and myself, and I beg leave to say that in the justice of the remarks of these two gentlemen I entirely concur, being convinced that no good whatever can arise, in a scientific point of view, from any sarcasms however pointed, or any recriminations however just; and therefore, in any difference of opinion from any other naturalist which hereafter I may be obliged to entertain, I shall make it my study to express such opinion in a way the very reverse of that style which has, during the course of the late controversy, been introduced into your pages. — *Francis Orpen Morris. Sept.* 6. 1836.

P.S. In my last letter there is a misprint of extirpan*te*, for extirpan*do*.

Mr. Morris's Remarks on Mr. Waterton. (p. 434.) — Mr. Waterton, having returned to England, has consulted us respecting writing a reply to Mr. Morris's last letter. From the tone, however, of Mr. Morris's communication, we felt satisfied that no good would result from a continuation of the controversy, and we therefore requested Mr. Waterton to take no further notice of the matter, with which he has kindly consented to comply. — *Ed.*

Is Man distinct, or not, from all other Beings? — I beg to offer the following comments on Mr. Blyth's remarks "on the distinctness of the human race from all other parts of the creation," published in a note in p. 398.

"Man alone," he says, "of all the countless wonders of creation, though clad in a material frame, the functions of which are necessarily identical with those of other animals, *is no part of the mere reciprocal system of nature;* as they are. He alone is bound to no particular locality, but inhabits alike the mountain and the plain, and by contrivance is enabled to endure the fervid heats of tropical climates, and the withering blasts of a polar winter; traverses in all directions the wide extent of the pathless ocean, interchanges purposely the productions of distant lands, and accommodates the respective soils for their reception."

Do not animals exhibit contrivance, when we see the elephant plastering himself over with mud, either for the purpose of keeping off the heat of the sun, or the annoyance of insects; and when we see the dormouse, and many other animals, gathering materials by which they may be protected from the rigours of winter? Perhaps he will tell us of instinct. Let that pass, then. But how does it appear that man "alone is bound to no particular locality," when it is known that ravens, and some other animals, are met with in all parts of the world.

"He alone degenerates in climates which supply his every natural want; and placed, as nature formed him, in the richest soil, is a being out of his element, unable by the mere unassisted use of his own organs, to maintain his existence as a species."

Degenerates! Who shall presume to declare which, among a number of human races or tribes, is the degenerated one, and which has preserved its primitive physiology? When it is said that man, "placed as nature formed him (that is, in a state of nudity, and without implements), is a being out of his element, unable, by the mere unassisted use of his own organs, to maintain his existence as a species, it is clearly intimated that he must have a weapon of defence and attack. No peculiar distinction this, surely, when we know that apes, in a wild state, defend themselves with bludgeons, and by throwing sticks and stones as missiles at their enemies. Even the little ant-lion throws grains of sand at his prey, so as to make it tumble into his pitfall.

"He alone studies the complicated laws of matter, that he may wield them at his will."

No one, to be sure, can imagine that animals study astronomy, chemistry, or mathematics; but that animals do observe the common laws of matter, and avail themselves of their observations, thousands of popular and well-authenticated anecdotes fully testify.

"He alone possesses a power of indefinite self-improvement,

and can so communicate his attainments that each generation shall rise in knowledge above the last."

Man is not capable of communicating his attainments so that each generation shall rise in knowledge above the last; for his successors will adopt or reject the attainments he has bequeathed them, accordingly as their own judgments may direct them. The preservation of ascertained facts is at the mercy of the opinions and caprices of successive generations. A generation born to-day are not a bit wiser than those born in the earliest and most ignorant times.

"He alone has the sense to sow that he may reap; and alone, intentionally and from observation and reflection, opposes obstacles to the course of events in their natural progression; reduces whole countries to an artificial state; and systematically increases vastly their capability of yielding sustenance for him, and for those creatures he has taken under his protection."

The error of stating that man alone, intentionally and from observation and reflection, opposes obstacles to the course of events in their natural progression, is obvious, when we remember that the beaver will dam up a river so as to pervert the course of its current; a spider lengthen or shorten his stay-lines according to the strength of the winds, so as to prevent their being snapt in twain by it, and it has been known to suspend a small pebble to the web to steady it during a gale. Man, it may also be observed, is not the only animal that takes other creatures under his protection; for the ants are known to keep aphides confined in their ant-hills, just as we do cows in our cow-houses, that they may secure their honey-dew.

"Other races disappear before him, whose existence is at all opposed to his interests, and those alone remain (but oh! how altered from their former condition) which minister to his wants and comforts."

Man is certainly not peculiar in making those animals whose habits militate with his interests disappear before him. According to the statements of naturalists, the brown rat banishes the black rat, and the red-legged partridge banishes the common partridge.

"All other beings are mere creatures of locality, whose agency tends to perpetuate the surrounding system of which they are members."

But does not man, also, in some degree tend to perpetuate the surrounding system? Without him would not some of the screws of the grand machine be lost, some animals whose existence depends upon his? What would become of such species of Entozòa, *C*ùlex, *P*ùlex, *P*edículus, &c., as are peculiar

to him? They would perish. To dame Nature these creatures are, perhaps, as precious as any others, as even the largest, the most active, or the most beautiful.

"Wherever man appears, with his faculties at all developed, the aspect of the surface becomes changed; forests yield to his persevering labours; the marshes are drained, and converted into fertile lands; the very climate accordingly changes under his influence, and oftentimes to the extinction of some of the indigenous products of the soil."

Some changes in the disposition of the works of nature, in their appearances, in their habits, and geographic distribution, do most assuredly take place without the direct agency of man. And such changes seem to be a part of the system.

> "Nothing retaineth the same form and face
> Hardly the half of half-an-hour's space." DU BARTAS.

Has Mr. Blyth never read of the agency of lichens in reducing even rocks; and of forests being destroyed by the ravages of lemmings, and even by swarms of insects? As for man being the only creature that causes the extinction of other species, the contrary has been already shown, in the instances of the brown rat and red-legged partridge.

"Does not, then, all this intimate that the human race is *no* part of the mundane system; that its agency tends rather to supersede, and is opposed to, that of the rest of organic nature?"

This seems to be hardly more than an echo of Mr. Swainson's observation, that man is of no use to the creation. (See his *Discourse on Nat. Hist.*) However, I think it intimates no such thing; for, as I have shown, his existence is necessary to the existence of other creatures, his parasites. Whenever man opposes his agency to organic nature, whenever he destroys one class of animals, he advances the interests of some other. For example, were he to destroy all the ant-eaters, he would favour the ants, of which the former is the enemy.

"Does not then all this intimate that a time must come, should nought intervene of what in physics we can take no cognisance, when the human race, having peopled all lands, shall have increased beyond the means of subsistence?

"But," continues Mr. Blyth, "who can dive into futurity? The same awful Being, who first awakened man into existence, in common with the meanest atom, who appointed his destiny on earth to be so diverse from that of his other creatures, who endowed him alone with a capacity to reflect upon his Maker's goodness and power," (Surely, we cannot be positive that animals have no knowledge of their Maker.) "may (I make no appeal

here to Revelation, writing only in the spirit of natural theology,) close his non-conforming career as a species, upon earth, in a manner different from the extinction of other species, which yield to the progressive changes of the surface."

To what manner of man's closing his career does he possibly allude? What becomes of the soul of man is not the question, but merely how he closes his career. I thought he left the stage from the same causes, and in the same manner, as other animals.

"No naturalist can doubt" (?) "that this beautiful world existed, and was clad in verdure and inhabited, for countless" (?) "ages before man became its denizen; and there are no memorials to indicate that an analogous being ever previously existed."

The circumstance that no remains of man, or of any analogous being, are found along with those extinct species that are ascribed to a former creation, is in itself hardly a *proof* that he did not then exist; for there may be something in the composition of human flesh and bones which does not permit of their preservation for ages in the earth, when buried therein without any coffin or any embalming. It is said, indeed, that man and the monkey-tribe are proof against the action of petrifaction.*

"Man alone is a creature by himself; the only being whose agency is at all opposed to the mutual and reciprocal system of adaptations prevalent around him."

Every animal, I thought, was as much a creature by itself as man. The latter portion of his sentence is but a repetition of what he has already observed, but the incorrectness of it is manifest. Is it not in the order of nature that power should be clashing with power, interest with interest? the old proverb being illustrated, "Every one for himself, and God for us all." Man, for instance, kills the eagle, the eagle kills the weasel, the weasel kills the swallow, the swallow kills the gnat, the gnat sucks man's blood.

* The commonly entertained notion that the bones of human beings, if placed under favourable conditions, would not undergo the process of petrifaction, may certainly rank as one of the most palpable of vulgar errors. There is not the slightest foundation for the supposition, and in fact it is completely negatived from the circumstance of human skeletons occurring completely fossilised in a limestone in the Island of Guadaloupe. No very satisfactory evidence has, however, yet been adduced, which would lead us to suppose that our own race inhabited this planet even at so comparatively recent a period as that in which the mammoth and mastodon became extinct. At the present time, particularly, any facts tending to the elucidation of this question would be of the highest interest and importance; but there is perhaps no subject connected with geology the investigation of which requires more caution.— *Ed.*

"He did not always exist here, and there is no reason to suppose that he always will."

He has before asserted that man did not always exist here; but the observation that "there is no reason to suppose that he always will," is a tame truism, for every body is aware that there is no reason to suppose he will; but there is as much reason (speaking apart from Scripture) to suppose so, as to suppose that he will not. Does Mr. Blyth see any reason to suppose that any other animal will always exist here?

"All conduces rather to intimate that he is but a sojourner for a short time."

Man, individually, is certainly, like every other creature, only a sojourner for a short time; but we see nothing intimating that the whole *race* of mankind is but sojourning a short time. His daily multiplication, and his extension over almost the whole world, would predicate, if any thing, the long future continuance of his race.

"In his vanity, he is apt to imagine that all were made for him, and presumptuously enquires of what use could have been the creation without him! Yet how ardently does he labour to exterminate every portion of that creation which he deems to be in the least injurious to his own interests!"

Here end Mr. Blyth's remarks. When I commenced reading them, I anticipated something philosophical, knowing that I had been often amused and instructed in the perusal of his natural histories of birds. That I was disappointed is sufficiently shown by the above comments, which I deemed it a kind of duty to write in refutation of his remarks. The subject, in my humble opinion, requires a closer reflection, and a stricter examination of facts, than he has devoted to it. —*J. H. Fennell. Sept.* 20. 1836.

Do Animals hybridise by Choice, or without Compulsion? — In a note at p. 511., Mr. Blyth says that, "*in every known instance, intermixture of species is solely induced by man's agency.*"

It appears that sometimes irregular unions between animals of distinct species take place voluntarily and by preference. Has Mr. Blyth forgotten that in the *Field Naturalist's Magazine*, vol. i. p. 279., he himself stated that he was informed, by "a very intelligent and accurate observer," that, "in some parts of the north of Scotland, nothing is more common than to see the hooded crow (*Corvus Cornix*) paired with a black crow;" and that another writer in that work, S. H. of Edinburgh, says that for four successive years he had opportunities of witnessing the pairing of the hooded crow with the carrion crow? (*Field Naturalist*, i. 239.) Selby mentions a male

wigeon (*Marèca Penélope*) breeding with a female pintail (*Querquédula acùta*), notwithstanding the fact of females of his own species being kept on the same piece of water. The present Magazine, too, has published instances. In the current Volume (p. 107.) it is stated that Mr. Reid of Doncaster has a specimen of a duck, deemed a *wild hybrid* between the pintail duck and the common wild duck (*Anas Bóschas*). Selby, by the way, mentions a similar hybrid. In Vol. VII. p. 599., Mr. H. Berry states that during two successive years a throstle and blackbird paired, and reared strongly marked hybrids, in the garden of James Hankin, a nurseryman at Ormskirk, in Lancashire; a fact well known to himself and many other persons. Even among the Mammàlia such voluntary intermixtures occur. The following, from Brown's *Anecdotes of Quadrupeds*, seems a very remarkable one: — "A domestic cat disappeared from a house in Penza. After being absent some time, she returned; and, within the regular time, produced four young ones, two of which strongly resembled the marten. Their claws were not retractile, as in the cat; and the snout was elongated, like that of the pine marten. The two others of the same litter more nearly resembled the cat, as they had retractile claws and round heads. All of them had the black feet, tail, and ears of the marten; and they killed birds and small animals, more for the pleasure of destroying them, than for food. The proprietor endeavoured to multiply this race, and to prevent their intermixing with the other domestic cats, in which he proved highly successful. In the space of a few years, he reared more than a hundred of these animals, and made a very beautiful article of furriery of their skins. A specimen presented to the Imperial Society of Natural History of Moscow was of the third or fourth generation; and it retained all the characters of the first. The fur is as beautiful and silky as that of the pine marten." (p. 307.)

Without making a great deal of research, I think I could adduce several other instances in refutation of Mr. Blyth's too positive assertion. — *James H. Fennell. Southwark, Oct. 8. 1836.*

Glowworm. (IX. 487.) — The glowworms which are found from the commencement of September until about the commencement of May are all larvæ. The larvæ emit light, and indeed light is emitted by the glowworm in all its stages of egg, larva, pupa, and imago. — *Id.*

THE MAGAZINE

OF

NATURAL HISTORY.

DECEMBER, 1836.

ORIGINAL COMMUNICATIONS.

ART. I. *Observations on Divers.* By Dr. LEFÈVRE, Navy Surgeon. Translated from the French by W. D.

THE privilege, enjoyed by travellers, of relating facts whereof the accuracy can only be verified by a limited number of persons, has often led them to be less scrupulous in the selection of materials for the gratification of the public curiosity. Hence, doubtless, the origin of the proverb, *A beau mentir qui vient de loin.*

The researches which have been made for the purpose of determining the period during which a man may remain under water, and there devote himself to some employment, have suggested these reflections. The fact is, that, in comparing the accounts of travellers, one is astonished at the little agreement which exists between them, on a point apparently so easy to be ascertained. Thus, in the *Natural History of India*, by Josè d'Acosta; and in the *Miracles of Nature*, by Vesali; we meet with some remarks on divers who have remained half an hour under water. Pison, in his *History of Brazil*, speaks of a native of the country, who had stayed 60 minutes at the bottom of the water. Cardanus, Leo a Capoa, and Redeivil adduce instances yet more extraordinary, of men who could spend four hours, a whole day, and even three days, under water. According to Lémery, a good diver will remain immersed for half an hour, and will descend 60 ft. in depth; and we find in the *Phil. Trans.* for the year 1668 the reply of Philippe Venatti, then president of Java, to certain questions addressed to him on the subject of divers, by Sir J. Moray, a member of the Royal Society of London, which is to the following effect: —

"The pearl fishers cannot stay under water beyond a quarter of an hour, and that in the ordinary way. There is

here a famous diver from Batavia, whose maintenance depends upon what he earns by fishing up anchors and cannons which have been lost in the roadstead. I have frequently seen him dive; and, endeavouring to hold my breath as long as I possibly could, he has remained under water more than twice as long. In short, as Chardin observes, the pearl-fishers are sometimes immersed as long as half a quarter of an hour, exhibiting an inconceivable power in this arduous exercise. Assertions so different prove, as Haller says in his *Grande Physiologie*, that they are owing to travellers whose observations have been inaccurately made, or who have been deceived by information obtained from ignorant men; and, consequently, no importance can be attached to them."

The fruitlessness of my researches into the exaggerated accounts of the earlier travellers induced me to consult those of more recent date, in the hope of finding something more satisfactory. Subjoined are the observations of Percival, in his narrative of a voyage to Ceylon, on the subject of the pearl-fishery, and the time which those employed in it can remain under water. It is open to remark, by the way, that the details which he has given have been transcribed almost literally by Felix De Roissy, into the sixth volume of his *History of Molluscous Animals;* as well as by M. Blainville, under the word *Perle* in the *Dictionnaire d'Histoire Naturelle* of Levault; and that neither of these naturalists have acknowledged the source from which their information was derived.

"The Bay of Condatchy is the most central rendezvous of the boats employed in the pearl fishery. They arrive there in February, and the fishing ends in April. The divers descend to a depth which varies from 20 ft. to 50 ft. Habituated from childhood to this exercise, the ordinary time during which they remain under water is two minutes; but divers have been pointed out to me who stay longer. When they emerge from the water, they sometimes emit blood from the mouth, ears, and nostrils. They can take the plunge forty or fifty times a day. Some rub the body with oil, and plug the nose and ears, to prevent the water from penetrating. Others use no such precaution; but they very generally perform certain ceremonies previously to immersion, which they consider necessary to preserve them from the dangers to which they expose themselves."

The facts reported by Percival greatly resemble those which, for some years past, I have had the opportunity of observing in the divers of the Levant; and prove that the time during which it is possible to remain under water is much shorter than has been stated. When I was in the

Greek seas, I had reason to think that the people who inhabit their shores must be practised in all the exercises of swimming. From very high antiquity indeed, the skill of the Greek divers has been in great repute. Herodotus relates that Scyllias of Scione, the most expert diver of his age, wishing to pass from the coast of Greece, plunged into the sea at Aphetæ, and landed at Artemisium. He thus swam a distance of 80 stadia; but, as the translator of the celebrated historian judiciously suggests, it is, doubtless, the *short stadium* of 50 fathoms by which the computation must be made. This will give a league and a half, and a little more than one eighth; a passage of considerable length for a swimmer on the surface, and which it would be impossible to accomplish under water.

In the Peloponnesian war, the Greek divers had abundant opportunity to manifest their skill. Thucydides relates that, during the siege of Sphacteria by the Athenians, divers were employed to carry food to Pylos. This they effected by swimming under water, and drawing after them, by means of a cord, bladders filled with provisions. The same historian states that, at the siege of Syracuse, the Athenian divers plunged into the water, for the purpose of sawing away the piles which the Syracusans had driven to impede the approach of the ships.

Lastly, Anacharsis [Is Anacharsis taken here for a real person?], during his stay at Delos, frequently saw the celebrated divers of that island dash into the sea, and, after seeking its lowest depths, repose quietly on its surface.

At a more recent date, the traveller Thèvenot speaks of the inhabitants of the Isle of Micaria, one of the Sporades, as very expert in swimming, and making it their employment to fetch the sponges from the bottom of the sea, and even the wrecks of vessels. He asserts that, in this island, no girl will marry a young man who is not known to have been, at least, eight fathoms under water, and to have brought thence some proof of the fact. "When," says he, "a very rich personage has a mind to marry his daughter, he announces the day on which he will give her to the best swimmer. On the day appointed, the young men strip themselves in public, and plunge into the water; and he who remains longest beneath the surface espouses the girl. Whimsical as this custom may appear, it is sufficiently indicative of the high importance which these islanders attach to swimming."

Some years since, when stationed in the roads of Navarin, I was enabled to convince myself that the modern Greeks are as expert in the art of swimming as their ancestors, and that,

in this respect at least, they have not degenerated. As long as the Turks remained masters of the Morea, little pains were taken to clear the roadstead of the several wrecks which the "untoward event" of Oct. 20., 1827, had left there. Shortly after the arrival of the French expedition, a course of salvage was set on foot; and a company of Greek divers had the privilege of raising the remains of the Turco-Egyptian fleet. As often as they retrieved from the water a bronze cannon, an anchor, or any other article of moderate value, they were bound to give notice of it to the commandant of the roads. It was forthwith sold to the merchants of Marseilles: one third of the produce was given up to the divers, and the remaining two thirds to the sailors of the squadron. Having thus obtained an admirable opportunity of ascertaining a fact respecting which no precise information could be gathered from books, I took frequent occasion to observe the labour of these industrious submarines. Almost all whom I saw were born in the islands of the Archipelago; for the most part of a robust constitution. They had the muscular system fully developed; and their skin, of a ruddy brown colour, offered, in this respect, some resemblance to that of the Caribbees.

From their youth they are habituated to dive, and to remain a long time under water. I have seen them bring up cannons, and anchors; and tear the sheets of copper from wrecks lying at the depth of 100 or 120 ft. At a like depth, they will penetrate into the interior of sunken vessels, and bring away articles of small size, such as pistols and yatagans. One of them returned with a volume of the Koran, richly bound, and still covered with a linen wrapper; and another presented himself with a chibouque, or pipe, tipped with amber.

With respect to the manner in which they prepare for the plunge, they first squat themselves down for a few seconds on the edge of the boat, which conveys them above the spot where they have to make their search. Then, in this position, resting their elbows upon their knees, they make frequent and short inspirations, which they repeat a great number of times, interrupted, at intervals, by signs of the cross, which form an essential part of their preliminary movements. At the moment when they are about to dive, they make one last and deep inspiration, and throw themselves into the water head foremost. If the object of their search is at a great depth, they pass the thumb of the right hand through a noose in the extremity of a small rope; which enables those who are in the boat to facilitate the return of the diver to the surface of the water, when he can no longer sustain the want of respiration;

and serves, at the same time, as a guide to other ropes, which are employed to heave up articles of great weight. In general, these men dive only in summer. As to the duration of their submersion, I noted down three successive times in the course of the year 1829. I had taken care to provide myself with a seconds-watch, and to mark with accuracy the number of seconds which each diver remained under water. The articles for which they went lay at the depth of 100 ft.; and the temperature of the external air was at 24° R.

1st Series.		*2d Series.*		*3d Series.*	
1st diver	86″	1st diver	65″	1st diver	50″
2d	69″	2d	74″	2d	65″
3d	86″	3d	90″	3d	95″
4th	94″	4th	98″	4th	90″
		5th	84″	5th	60″

It will be seen that this scale gives, on an average, 76″ for each man; a period considerably shorter than that indicated by Percival.

When these labourers emerge from the water, they have almost always the face strongly injected. They are often seized with profuse bleeding at the nose; and, in some instances, blood has been observed to issue from the eyes and the ears. As soon as they are out of the water, they wrap themselves in thick woollen cloaks, and thus await their turn to repeat the dive. They can perform this task three or four times in an hour. I could obtain no answer to my enquiries, whether, at an advanced age, they were more than ordinarily afflicted with derangements of the circulatory functions, as might be conjectured from the repeated suspensions of respiratory action, and the consequent stagnation of the blood in connexion with the pulmonary system.

We may conclude, therefore, that the space of two minutes is the maximum of those which travellers have recorded, and which the most skilful divers can seldom attain. A melancholy anecdote, applicable to this subject, will serve to conclude these remarks. Brydone, the author of a *Tour in Sicily*, has noticed the astonishing powers of a Neapolitan diver, named Pesce, whose feats are said to have been most extraordinary. Frederick King of Sicily was curious to see his performances; and, in order to excite his emulation, directed a golden vase, of considerable value, to be thrown in the sea near the whirlpool of Charybdis. Pesce collected his strength, calculating that it would take him about two minutes to descend to the bottom of the water and reascend to the surface. He plunged into the sea, full of hope; but, alas! he was never seen again.

ART. II. *On the Species of Birds observed, during the last Four Years, in the Vicinity of Tooting, Surrey; with a few Remarks on their comparative Numbers and Distribution.* By EDWARD BLYTH, Esq.

PERHAPS, in treating on the fauna or flora of any particular district, the first thing that ought to be considered is, the character of the soil, and general aspect of the country. This may be here told in a few words. We are situate nearly seven miles from the metropolis, upon the London clay, which is hereabouts everywhere covered with a thick layer of gravel. In many parts, the superjacent soil is deep, in others scanty. Where the former obtains, the ground is generally devoted to cultivation, but there is little corn raised; hay, and especially medical herbs, being the chief product. The inferior land is suffered to run waste; and in every direction there are some extensive commons interspersed, overspread with furze or heather. Our immediate neighbourhood is, in general, low, with much water; and would soon return to its former marshy and unhealthy state, were it to be left to the operations of nature for a few seasons. The small river Wandle winds its course hard by, and turns numerous mills in its progress to the Thames: more, I believe, within a few miles than any other stream in the country. On either side of its banks are low meadow lands, in many places wet and marshy. We have no woods very near; but, in several directions, they are extensive within a few miles. Coombe and Dulwich Woods are the principal; and beyond Croydon are some wide-spreading fir plantations. To the south and east, we come, after a few miles, upon chalk, where, in general, there are extensive downs (fine arable and pasture lands), varied, in one or two localities, with abrupt escarpments, and evergreen-covered hills. At a short distance to the west, the beautiful park of Earl Spencer, and, farther on, the delighful scenery of Richmond and the contiguous parishes, offer a widely diversified country for the investigations of the student of natural history. In short, it will be seen that we have a wide field for general observation, and have every description of scenery but that of the mountain and the main.

As the whole district, however, is extremely populous, and shooters abound in every hamlet, there is a great dearth of all the larger birds, and the list of raptorial species is rather scanty.

I cannot definitively say that the *Osprey* has been seen; but have reason to believe that it occasionally hovers over the Thames. Last week, I examined a recent specimen that had been shot in Sussex, evidently a bird of the year; and Mr. Gould

informs me that, for several weeks last year, a pair frequented some water within twelve miles of London. These were at length shot down, after many futile endeavours.

The Peregrine Falcon was also killed, a week ago, upon the steeple of St. Bride's Church, Fleet Street; where the individual is said to have inhabited for many years, subsisting, for the most part, on the London pigeons. I have several times seen this species in the heart of London, but never in the environs; a very few minutes' flight sufficing to transport it a distance of many leagues.

The Hobby Falcon appears to be a rare species, but is less so in Kent. One or two, mostly the young of the year, are generally seen towards the close of summer. I have met with no instance of its breeding in this neighbourhood. Specimens are occasionally taken in the bird-catchers' nets; where, also, are sometimes captured a few kestril and ground falcons.

The Kestrel Falcon is another of the *Fauna Londinensis:* it is here less frequent than in the north of London. Nevertheless, it is our commonest bird of prey; and I seldom take a long ramble without an opportunity occurring to admire its graceful flight. It breeds in the church steeples in London, and in deserted crows' nests in Wimbledon and other parks. In the last-named locality, I have seen four or five in the air together.

The Ground Falcon, or *Merlin*, is a regular winter visitant, but not common, though a few are generally shot every season. All that I have seen of these have been in immature plumage.

The Common Hawk would be rather plentiful than otherwise, in the woodland districts, were it not to be so much persecuted by gunners; as is also the kestrel falcon. As it is, I very rarely enjoy the treat of seeing one.

The Buzzard is excessively rare; perhaps somewhat less so as the distance increases from London. The only instance I have known of one occurring near this place happened the winter before last, when a solitary individual flew over Mitcham Common. It had hardly reached the boundary, when it was shot at, but missed; whereupon it rose gracefully into the air, and ascended in easy circles till beyond the reach of vision. So large a bird has little chance of existence in this neighbourhood.

The Blue-grey Harrier is seen, though rarely, on some of the more distant heaths; where, however, I have not heard of its breeding. What becomes of the young of this species? They do not undergo a moult till the second autumn; and, till this is effected, I believe, no species of bird is capable of

propagation: yet we observe no preponderance of young individuals, but the species is rarely seen otherwise than in pairs, one grey and one in the plumage described as the ring-tail. The fact is, I suspect, that the young of this, as well as of most other Falcónidæ, migrate, and remain away till the breeding stimulus prompts them to return, by which time they have attained their adult livery. We read of large flights of hawks annually crossing the Mediterranean: of what do these consist?

The Barn Owl would be common enough, if war were not so generally waged against it in this neighbourhood. A more harmless, nay, a more useful, creature scarcely exists. A very few pairs breed annually in this neighbourhood.

The Tawny Hooter is still more rare than the preceding species; except, perhaps, in one or two of the more distant localities, where it is less uncommon. It is long since I have heard its nocturnal cry. A hen or two always breed in Wimbledon Park, and more as the distance recedes from London. Mr. Macgillivray says, of this species, "The female is considerably larger than the male, and resembles it in colour. This I have determined by dissection, and not merely conjectured. Let them who allege the contrary come forward." He afterwards alludes to "grey" individuals, which are those without any rufous colouring. I have examined several of these latter, and invariably found them to be males; wherefore I suspect that, after the second (?) moulting, this is the fixed plumage of the sex. The last bird of this description that I have dissected is now in the Natural History Museum at Worcester.

Long-tufted Madge. — A single individual of this species was shot, as it sat on the ground, on Mitcham Common, three years ago.

Of the Short-tufted Madge a very few individuals are now and then met with, in winter, on the more distant heaths. Vast numbers of them are annually exposed for sale in the London markets: they are principally sent up from the fenny counties.

A pair of one of the small species of *Strígidæ* (I cannot say which) was observed sitting on the naked bough of a tree, in Wimbledon Park, in the summer, I think, of 1832. The booby who discerned them thought of taking them by hand, and was climbing up the tree for that purpose, when, regarding him with a look of much wonder, they soon took flight, and disappeared among the surrounding timber. These were probably of the *Nóctua* genus, as the little scops is much too noisy to escape notice.

I was told this morning that, about two months ago, a person offered to the son of my informant "a curious little owl, no bigger than a starling," which had been just knocked down in the county of Essex. The youth not caring to have it, it was offered to another person for 2*s.*; who refusing, however, to give 1*s.* 6*d.* for the specimen, did not obtain it. What finally became of this *rara avis*, I could not hear; but, most probably, it was *thrown away*. Mr. Rennie has seen one of the *Nóctuæ* nailed up against a barn in Wiltshire.

The Swift, and the three species of swallow, are all plentiful in this part of Surrey. I have already noticed, in a former number of this Magazine, the fact of a few individuals of the white-bellied swift, being several times seen to mingle in flight with the common species.

The Motheater, or Nightjar, is by no means uncommon in the wilder districts. They are occasionally met with near this place; whence I conclude that they sometimes range to considerable distances for food. I have heard one emit its cry during bright sunshine, at about four o'clock in the afternoon. In the daytime, they frequently sit on lichen-covered palings, and sometimes on hedges; and will permit of a very near approach. A large proportion of them do not arrive till June; and they are now and then met with late in October. A few seasons ago, at the time of the autumn migration, two or three of them were seen, for above an hour, one evening, playing about opposite the wall of the King's Bench Prison.

The Kingfisher is not very rare, and would be abundant, were it not to be continually shot down by bird-stuffers and others. I have known it breed a considerable distance from any water.

The Collarless Pyet, or Pied Flycatcher, is in these parts a very rare summer visitant, arriving in the first week in April. I have known but of two instances of its breeding in this neighbourhood. It is remarkably attached to the place it has once selected for nidification.

The Grey Flycatcher abounds. The major part arrive about the second week in May, and many remain till the second week in October, being one of the latest of our summer visitants to retire.

The Ash-coloured, or Sentinel Shrike. One was shot, the winter before last, near this place; and I suspect that another was seen last winter.

The Flusher Shrike is a moderately plentiful species, making its appearance about the first week in May, and departing in September. After, I think, the second general moulting, the females assume the livery of the male bird, and continue to

breed in this plumage. They are chiefly found about tall and thick hawthorn hedges.

The Missel Thrush is abundant, more so than in most parts of the kingdom. Many remain throughout the year about gardens; but the majority associate, in autumn, in moderate flocks, and affect parks, and other similar localities interspersed with clumps and groves of lofty trees; a few of apparently the older individuals only continuing solitary, which remain in song, in particular states of the weather, while the screech only is heard of the others. Last summer, I knew of four nests of this species within a few trees of each other. I am unaware that we receive any accession to their numbers in the winter season.

The Ring, or Mountain, Thrush is met with occasionally during the seasons of migration, more commonly in one or two distant localities, where the yew grows plentifully. A very few have, at different times, been shot about this place.

The Fieldfare Thrush arrives in numerous flocks about the middle or end of November, and many stay till the second week in May; when all the members of a flock depart simultaneously, as might be expected from their habit of breeding in society. They chiefly affect park-lands, and enclosures where a few tall trees are scattered, and retire at night to roost among the furze on commons, where I have frequently put them up by hundreds.

A few Redwing Thrushes generally appear about the end of September; but the main flights rarely arrive for several weeks afterwards. This species is more numerous here than the preceding, and keeps in looser flocks, which retire more gradually in the spring. It also departs rather earlier. Their song usually commences, in mild weather, in February; whereas that of the fieldfare, such as it is, is seldom heard much before April.

The Mavis Thrush is very common, as elsewhere. Small flocks of them arrive about the same time as the redwings, and remain gregarious through the winter. They do not depart till the time the redwing thrushes leave us; at which period many of our residents of the same species have reared their first brood. A dozen or twenty of them may sometimes be noticed, in early spring, warbling in concert on the same tree.

The Black Thrush is plentiful in the extreme. This species appears to pair for life, as all but those of the preceding summer remain in couples through the winter. I do not think that we have any visitants of this species in these parts.

The Fallow Chat, or Wheatear, is rather uncommon: but a very few are met with in the immediate neighbourhood, and

only in the seasons of passage. A few pairs are scattered, in summer, over the chalky downs; and I have occasionally noticed some young ones in the Coombe district.

The Stone Chat is not particularly abundant, considering our extent of heathy land: the great majority of them migrate; not above one in a dozen, I believe, remaining through the winter.

The Whin Chat leaves us entirely in the brumal months, though a few stay the winter through in Sussex. This is the commonest species in summer, arriving in the middle of April, which is the time the absentees return of the last species. In all three the feathers undergo great seasonal changes.

The Common Redstart arrives about the second week in April, and departs in September. It is numerous on the chalk and gravel; but on the clayey soil of Penge Woods it is extremely rare.

The Robin is found abundantly, both in winter and summer, about human habitations, in the depths of woods, and in the centre of extensive commons. In short, every where, turn up a piece of ground, and you will be sure to see a robin. In hard weather, I have noticed the stone chats hopping about before the huts and cottages scattered over the heaths, and in farm-yards contiguous to commons, with almost as much familiarity as a robin.

The Nightingale arrives in vast numbers every season, about the middle or third week of April: a large proportion of them fall a sacrifice to the bird-catchers. This superb songster is nowhere more plentiful than along the whole valley of the Thames.

The Blackcap Fauvet is every where excessively abundant. Its melodious whistle is oftentimes the first to intimate that our summer guests are arriving. It is also one of the latest to depart in autumn.

The Garden, or Olive-brown, Fauvet is much less common. A few of these dulcet choristers arrive about the third week in April; but the great majority of them are not heard till the middle of May. They are then by no means scarce in this neighbourhood; but they are far more abundant in Penge Woods, over a clayey soil.

The White-breasted Fauvet, or Lesser Whitethroat, is a moderately plentiful species, arriving generally about the middle or third week in April, though I have known some to make their appearance much sooner. Its habits are considerably more arboreal than those of the whitethroat; equally so with those of the olive-brown species: it is nowhere found but where there are trees, from the higher branches of which its

long concluding note is often heard. We seek in vain for this species in the open brake, upon commons, unless there are a few trees introduced. It comes a good deal into gardens, and is more eminently frugivorous than the whitethroat fauvet.

The last-mentioned bird abounds everywhere in the hedges, and in the open brake, frequently mounting in the air to sing, as seems to be the universal habit of brake birds. It arrives about the same time as the preceding. This is the only species of the present genus that was found in Sutherlandshire, by the party of naturalists who visited that county in the summer of 1834. But a very few were seen in that northern habitat. I gladly avail myself of this occasion to recommend to the perusal of every naturalist Mr. Selby's pamphlet *On the Quadrupeds and Birds inhabiting the County of Sutherland*, which was published in Jameson's *Journals* for January and March of the present year. They will derive thence much interesting information.

The Dusky Furzelin, or Dartford Warbler of the books, is here extremely scarce, and very local. In one situation which I knew of, the breed seems to have been quite destroyed by collectors of specimens.

That singular bird the *Locustella, or Grasshopper Warbler*, is not rare on the heaths around London, although the contrary has been asserted. Its strange voice is generally first heard on the second week in April; and it departs early, as is satisfactorily shown at p. 106. of the present Volume. I have heard it emit its cry when flying rather slowly from bush to bush, but never when suspended overhead, as is there stated. It gapes very widely indeed whilst uttering this; and the sound is accompanied by a tremulous thrill of its whole frame. I believe that its mode of progression is ambulatory, as in the pipits; but this I cannot positively assert; for, though I have many times seen it rise from the ground, in little bare open spaces between the bushes, the dinginess of its colour has ever prevented me from noticing it before it flew. Sometimes I have observed this species in very dense hedges, and still less commonly in the interior of thick woods: but the open brake upon the common is its normal habitat; where it by no means peculiarly affects, as it has been often said, the lower and more damp situations, but occurs frequently in the driest places. I have often met with it where the furze is extremely low, clipped and stunted, and mingled with hassocky tufts of grass. Its nest, I suspect, will be found to rest invariably upon the ground.

The Sedge Reedling is common, and found everywhere in

damp situations. Its range extends to the extreme north of the island.

The Fen Reedling is also plentiful, but less generally diffused than the preceding. Both of them arrive about the third week in April, and depart in September. The fen reedling not only nidificates among the reeds, but very commonly in tall shrubs growing near the water; and this, too, where reeds are plentiful in the close vicinity. It, indeed, more frequently builds in shrubs, and sometimes even in hedges, where it has the choice, generally 9 ft. or 10 ft. from the ground; and the nest is somewhat differently constructed from what it is when affixed to the reed stems. This species comes a good deal into gardens, where these are situate in damp localities. It continues habitually in song rather longer than the sedge reedling; but the latter chants a little, at intervals, till the moulting period, which is not the case with the other. Both warble at all hours of the day and night, and the locustella is equally liberal of its sibilous rattle.

The Grove Pettychaps, or Wood Wren, is not uncommon. It is every where confined to the vicinity of high trees, occasionally descending to the lower branches, but very rarely alighting on a bush. In autumn, it assumes a good deal the habits of a flycatcher. This bird will often be heard reiterating for a long while the monosyllable *tsit*; on which occasion it is always flying rather slowly along; and the moment it settles, the same note is immediately repeated, quicker and quicker, till it dies away in a kind of thrill, during the utterance of which the wings shiver. When it commences this strange *song* upon a perch, the first part is never thus prolonged. It has, besides, a peculiarly melancholy cry, which it emits at intervals, and which is common to both sexes. I do not allude to its plaintive note of distress when it fears to have its nest disturbed. This species arrives early in May, and departs in the beginning of September.

The Song Pettychaps arrives in the first week in April, and remains later than the preceding bird. It is, perhaps, the most abundant of our summer minstrels, and the most generally diffused over all parts of the British Islands. It inhabits every sort of locality, but is less frequent upon the hills. It was met with plentifully in Sutherlandshire, and extends to the western counties of Ireland; it is also common in Norfolk, where, at least in some districts, its two congeners appear to be of rare occurrence. A few are said to remain in Cornwall through the winter.

The Dark-legged Pettychaps, or Chiffchaff, is nowhere so abundant as the last species, and seems rather to affect

woods on rising grounds. Here it is not very common: in the immediate vicinity it is, indeed, rare; for, though many are always heard in spring, in the time of passage, comparatively few stay to breed in this neighbourhood. With us it is the least common of the three.

The little Golden-crowned Kinglet is, I believe, plentiful in every county of the kingdom: it is here very abundant, as elsewhere.

The Cole and Marsh Tits are both moderately plentiful, each in its respective proper locality. The *Blue* and *Oxeye Tits* are somewhat more so.

The Rose Mufflin is not very abundant; at the same time, it cannot be considered at all rare. It seems to be very uniformly diffused over the greater part of the country.

The Hedge Dunnock is every where a plentiful species. The *Wren*, also, is numerous; as is likewise the common *Tree Creeper*. The *Nuthatch*, too, is rather plentiful than otherwise.

Many years ago, a *Hoopoe* was shot on Tooting Common; and, more recently, a pair near Mitcham Common: these latter would, undoubtedly, have bred, had they been suffered to do so.

The Waxwing should be considered an "irregular winter visitant," rather than a "rare and accidental straggler," as is commonly stated: the latter implies a much less frequent occurrence than the former. There have been many instances of its occurring in these parts in cold winters. I know several persons who have shot them. Lately, I have had some opportunities of observing one alive in confinement; in which condition the species is extremely hardy, and thrives upon almost any sort of food. It is remarkably fearless and familiar in the cage. The plumage fades very much in the course of the summer, both in captivity and in the wild state; so much so, that the new feathers put forth in autumn contrast strikingly with those about to be shed. The new plumage produced in confinement is equally rich with that of the wild individuals. Its song is a low inward warbling, occasionally uttered during the greater part of the year.

The Dark Wagtail (*Motacilla lugubris*) is a common species: this, and not *M. alba* of the Continental writers, is the ordinary pied wagtail of this country, as has been satisfactorily determined by Mr. Gould. It has a black back in summer plumage; whereas *M. alba* has the upper parts always grey. There are, besides, other differences.

The Pale Wagtail (*M. alba* of Temminck) I have also shot, two or three times, during the summer months; but,

unfortunately, have not preserved a specimen, supposing them to have been merely a particular state of plumage of the common species, which I could at any time procure at my leisure. I had never compared the two together; which, perhaps, I should have been tempted to do, had M. Temminck stated that they were apt to be confounded one with another. I think I may safely venture to assert that the true *M.* álba is not of unfrequent occurrence here, at least in the summer months. I particularly remember to have shot it at Beddington, and also in Streatham Park, both near this place. All that I have lately examined, in their winter dress, have been *M.* lùgubris.*

The *M.* álba being the *Bergeronette grise* of the French, and the term *grey* wagtail being alike applicable to it and to *M.* Boárula, I shall, in consequence, designate the latter bird by the appellation *yellow-rumped wagtail*, which is sufficiently exclusive. This species is only a winter visitant in these parts, and is by no means common. No instance has been hitherto recorded of its breeding in the south of England. I once, however, observed a pair, I think in the summer of 1831, which had evidently a nest in the neighbourhood, upon Penge Common, Kent; but this is the only instance. It usually arrives here about the middle of September, and departs very early in the spring. One was singing cheerfully near my residence a few days ago.

Golden Willet (Bùdytes flavíssima). Extremely common: arrives early in April, and betakes itself to the pastures and sheep-walks; and departs late in September, at which time they incline to be social; as do, also, all the other species of the wagtail group. In summer, it is every where plentiful aqout the fields and meadows, and does not habitually frequent watery places. One or two bird-catchers, to whom I have described the blue-headed species, seemed to recognise the bird, which they tell me they remember to have occasionally taken in their nets, though very rarely. It seems to be most plentiful in Scotland.

Anthus aquáticus Auctorum. Here, again, there appears to be two species confounded. The common British bird is partly characterised by the confused indistinctness of its breast markings, and the absence of *pure white* on the exterior tail-feathers; though there is always a pale spot. We are again indebted to Mr. Gould for this discovery, who has done so

* Perhaps it would be better (as, in future, it will be difficult to understand which is meant by álba) to designate the pale wagtail *M.* albèola. For the same reason, I prefer flavíssima for the common British species of Bùdytes.

much towards the elucidation of the species of British birds. For the ordinary Continental species, I refer the reader to Temminck's *Manuel*. Our bird is called *Mud-lark* by the bird-catchers. It is occasionally taken on the heaths round London, in the autumn months; and I have kept one so obtained a twelvemonth in confinement. It is, however, of rare occurrence inland. When on the sea shore, this species principally feeds on small-shelled Mollúsca.

The Common Pipit (*A.* praténsis) is one of the most abundant of British birds, and, perhaps, the most generally diffused of any; frequenting alike the mountain, the marsh, and the sea shore, and occurring in equal abundance on the bleakest upland moors, and along the richest water-meadows of the south. Here it is quite as common as elsewhere.

From what I have learned, I have reason to suspect that the *Great Pipit* (*A.* Richárdi Auct.) was taken, a few seasons ago, upon Tooting Common. One I lately examined, that had been captured alive near London, and then killed and made a specimen of, was undergoing its autumnal moult: its summer and winter changes being obviously precisely analogous to those of *A.* praténsis.

The Tree Pipit is a common summer visitant, and is the *Tit-lark* of the London bird-catchers; the *A.* praténsis being known as the *Pipit-lark*. It arrives in the first week in April, and departs late in September; at which time it is decidedly social. It is every where very abundant in this neighbourhood. This bird differs greatly from all the other British *Motacíllidæ*, as observed alive; being quite of a different make, and more equably poised on the centre of gravity; whence all its attitudes are very different, and its movements are far more deliberate than those of its congeners. The mode of progression is indeed quite different, though ambulatory in both instances; the slow gait of the tree pipit contrasting strikingly with the nimble run of all the others; which latter is, again, very unlike the quick step of the larks. In captivity, it is an extremely healthy bird, and moults very freely; thrives upon almost any sort of food, and delights to bathe and wash itself in a pan of water. The other pipits, however, and also the wagtails, are very difficult to maintain in health in a captive state: they refuse to wash themselves, and suffer very much at the moulting period, both in spring and autumn. I never knew one, or a wagtail, to change its plumage well in the cage. All the latter, too, are very snappish in confinement towards other birds; a trait of character which is not observable in the tree pipit. It is by far the finest songster of the genus, and the most thoroughly migratory: it is also

remarkable for the loose hold of its feathers, which come out easier, when the bird is handled, than those of any other species I know of: this circumstance is, doubtless, connected with its easy moulting. It is needless to point out the peculiarities of its bill and feet, and of its general formation. The species should be seen alive, together with one or more of its congeners, before half the diversity can be appreciated.

The Wood-lark is here very rare. A few are taken by the bird-catchers at flight time; but the species never breeds in this part of Surrey. I do not remember to have heard it sing in this neighbourhood.

The Common Field-lark is abundant.

The Snowflake very rarely occurs so far to the south. A small flock of them was taken by a bird-catcher the winter before last, one of which is still alive in my possession. It is a hardy bird in confinement, and passes most of its time on a perch.

The Corn Bunting is moderately plentiful: I think more so upon the chalk.

The Yellow Bunting is much more abundant.

The Cirl Bunting is extremely rare, and local. A specimen is occasionally taken in the nets during the winter months. Further into the county, it occurs plentifully in one or two scattered isolated localities.

The Reed Bunting is rather a common species.

The House Sparrow is, of course, abundant.

The Tree Sparrow appears in autumn, in moderate flocks, but rarely enters the farm-yards. As a specimen was shot, last July, near this place, I conclude that a very few breed in the neighbourhood. Has any reader seen the young of this species? And does it not resemble in plumage the female house sparrow?

The Northern Chaffinch, or Brambling, arrives about October, and departs in April. It is not very common; but appears less so from its taciturnity. The winter edgings to its feathers are not nearly so quickly shed as those of the common chaffinch; nor does the bill become blue till late in April. In the middle of that month, I have watched a flock of them, by means of a glass, all of which had the bill quite yellow, though the plumage had assumed its summer aspect. As in the redwing and fieldfare thrushes, the internal indications of the approach of the breeding season are not manifested so soon by several weeks as in the resident species. The change of colour in the bill accompanies these developements; whereupon the migratory impulse is also soon induced. The

coarse song of the present species, too, is not heard till then. Both sexes occur plentifully in the same flock.

The Common, or White-winged, Chaffinch is abundant. Many of both sexes remain all the year about human habitations; and, though flocks are occasionally met with in winter, consisting wholly of females, it is not unusual to observe both sexes mingling in flight with yellow and reed buntings, green grosbeaks, and other of the larger *Fringillidæ*.

The Haw Grosbeak is rare; but breeds sparingly in several localities. I have obtained the young from the vicinity of Tooting Common. Richmond Park is rather a favourite situation; but the species is less common than in Kent. It is remarkably shy during the summer months. I have known an instance of its nidificating two seasons following upon the same bough of a tree; and a similar instance is recorded in the *Field Naturalist's Magazine*. This summer I raised a young one from the nest, which has become a handsome and healthy bird. It is easily kept, in captivity, on the seeds usually given to *Fringillidæ*.

The Green Grosbeak is here plentiful, as in most other parts of the kingdom.

The Song Linnet arrives in large flocks every autumn; but is somewhat rare in the summer months, owing to the numbers which are annually captured by the bird-catchers, and the avidity, also, with which the nest is sought for: it would otherwise be very common throughout the year.

The Mountain Linnet is a regular winter visitant, by no means rare. Much as I have seen of this species, I have never heard from it any note which could be construed into *twite*, represented as its ordinary call. Its song is very inferior to that of the preceding.

Rose Linnet, or Lesser Redpole. This pretty little bird has hardly ever been known to breed in the southern counties; but arrives in vast numbers every autumn. It is extremely common in the winter months.

The Mealy Linnet (Linària canéscens *Gould*) is a rare and very irregular winter visitant. A very few were taken last winter, of which I obtained one, and kept it for several months in confinement. Its song differs from that of the little rose linnet; but its chirp and call-notes are extremely similar.

The Siskin Goldfinch appears regularly every winter, sometimes in very considerable flights. I have known a young one to be taken in nestling plumage; wherefore I infer that it was bred not very far off. This bird, indeed, appears to breed

sparingly in many parts of the country. In spring, they assume the nuptial aspect before they leave these parts.

The Common, or Garden, Goldfinch is here a rare bird in summer; in consequence of their being so much thinned by the bird-catchers. Immense flights of them, however, arrive every autumn; and, were their enemies to suspend operations for a single season, the species would be very numerous in this part of the country.

The Crossbill occurred rather plentifully last year, in many, if not most, parts of England. A few were taken in this neighbourhood, and one or two have been met with this summer. I obtained a young male alive, in immature plumage: this closely resembled that of the hen siskin goldfinch and rose linnet, even to all the minutiæ of the markings; as the pale mesial streak upon the back, the dusky chin, &c. It is much more nearly allied to these birds than is commonly supposed, and is, in fact, but a modification of the siskin form, of a stouter build. Its call-note, and the peculiar swing of the body accompanying this, reminded one forcibly of *Carduèlis*, and there are a variety of other particulars in close accordance. All the males assume red plumage at the autumn moult, contrary to what has been asserted; the young of the year being rather less bright than the older birds. After breeding, I suspect, this fades into an orange tint; and, as the young birds change their dress earlier in the season than their parents, these are, towards the end of summer, of a bright red; whilst the adults continue of a dull buff orange. Hence has arisen the prevalent error, that the latter is the mature fixed livery.

The Bullfinch is not of very common occurrence here, from the same causes which arrest the multiplication of other cage favourites.

Neither is the *Starling* a very abundant species, a large proportion of them being annually captured by the bird-catchers.

The Jay, too, is so much sought after by stuffers, on the one hand, and by gamekeepers on the other, that, were it not for the extreme shyness and cunning of the species, it would have been exterminated long ago in these parts.

The same applies to the *Magpie*. Both of these may be considered rare in this neighbourhood.

The Jackdaw is, for the most part, rather thinly distributed, except in a few localities here and there. Individuals more or less marked with white are not very uncommon.

The Crow is quite as plentiful as could be expected; and we hear of its mischievous doings in the farm-yard every

season. Not very many breed about this place. The raven may be omitted altogether.

The Hooded Crow has, I believe, been shot on Mitcham Common.

The Rook is very plentiful indeed.

The Red-legged Chough has been once killed on Mitcham Common. This species makes its appearance inland rather oftener than is generally supposed. On Salisbury Plain, they are occasionally met with in the winter months, particularly walking about the high roads.

The Green Woodpecker is very rare in this part of Surrey, but becomes common as we recede from London. Its rarity is chiefly attributable to the gunners.

The Pied Woodpecker is equally uncommon. In the fir woods beyond Croydon, it is more numerous, as is, also, the preceding species.

The little Barred Woodpecker is the commonest of the three in these parts; still it is by no means very abundant. It comes not unfrequently into gardens, close by human abodes.

The Wryneck is a very plentiful species. It is first heard, generally, early in April; but is occasionally shot several weeks previously. For the beauty of its plumage, it is much sought after by bird-stuffers from London, who decoy it to its destruction by means of a mouth-whistle. Great numbers are thus destroyed every season. It frequently selects for the purpose of incubation the nest of a redstart of the preceding year; but occasionally lays on the bare sawdust-like fragments of wood, at the bottom of a hole, in a stump of willow. But few of the nests are found, considering the abundance of the species.

The Cuckoo is moderately plentiful, and would be more so were it not so much harassed by gunners. A little further into the county, where it is comparatively unmolested, this species is very common. It often arrives in the country several weeks before its well-known cry is heard. Both its notes are common to the two sexes. The egg is found in a great variety of nests, both of granivorous and insectivorous birds; but, in the enclosed districts, it is most frequent in that of the hedge dunnock, and not rare in the field-lark's; whilst, on the open commons, the meadow pipit's and wagtail's nests most usually receive it, and not unfrequently that of the whitchat. Having spared no pains to investigate the economy of this interesting bird, I am now enabled to speak with confidence on most points on which I formerly was doubtful. The species both arrives and departs in flocks; though some

of them migrate singly. The adults change the clothing plumage, and also the tail, during their stay with us; but retain the quills to bear them on their migratory journey. The barred markings on the sides of the neck are exhibited in the new feathers which the adult females put forth at the close of the summer, or, rather, a little after midsummer; and appear, therefore, to be a permanent characteristic of the sex; whereas Mr. Selby states that "the female differs in no respect from the male." The young of the year do not change a feather till after they have left us. Unlike many other species with which I am acquainted, the females often continue to lay while in deep moult. They deposit, on the average, five eggs in the course of a season, rarely more; and these, judging from the result of numerous experiments which I have instituted, are not unfrequently ejected by the birds to whose fostering care they are entrusted: hence, I believe, the disproportionate scarcity of their occurrence. A considerable period intervenes between their successive deposition; during the lapse of which the female cuckoo instinctively watches the proceedings of birds that are carrying about building materials; the time her egg requires to become matured for laying being at least equal to that which the majority of smaller birds consume in the process of nidification. That she cannot, however, much protract the time of disburthening herself, as has been suggested, when the egg has been received into the oviduct, is sufficiently proved by the fact of her sometimes laying into an unfinished nest. There is no division of her eggs into separate lots, as in the case of birds which incubate their own; a fact which might, indeed, have been suspected *à priori*, seeing that no purpose could be effected by such an arrangement. In point of fact, each separate consecutive egg is analogous to a *lot* in other species. The remarkable deviation of the cuckoo from the general habit of the feathered race, in confiding its progeny to the care of strangers, is dependent on a peculiarity of the vascular system, and particularly on the minuteness of those blood-vessels which supply the generative parts; in consequence of which the male organs, even at the full period of sexual excitement in summer, are most disproportionately small; and each successive egg of the female requires so long a time to become fit for deposition, that they could not be incubated simultaneously: even when developed, they are, from the same cause, remarkably small for the size of the bird; which, however, adapts them to that of the nests into which they are intruded. I cannot suppose that this peculiar conformation is intended merely for the purpose of retarding

the growth of the egg; though this effect is unquestionably occasioned by it: it must rather have reference to some other peculiarity of the bird's habits, which we have yet to discover. It is certain that the maternal feelings of the cuckoo are not quenched, astonishing as this may appear. Mr. John E. Gray of the British Museum informs me that he has himself seen a cuckoo, day after day, visit the nest where one of its offspring was being reared, and which it finally enticed away from its foster-parents! I had previously heard of analogous cases, but was disposed to regard them as fabulous, until corroborated by so paramount an authority. Since I have proceeded thus far with the cuckoo's history, I may add that, although caterpillars form its principal subsistence, it feeds likewise on snails, and various fruits; and that it is quite true that both sexes devour birds' eggs, as well as callow broods. Of the numerous cases I have now accumulated of the occurrence of the cuckoo's egg, not one has been met with wherein it could not have been *laid* into the nest. The egg of the cuckoo is most commonly found *alone*, or together with less than the average number of those of the species to which it is confided. I have one instance in which a young cuckoo was found, half-fledged, in the same nest with two hedge dunnocks of equal age; which fact I can only account for by supposing that the interloper was weak and sickly at the time of its exclusion, and remained so till the instinctive propensity to oust its companions had entirely dissipated, as we know to be the case. It was, however, apparently quite healthy when discovered.

Having now brought the principal groups of land birds to a close, the remainder of the feathered tribes noticed in these parts, with the list of fishes observed elsewhere than in the Thames, may be reserved for a future contribution.

Tooting, *Oct.* 18. 1836.

ART. III. *Additional Remarks on* Lèpas anatífera. By the Rev. W. B. CLARKE, A.M.

IN VIII. 55. I have stated the circumstance of numerous specimens of *Lèpas* having been found, off the Dorset coast, on February 7. 1834. A friend has just brought me another series of specimens, attached to a far more curious vehicle than a log of fir; and, as a proof of the singular tenacity with which these creatures maintain their power of voyaging across the globe, I send you a brief account of the fact.

One of our Poole pilot-boats was cruising, to-day, in the

Channel; and, about four leagues from land, they picked up a *bottle*, smelling strongly of rum, and closely corked, upon which three congregations of *Lèpas* have rooted themselves. The first is about the neck of the bottle; the second, consisting of two only, is in the middle of what, from the weight, must have been the under surface; and the third depends, like a bunch of flowers, from the hollow at the bottom. They are of the variety described by Dr. Weatherill in V. 339. But I notice that that part of the pedicle which is nearest to the shell is, in several of them, considerably enlarged, or swollen, so as to be as big again as the lower part; and this swollen part is very sudden in its enlargement. The pedicle is fastened to the bottle by a substance in *appearance* very like plaster of Paris. The individuals are, with four exceptions, very large, and must be old. I do not know whether there is anything else particularly observable in them; but the circumstance of their being attached to such a vessel as this bottle is certainly curious. If this bottle had contained any document by which we could trace its course, it would have been an interesting means of ascertaining the actual direction of its passage. But, in default of such evidence, I can but conjecture that it was thrown overboard in the warm latitudes about the Gulf Stream; and that it has been floating across the Atlantic in the set of the current towards our shores. That it has been long in the water the state of the cork bears witness, as well as the great size and number of the barnacles; but, tossed about, as it must have been, during the period of its immersion, notwithstanding the ballast supplied by its passengers, it must have had a difficult voyage on account of these passengers; who, in first attaching themselves to so slippery a craft, and then maintaining their position so long, are entitled to our notice. Mr. Kirby (*Bridgewater Treatise*, vol. ii. p. 6.) enumerates the backs of the turtle, the dolphin, and the whale, as some of the agents of locomotion to the balanites; but the present instance shows that the lepadites are as capable of attachment to equally smooth and rounded surfaces. I have conjectured that this bottle has been long at sea. Mr. Kirby tells us, however (vol. ii. p. 9.), that Poli found full-sized sessile barnacles in October, which were not bigger than the point of a needle in the beginning of June; but, he adds, these were attached to boats that had long been *stationary*. The case, here, is of lepadites attached to a smooth cylinder of glass, which must have been in constant rotatory and vibratory motion, subject, also, to the fluctuation of stormy waters. They, probably,

were drifted up the Channel before the violent storms of the last few weeks.

Stanley Green, Oct. 22. 1836.

ART. IV. *Short Communications.*

REMARKS on the extravagant Price of Works on Natural History. — My paper on this subject (IX. 213.) having elicited a request from a correspondent, at p. 266., for more particulars, I shall submit a few instances of the reduced price of works for his inspection. Leach's *Zoological Miscellany*, 2 vols. royal 8vo, was published at 3*l.*: it may now be had for 30*s.* The *Zoology of North America*, by Swainson and Richardson, published under the patronage of government, vol. ii., the birds, cost originally 4*l.* 4*s.*, and may now be had for 2*l.* The *Transactions of the Horticultural Society* of London, 9 vols. 4to, uncut, may be purchased for 11*l.* 11*s.*: original cost 40*l.* Some of the first volumes of the *Linnæan Transactions* I have seen advertised at 5*s.* each. Stephens's *Illustrations of British Entomology* Mr. Conway may now procure for 4*l.* 10*s.* The original cost, if he prefers it, will be 2*l.* 10*s.* more; for which he may procure Jardine's truly valuable edition of Wilson's *American Ornithology*. The original cost of this edition was 6*l.* 6*s.*; and the original cost of the original edition was 35*l.*: so that, you see, original books are not always the most desirable. *Plantes Equinoxiales*, atlas fol., 2 vols., 144 plates, 4*l.* 10*s.* This work of Humboldt and Bonpland was published at 21*l.* All these, and many more, may be had at the above prices.

Since my former notice of works on zoology deserving of notice (IX. 213.), several others have appeared. Eyton's continuation of Bewick contains some good woodcuts; but, as for the rest, it is worth nothing: his representation of the fire-crowned kinglet is as bad as Bewick's of the gold-crowned kinglet. The *British Song Birds* is an interesting work; and, though it contains little that is new, yet it puts us in possession of what has long been known, in a portable form. A third edition of the *Wanderings* of Waterton (who, with the exception of Wilson and Audubon, is perhaps the first practical ornithologist of the present century) has appeared, price 6*s.* Macgillivray has published an interesting work on the *Preyers of Britain*, price 9*s.* The *Cyclopædia of Natural History*, edited by Partington, verges towards the conclusion of the third and last volume. This *might* have been a first-rate

work, but has been edited in a slovenly manner. The second edition of the *Feathered Tribes* has appeared, and, I am sorry to say, in fully as disgraceful a manner as the second edition of the *British Naturalist*, by the same author, for an exposition of which I refer to the article of your able correspondent A. R. Y. (IX. 495.) Not only are several typographical errors suffered to remain, but others are added: for instance, at the head of the description of the bearded pinnoc, is written "Bearded Tit or *Road* Bird." Relying on the advertisements, which set forth that the new edition was greatly improved and enlarged, I procured a copy; and found that, although a few new species had been added, yet the number of pages was exactly the same! and, also, that some of the land birds were yet unceremoniously crammed into the volume dedicated to *water* birds, apparently to make the volumes of equal thickness!! In the preface to the first edition, the author complains of want of room to bring forward all he has to say on many species; and, in the preface to the second, he tells us he has not found much to add! If this is the case, he really should not try to *gull* his readers in advertisements. The plates (many of which would disgrace a twopenny nursery book) remain the same. From this disgraceful exhibition, we turn with pleasure to a noble undertaking commenced by the spirited publisher Van Voorst; namely, a complete series of works on British zoology. The fishes, by Yarrell, are completed; and the quadrupeds, which are equal, if not superior to that work, are wellnigh completed, under the auspices of Bell. The birds will follow next. The woodcuts are truly beautiful; and the typography and getting up of the work is more to my taste than anything of the kind I have before seen in works of natural history. — *C. T. Wood.*

Campsall Hall, Doncaster, Nov. 9. 1836.

Notes on a Cruise off Cherbourg. — *Sept.* 1836. I went into Cherbourg on Monday, Sept. 19., in a yacht of 19 tons; the wind gentle from the north. We left Durlstone Head at 8 A. M., and made Cape la Hogue, at 3 P. M.; having lost sight of the English land two hours. About four o'clock, a swallow made its appearance, and hovered round us for some time, attempting to settle on the gaff-topsail; but the roll of the sea shook the vessel so much, that it was with difficulty the bird could keep its hold: but it continued hovering about us till we anchored in Cherbourg Roads, at 8 P. M. It was evidently much distressed. If it was, as I suppose, passing from Dorsetshire to Normandy, on its way southwards, its distress was probably occasioned by

a want of a wind from the south; which, though adverse to us, would have been *fair* to a bird steering southwards, as is well known to naturalists. This, and the lightness of the air, rendered its passage across the Channel, in so fine and clear a day, more troublesome than it would have been in a rougher south-west gale. The swallows, in this part of England, had left before the date alluded to; and on the coast of France I saw none.

On coming out of Cherbourg, on Wednesday, Sept. 21., when off Fort de Querqueville, about seven miles from land, I picked up a wheelbarrow, floating in the tideway, which, by the marks upon it, had evidently been washed from the Breakwater, and had been in the water several days. It was floating bottom upwards; and, on turning it to get it on deck, we found three "John Dorys" caught between the planks. They were, it is true, extremely small; but their position there showed that small fish are glad to get in (as Paddy said, when he fished under the arch of Dublin Bridge) "*out of the wet*," and to shelter themselves from the violence of the surface waters. I believe all fish will get under cover if they can. — *W. B. Clarke. Stanley Green, Oct.* 24. 1836.

Woodcocks. — An extraordinary quantity of these birds appear to have migrated to our shores within the last week or two. On Thursday, Mr. Harrington Hudson of Bessingby, and a friend, shot 16 couple; and, on Saturday last, another individual shot 12 couple. (*Hull Packet* of Friday, quoted in *Times*, Nov. 10. 1836.)

Singular Habit of a Gull. — On the artificial pond called Canonmills Loch may be daily seen, during the winter, a solitary sea-gull, swimming about apart from the ducks which so numerously frequent the loch. He leaves it every night, and returns again in the morning. For a number of years, he has unerringly, at a certain season taken his flight to other shores. and, with the same regularity as to time, been seen circling around the little loch before alighting to take up his winter sojourn. But it is remarkable that, as if foreseeing the early storm, he has this year returned a week sooner than usual, having made "his first appearance this season" on Tuesday, Oct. 25. (two days before the frost set in). It may be surmised that this singular bird would not quit his tribe and native element, and forego the wild pleasure of "brushing the white sail with his white wing," unless he had a reason of his own for it, and the food administered to him by the kindly hand of Dr. Neill is a very substantial one. (*Caledonian Mercury*, quoted in the *Times*, Nov. 10. 1836. *Communicated by Mr. George Dennes to this Magazine.*)

Dreissèna polymórpha (IX. 573.). — In forwarding to us the drawings for the woodcuts of this shell, Mr. J. Sowerby observes, "I have somewhere published an account of the discovery of the Dreissèna in the Commercial Docks; but I cannot remember where. In that account I mentioned the occurrence of crystals within the shell; and in the drawing now sent I have introduced the crystals. They seldom show more than one face, and only one shell in 500 or 1000 has them at all." False septa are common, resulting, probably, from the superabundance of carbonate of lime in the waters of the docks."

ART. V. *Retrospective Criticism.*

INDIGENOUS Nature Papílio Podalírius. — Without expressing any other opinion than that given in my *Illustrations* (vol. i. *Haustellàta*, p. 8.), as to the indigenous nature of *Papílio Podalírius*, I cannot refrain from noticing the remarks of Mr. Dale on the subject, contained in p. 599. of your present Volume; "*truth alone*," and not mere opposition, being my object. This writer, in the page above quoted, states, "At p. 333. Vol. III. I gave the different authorities for considering *Papílio Podalírius* as British. Mr. Stephens chose to consider this 'absurd;' giving as a reason, that 'it was a geographical impossibility;' and he has been followed," &c. Upon referring to the volume of my *Illustrations* in which this subject is mentioned, it will be found that I say, "This insect appears to have been introduced into the British fauna upon the most loose and unsatisfactory authority. Its introduction by modern authors arose from the following words of the celebrated Ray: — 'Prope Libernam portum in Etruria, invenimus; et etiam, *ni male memini, in Anglia.*' (*Ray, Ins.*, p. 111.); and from the expression of Berkenhout, who says, in his *Outlines*, that it is 'rare in woods.' Now, as the attention of entomologists has been so especially drawn towards the solution of this point for at least forty years, and no *authentic* instance of its capture is recorded, it seems absurd to consider it as a British species: but, notwithstanding, there are several entomologists sanguine enough to expect that it may eventually occur in some of the unexplored parts of the country, although its highest northern range on the Continent appears to be about the latitude of Paris." These remarks of mine were published on June 1. 1827; and some additional ones, on June 30. 1828. Mr. Dale's notes (which he now states that I chose *to follow*) were written on January 3. 1830, and published on July 1. in the

same year; being *above* two years *after my publication!* It is, therefore, needless for me to insult the intellect of your readers, by pointing out the palpable absurdities and gross misstatements of the writer, beyond what is above stated; sufficient has been given to show the *animus* which appears to incite the writer to *oppose*, by garbled notices, what I have remarked; and the little reliance that can be placed on his statements. — *J. F. Stephens. Old Church House, Camberwell, Oct.* 31. 1836.

Scólytus destrúctor attacks healthy Trees. — In referring to Mr. Denson's detailed account of that formidable insect the Scólytus destrúctor of Olivier (IV. 153—156.), I am inclined to think he is mistaken, when he states that the insect only attacks diseased or dying trees. He certainly appears justified in that opinion by the experiment on the elm in his garden; but, in the parish in which I reside, I have witnessed so many young and healthy elms perish from the attacks of this insect, that I feel satisfied their ravages are not confined to diseased trees alone. The churchyard of Hackney parish was planted, about thirty years ago, with a variety of forest trees, the greater part of the common elm (*U*lmus campéstris); and, until the last five or six years, they throve, and promised to become, for many years, an ornament to the spot; but they then began to suffer from the Scólytus; and, out of probably a hundred elms, twenty have already perished, and many others are so injured, that they cannot survive another year. Any one who has observed these trees (and there must be several among your readers) will, I am sure, agree with me, that more vigorous trees could not be found, previously to the attacks of the insect; therefore, I fear the elm is subject to the ravages of this destructive insect in every stage of its existence. The trees now infested (Sept. 28.) have nearly lost their leaves; and their trunks swarm with flies and wasps, attracted to the banquet by the saccharine juice they exude; as Virgil says of the oaks, "Sudabunt roscida mella;" while the uninfested trees have their "green livery" as fresh as in July. Some persons have imagined that gas escaping from the pipes has produced the great mortality among the elms; but, as they perish where gas is far removed from them, this conjecture is untenable. The writer of a *Treatise on Ornamental Planting*, published by the Society for the Diffusion of Useful Knowledge, says, in a note (p. 72. and 73.), that a tree of the *P*inus *P*ináster, reared in a pot, was subjected to the influence of carburetted hydrogen gas, by means of a pipe conducted to its roots, without producing any perceptible effect. Fabricius calls this

in sect Hylésinus Scólytus, and says, on the authority of a Mr. Lee, "Distruit ulmos Angliæ." Gyllenhall (*Insecta Suecica*, tom. iii. 346, 347.) calls it Eccoptogaster Scolytus (εκκοπτω γαστηρ, excido et venter); and says, "Habitat in truncis exsiccatis Betulæ albæ sub cortice, passim;" and it is somewhat singular that, in his descriptions of the various insects of this genus, he does not specify one as feeding on the elm: he does, however, mention dead trees (*arborum mortuarum*) as the habitat of several. No other tree, that I have observed, but the elm, has been injured by this insect, in our neighbourhood. — *O. Clapton, Oct.* 15. 1836.

Nature of Mineral Veins. — Reading over the interesting lecture on the mineralogy and geology of Nova Scotia, in the last Number of your Magazine, I noticed a remark (p. 579.), that "the minerals which occasionally fill up veins and cavities in rocks are always component parts of the rocks in which they are found." It is difficult to find a rule altogether without exceptions; and exceptions to this rule must always be difficult to account for: yet they exist. It is a well-known fact, that veins of compact quartz rock, and cavities containing quartz crystallised, are frequent in granites; the cavities, however, being generally in the quartz veins, rarely in that granite which contains them, except in the form of mere fissures. Flexible amianthus, green and white, with large crystals of felspar, chlorite, and schorl, is usually found accompanying the quartz; and, with these, it is a thing of not very unfrequent occurrence to meet with crystals of calcareous spar, neither small nor few in number. There would be little singularity in this, if the cavities had ever been exposed to the air, or to the action of water by infiltration; but, when it is considered that they are in the heart of the granite or quartz, if not far from its surface, at least entirely secured from the influence of extraneous circumstances, and only to be discovered by the indefatigable search of the crystal-hunter, the circumstance becomes remarkable, if not unaccountable.

Mineral veins are, indeed, formed, not only in compound rocks from their component parts, but also in simple rocks from their constituent parts. Thus zeolites occur in trap (by the by, at p. 580., has not the word "steatites" been accidentally substituted, or taken down erroneously, for "zeolites?" I do not know what is meant by "opaque limespar:" but steatite does not radiate in its crystallisation; and, when found in floetz trap, it is usually in angular fragments); and thus quartz veins and crystals of chiastolite are formed in clay slate, the one from its silex, the other from its

alumine. But the quantity of lime in felspar, being so extremely small, will not account for large, or comparatively large, formations of calcareous spar; particularly as there are no signs of decomposition in the adjacent felspar. It is possible that minute portions of carbonate of lime may exist between the component minerals of the granite, from which the crystallisation may take place; particularly as I am not sure that the crystals have ever been found in cavities formed exclusively in the quartz veins. It is, likewise, possible that calcareous deposits may, at some period, have existed on the granite, from which the crystallisation may have been formed by infiltration through infinitely minute invisible fissures; the deposit being afterwards destroyed by arrosion, or other causes. This calcareous spar is sometimes accompanied by sulphur. I have a piece of it from the granites of Chamouni, with bright yellow native sulphur, in the form of a thick coating, here and there imperfectly crystallised. The reverse of this formation of calcareous matter in siliceous rocks occasionally seems to take place, but is usually more easily to be accounted for. I remember finding, near Bassano, in Lombardy, a piece of compact, hard, fine-grained limestone, with a vein of chalcedonic flint, about a quarter of an inch broad, running through it, apparently so, at least; for, though improbable, it is not impossible, that the silex may accidentally have assumed a tabular form (especially as the fragment was not large) before becoming involved in the calcareous matter. Many instances might be given of silex occurring singularly involved in such substances; but they are generally only accidental juxtapositions. At p. 581. is a notice of "pellucid spar" occurring in a nodule of jasper. The term "spar" is usually applied to calcareous crystals; but I suppose it here implies quartz: if not, the fact is very remarkable.

I remember, in corroboration of the remark that crystals are usually connected with rocks in a state of decay, a bed of clay, formed by decomposing clay slate, near Bangor, in North Wales, containing aggregates of beautiful clear rose-coloured quartz crystals. Of course, when the mineral, as in slate, is a constituent part of the rock, decomposition of the one will occasion crystallisation of the other; but where, as in granite, it is only a component part, the crystallisation appears to be occasioned by a superabundance of the mineral; for it is neither produced nor attended, neither preceded nor followed, by decomposition. After all, the formation of earthy crystals in a rock of a different nature is hardly more anomalous than that of metallic nests. At p. 582. it is said that veins, having been once fissures, "have since been filled

by metallic ores, or some other mineral which formed a part of the general mass." Does this mean that the metallic ores once formed a part of the general mass? Are the metallic bases of the earths so accurately ascertained, as to permit us to believe that the gold which is found in nests in quartz; the titanium, crystallised in the same mineral; the galena, whose veins intersect the limestones of Derbyshire; the molybdena, which occurs in nests in the granites of Chamouni; ever entered into the composition of the general mass? We may expect great results from the late discovery of the influence of the galvanic fluid, in the formation and arrangement of metallic minerals. — *J. Ruskin. Herne Hill, Nov.* 2. 1836.

The Blackchin Grebe, mentioned at p. 599., is merely the little grebe (Pódiceps pusílla), in a particular state of plumage. As long as correspondents depend on Bewick, and other equally erroneous authors, they will continually be falling into these blunders. Why do they not procure authorities on which reliance may be placed, as Selby's *British Ornithology*, or Mudie's *Feathered Tribes?* In these excellent works Nature is represented as she *is*, and not as closet naturalists would make her. — *C. T. Wood. Campsall Hall, near Doncaster, Nov.* 10. 1836.

Egret.—In reply to the Rev. Mr. Ventris's query (IX. 319.), as to the occurrence of the egret (*Ardea Garzétta*) in Britain, I beg to say that I have a very fine specimen, said to have been shot at or near Sutton Coldfield, in Warwickshire. I bought it of a very respectable bird-stuffer, who assured me he had received the bird direct from the gamekeeper who shot it. Still, I confess I had my doubts, and bought the skin more for its beauty than as an authentic British specimen. However, during a visit, in April last, to Lord Mount Norris, at Arley Hall, I happened to meet with a gentleman, who assured me that, within the last few years, he had known of three specimens of the egret, and two of the little bittern, having been shot at Sutton Coldfield. I therefore think there is no doubt of its occurrence in this country, though it must be classed amongst our rarest birds. — *W. Christy, Jun. Clapham Road, Nov.* 5. 1836.

Comments on Mr. Blyth's Remarks on Specific Distinctions. (IX. 510.) — Because particular species of animals, in different countries, and which animals have been regarded by high authorities as identical, happen to differ in some one habit; the size, number, or colour of their spots; or in the length of a feather; Mr. Blyth would declare them to be distinct. Now, it appears to me that he does not make a sufficient allowance for the modifications of an animal, gradually incurred by a difference of circumstance. Were we to adopt

his views, we must admit the *especial* creation of several Adams and Eves, to account for the various modifications of the human subject; some races being of one shape and some of another; some being of one colour and some of another. What naturalist imagines the existence of several species of dogs, because dogs, in different countries, which call for different exertions on their parts, have become modified? I believe that any habit or structure is liable to, or capable of, modification according to locality, with its peculiar climate, soil, produce, &c. I believe, too, that on the scarcity or abundance of food, or the dangers to be encountered in the procuring of it, in one country and in another, may depend the solitary or social habits of particular birds, and other animals of precisely similar species. Did Mr. Blyth think thus, he would not lay quite so much stress on the mere fact of the common crow being gregarious in America, while it is solitary here, as a proof of the distinctness of the crows of the two countries.

He asks, "What is a species?" I reply that a true species is the uncrossed offspring of uncrossed parents descended from any *one* primitive couple of beings, which God created male and female, and for each other. Though a species may have continued to propagate, without any intermixture with other species, which would produce different appearances, if not habits, yet I do not think that the order of nature has offered any opposition to the structure and habits of any animal becoming, from the cause I have mentioned, gradually altered, in a greater or less degree, from those of its primitive parents. My views may seem to involve the Lamarckian theory; but they do not. On some more convenient occasion, I hope to speak at large on the changes which I believe, after much observation and reflection, to have taken place in the works of nature, not only in the habit, but in the structure. — *James H. Fennell.* 4. *Chester Terrace, Borough Road.*

Sparrows taking Possession of the Nests of Swallows. — Mr. Moss's communication of an instance of the house sparrow attempting to take possession of a martin's nest (p. 545.), induces me to send you the following extract from the *Architecture of Birds:* — "Avicenna, and afterwards Albertus Magnus, tell us that, when a sparrow takes forcible possession of the nest of a window swallow (*Hirúndo úrbica*), there ensues a determined battle between the proprietors and the invaders, in which the latter usually come off, in the first instance, victorious, from their cunningly remaining in the nest. The swallows, however, take care to be revenged; for, summon-

ing their companions to assist them, they bring a quantity of the mortar which they use in building their nests, and, closing up the entrance, entomb the sparrows alive. The same story is told by Rzaczynski; and Batgowski, the Jesuit, affirms that he was an eyewitness of the circumstance; while Linnæus, who was somewhat too credulous of such matters, state it as a fact ascertained. (*Fauna Suecica.*) M. Montbeillard, on the contrary, says that the instances which he has witnessed of contests of this kind give no countenance to the story. He observed the swallows, indeed, return frequently in the course of the summer, to quarrel with the sparrows, and often wheeling about for a day or two; but they never attempted to enter the nests, or to shut them up with mortar. (*Oiseaux*, art. *L'Hirondelle.*) The whole account, we should say, is a fanciful legend; for the sparrows, with their strong bills, would instantly demolish the thickest wall which the swallows could build, instead of quietly permitting themselves to be imprisoned." (p. 334.) — *James H. Fennell. Oct. 4. 1836.*

Coronilla vària indigenous? — Dr. Broomfield (IX. 603.) expresses his belief of the occurrence of Coronilla vària wild in Devonshire. Certainly the two localities he mentions seem to preclude the possibility of an escape from gardens; otherwise I should have suspected it, as I have more than once seen it naturalised to a considerable extent. I remember, some years since, one of my brothers bringing me home a lot of specimens of it on his return from travelling, I think, in Wales; but, as I considered it an escaped plant, I did not preserve the specimens, or note the locality.—*W. Christy, Jun. Clapham Road, Nov. 5.*

Art. VI. *Queries and Answers.*

Rooks using old Materials in building. — Having seen in your Magazine for September a query, "Do not rooks, in providing themselves with nests, habitually appropriate any old nests which have remained from a former year, either by repairing and adopting them, or by using all or part of the materials of which they are composed in the construction of their new nests?" I send you the following answer: —

Rooks, upon the return of the breeding season, certainly make use of the nests which have remained from the last year. I have seen, in the prong of a poplar tree at Ballingdon, nests which have been repaired from year to year, till they have reached between 3 ft. and 4 ft. in height. Those who make a

pastime of shooting the young rooks know that there are two flights, an early and a late one. The early flight is composed of the young of those rooks whose nests have remained from a former year. These having only to repair their old nests, lay and hatch much sooner than those who have to build entire new ones. I believe rooks never breed twice in a season, unless their first nest is robbed. The fact of there being two distinct flights, one considerably later than the other, and the immense mass of materials of which some of the nests are composed, would be sufficient to prove that rooks make use of the same nest for years together; but they may be seen in the spring, and sometimes much earlier, repairing the old nests, which have been disarranged by the storms of winter, by any one who will take the trouble to watch the proceedings of these interesting birds. — *R. R. Sept.* 1836.

Winged Glowworm. (p. 487.) — The question I asked, and which E. N. D. has obligingly answered, I intended to put to some *entomologist, who had seen the insects* alluded to *in the spot named.* I never supposed my information was sufficient for an "exact" answer. — *W. B. Clarke. Oct.* 21. 1836.

REVIEWS.

Murray, Alexander, M. D.: The Northern Flora; or, a Description of the Wild Plants belonging to the North and East of Scotland. With an Account of their Places of Growth and Properties. Part I. Edinburgh; Adam and Charles Black: Aberdeen; A. Brown and Co.: London; Smith, Elder, and Co.*

The organisation, classification, nature, and uses of the various subjects of the vegetable kingdom, one of the fairest portions of creation, comprehending the green herb in which the earth is arrayed; the beautiful flowers with which it is adorned; and the delicious fruits and seeds, both the means of their future reproduction, and the chief sustenance of living creatures; have been illustrated by many expensive and excellent works.

Publications on local botany exceed all these in interest and utility. A botanist, with a little exertion, can gather or procure all the plants described in such treatises, while the subjects of more general and extensive floras are beyond his abilities to reach, or his means to procure. The authors of

* We have previously noticed this work. The present review is from a correspondent.

such works are the greatest benefactors to science, and best entitled to the esteem and goodwill of its votaries. By their labours it is fostered in various parts of the country where it can be successfully investigated: other local botanists are hereby produced, who, in their turn, will contribute to the general fund of botanical information.

By this means botany will be rescued from neglect, and elevated to its proper place as a useful and interesting part of a liberal course of study. Floras of districts, counties, provinces, or other sectional portions of a country, are the most suitable for such as are desirous of learning the science; because the student will not be perplexed with a multitude of species, as in general floras. Moreover, their characters, habits, and localities, with their seasons of growth and maturity, can be more accurately described by the botanist who has the means of investigating them in all their different states and modifications.

It will be easy for any person, who has such a work in his possession, to learn the names and properties of the spontaneous productions of the fields, the woods, and the commons through which he passes either on business or pleasure; to combine them in orders and genera by their more essential characters; and to separate them by their individual characteristics. With this for a basis, the student may easily extend his acquaintance, not only to the plants indigenous to his native country, but towards the productions of foreign lands. The following facts will show that this is not an exaggerated statement:—Two thirds of the genera, and above one half of the species, spontaneously produced in any country may be collected within a moderate distance of the collector's residence; say ten miles. On Hampstead Heath, and in the woods and fields within a mile's distance of the same; or within a circuit of two miles' radius around Hampstead, above half the indigenous plants of Britain have been gathered.

The number of genera of British vascular plants, including *Filices* and *Chàra*, is 460. Of these, 300 have been collected in the confined tract above mentioned; being considerably more than five eighths of the whole. The natural orders of these species (viz. British) are about 100: of these, 87 have been seen in the above-prescribed limit of four miles' diameter, which are about nine tenths of the whole. Within 20 miles of London, all the British genera are found, exclusive of about one sixth. This latter extent supplies about three fourths of the number of British species; the former, above one half. From these facts, which the writer of this article can verify, the great importance of local, provincial, and

national floras may be estimated; for, although the number of plants growing wild in any particular place, county, or kingdom, forms but a small fraction of the number of known species, the generic, and especially the ordinal, proportions are much larger. Consequently, if a botanist be acquainted with the characters of the orders and genera of plants in his own vicinity, he will be thereby able to refer with certainty to their proper families perhaps one half the number in existence, and of these a great proportion to their proper genera. Thus he may not only learn the nature and uses of the species under his immediate observation, but, what is more important, that of all similar plants, or all that agree in having the same ordinal and generic types, amounting to many thousands, wherever and whenever he may have an opportunity of seeing them.

Moreover, local floras, and catalogues, or lists of plants, supplied by resident collectors, are the chief source from which the materials of more general works are derived. About 200 years ago was published the first local flora extant, by a famous botanist of that period; viz. Johnson, the editor of Gerarde's *English Herbal*, and a member of the Apothecaries' Company. This botanical curiosity is entitled *Stirpium sponte nascentium Enumeratio in Ericeto Hampsteadiano*; a meagre, but interesting, list, including a fair proportion of the plants then known as genuine English species. He also published accounts of several herborising excursions, extending over various parts of the kingdom. These interesting tracts are now as rare as, or rarer than, any of the plants recorded therein. Johnson, who fell in the civil war of that period, was succeeded by Ray, the most illustrious among the promoters of natural science at that period. Ray's *Stirpium Synopsis* is the first complete account published of our indigenous flora. Blackstone's *Harefield Plants*, Jacobs's *Feversham Plants*, and Warner's *Woodford Catalogue*, and some other local lists, were published before the appearance of Hudson's *Flora Anglica*, the first English flora arranged according to the Linnæan system. The *Floras of Cambridgeshire*, *Oxfordshire*, *Bedfordshire*, the *Midland Flora*, *Tunbridge Flora*, &c., subsequently supplied materials for the *Flora Britannica*, and its successor, the *English Flora*.

Since the publication of the *English Flora*, or since the appearance of the first volume, the *Floras of Edinburgh*, *Berwick*, and *Devon* have been contributed: and it will gratify the botanist to learn that the investigation of local botany has reached the north and east of Scotland; a district

hitherto almost neglected by the explorers of the land; and, consequently, its productions were unknown. The *Northern Flora* will abundantly corroborate this statement.

The tract of country investigated by Dr. Murray includes the greater part of the far-famed Grampian Mountains; viz. east of Dunkeld and Blair of Athol; the shores of the German Ocean, from the Basin of Montrose to the Moray Frith; the extensive and fertile plains of Buchan and Moray; the rich vales of Garioch, Alford, and Cromar; the Straths of Don and Dee; the mountainous counties of Inverness and Sutherland; altogether extending 200 miles in length, and 10 in breadth; containing the highest ground, and the greatest variety of temperature, to be found in the island; and yielding to none in the rarity of its vegetable productions.

The first part of this work, comprehending the first, second, third, fourth, and half of the fifth class (Linnæan arrangement), is just published. From Dr. Murray's well-known diligence as a collector, his excellent discrimination, skill in practical botany, and attachment to the science, great hopes were entertained that the flora of the north would be creditable to its author. His residence for some years among the hills of Forbes, Kildrummy, Strathdon, and Corgarf; and the facilities for collecting and observing plants in their native places, afforded by an extensive professional practice; are opportunities rarely equalled, never surpassed.

That these advantages have been well applied, this excellent work is a proof; for, among all the local floras of this country (and they are mostly of a superior order), the *Northern Flora* may challenge, and will certainly gain, the preeminence; for there is no doubt that the subsequent parts will maintain, if not exceed, the high character of their predecessor. The generic and specific descriptions are not copied from other works, but are really descriptions of the plants in question, and were written while the subjects were under the author's inspection. Their originality is not their greatest merit: they are divested of technicalities as far as possible; and are neither wearisome, tediously long, nor unsatisfactorily brief. One of the meritorious features in which this flora differs from every similar work (at least, in this country), whether local or general, is, the observations which accompany every genus, or group of species in a genus which are nearly akin. For example, the genus *Potamogèton* is separated into three groups. The first group contains three species, known from the others by their floating leaves. The second is distinguished from the

first by having the leaves all under water, and of a lanceolate shape, of which there are five species. The third likewise contains five species, which have submersed narrow leaves, mostly linear. The excellence of this plan of description consists in bringing together such individuals as have one common obvious characteristic; then, in pointing out their marks of distinction from kindred groups; and, lastly, from each other. This will easily be appreciated by the learner; and it is plain that a species will much more readily be detected in a group of only three or five, than among fifteen, or twenty-seven, as the case may be. The ordinary definitions of genera and species contain many repetitions of characters common to similar genera of the same order, and species of the same genus; so that it is often difficult, especially to a beginner, to determine which is the distinguishing characteristic of a genus or species; that is, the mark whereby it may be known from its congeners and kindred species. In these excellent and learned observations the reader will find this peculiar mark, or character, so prominently exhibited, that he will have little difficulty in referring any specimen to its proper species. An extract from p. 90. will illustrate this: —

"GENUS II. GALIUM.
"Calyx small, 4-toothed, superior," &c.

"SPECIES.
"**Flowers yellow. Fruit without bristles.*.

"1. Gal. cruciatum." Description.
Locality. Four distinct places, with authorities.
Time of flowering.

"2. Gal. verum." Description.
Locality, authority, and time of flowering, as before.

"OBS. — These two species are separated from the succeeding members of the genus by the yellow flowers and smooth fruit; while the ovate hairy comparatively broad leaves, four in a whorl, sufficiently distinguish G. cruciatum from G. verum."

"** *Flowers white. Fruit without bristles.*"

Gàl. palústre, *G.* uliginòsum, and *G.* saxátile, described as before. Localities, authorities, &c.

"OBS. — These three Galiums, like other three which immediately follow them, are characterised by white flowers, and the fruit without bristles. G. palustre is known by the leaves being blunt, without a bristle, rather long, and sometimes unequal; G. uliginosum, by the bristle-pointed leaves and rough stem; and G. saxatile, by the granulated fruit, smooth stem, and blunt though bristle-pointed leaves, which are of an ovate form, and broader than in either of the others."

G. Mollùgo, pusíllum, and aristàtum form the next group, and the subject of the succeeding observation.

In the remarks and observations on the genera, there are

a great many valuable facts and opinions respecting the agricultural, dietetical, medical, and chemical uses of the plants. Many of these are original; some quoted from the ancient herbalists; others from ancient classical authors; and some from the moderns. For example, in describing the *Atropa Belladónna* (p. 143.), the author states: "Perhaps one of the most protracted instances of this effect (dilatation of the pupil) has occurred to the writer of these remarks, who was some years ago consulted by an individual in whom one eye was blind, while, in the other, vision was so impaired, that he only saw when under the effect of belladonna, as light only then could reach the optic nerve. For the uncommon space of six or seven years, this influence was continued in a great measure; though latterly, I understand, the indulgence was reserved for fairs and feasts, and other remarkable occasions. An English opium-eater, I recollect, speaks of carrying happiness in his waistcoat-pocket; and, in the same way, the individual referred to might well consider vision in the light of a portable commodity." Again: "The preparations of hyoscyamus, according to my experience, are the best substitutes for opium that we have; possessing, in no small degree, its useful qualities, without causing the bad effects fairly attributable to that medicine."

The observations on localities will be found peculiarly interesting, especially to such botanists as are fond of investigating the geographical distribution of species. Respecting alpine plants, the height above the sea level is indicated, and frequently the degree of altitude below which they are not found.

"On Ben-na-buird, Azalea procumbens, according to H. C. Watson, a distinguished writer on the distribution of British plants, is found as high as 3500 feet, and in Aberdeenshire as low as 2100; in Switzerland not below 6000; and may be considered as exclusively an upland plant, and not one of those pliant species which the mountain flood is apt to snatch from their tempestuous Highland homes, and carry away in its swelling bosom to a more peaceful bed, wherein they seem to grow and prosper as well as in their own native stations."

Dr. Murray has the merit of rescuing from oblivion the name and pursuits of Dr. D. Skene, a famous botanist of Aberdeen, who, in the days of our fathers, was honoured with the correspondence of Linnæus and other distinguished men of science.

In an observation on *Cornus suécica* (p. 100.) there is a remark respecting this gentleman and the well-known theologian, Dr. Campbell:—

"This is a remarkable plant, with which, upon first inspection, I was considerably puzzled. Dr. D. Skene, too, was at no little loss about

this species, upon receiving a specimen found upon Morven, in Aberdeenshire, from Principal Campbell, who occasionally resided at the foot of that mountain: 'Hæc planta, quam accepi a Dre. Campbell, in Morven ab eo lecta, prorsus singulari gaudet structura. . . . An sine calyce, an sine petalis? Folia 4 magna plana radii dixi corollam, solummodo, ex colore et facie. . . . Nullam vero talem plantam invenio in Linn. v. Hudson.'"

A fac-simile of extracts from two letters of Linnæus to this eminent individual are attached to the appendix.

It will be seen that certain plants hitherto believed to be alpines, and solely confined to such stations, have been found on the Buchan coast, and at or near Aberdeen; viz. Rhodìola *rósea* in the former place, and *Alchemílla* alpina and Saxífraga oppositifòlia about the latter.

Dr. Murray has also added a new species to the British flora, Myosòtis secúnda, which had hitherto been overlooked, or taken for palústris.

The author is much to be commended for eschewing all ungracious remarks on the labours of other botanists. There does not appear to be one ill-natured observation in the whole work. When the author dissents from the judgment of other writers, he does so courteously; giving his own opinion with firmness, and his reasons on which it is founded. The first part of the appendix consists of notes from the ancients respecting our native plants. One of these, viz. on *P*otamogèton nàtans, includes a quotation from Pliny, whereby it seems that the gender of this word is feminine, and neither masculine nor neuter, as Sprengel, Smith, and others have written it. The second part is occupied with observations on the agricultural properties of native plants, particularly the grasses, by a practical agriculturist. These remarks will repay a careful perusal, especially if the peruser have any direct interest in the subject.

Every botanist will heartily thank Dr. Murray for this important addition to the botany of his country; will cordially congratulate him on the partial completion of a work so creditable to his skill and industry; and will be glad to hear that his labours have been properly appreciated and remunerated.

END OF THE NINTH VOLUME.

London:
Printed by A. Spottiswoode,
New-Street-Square.

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