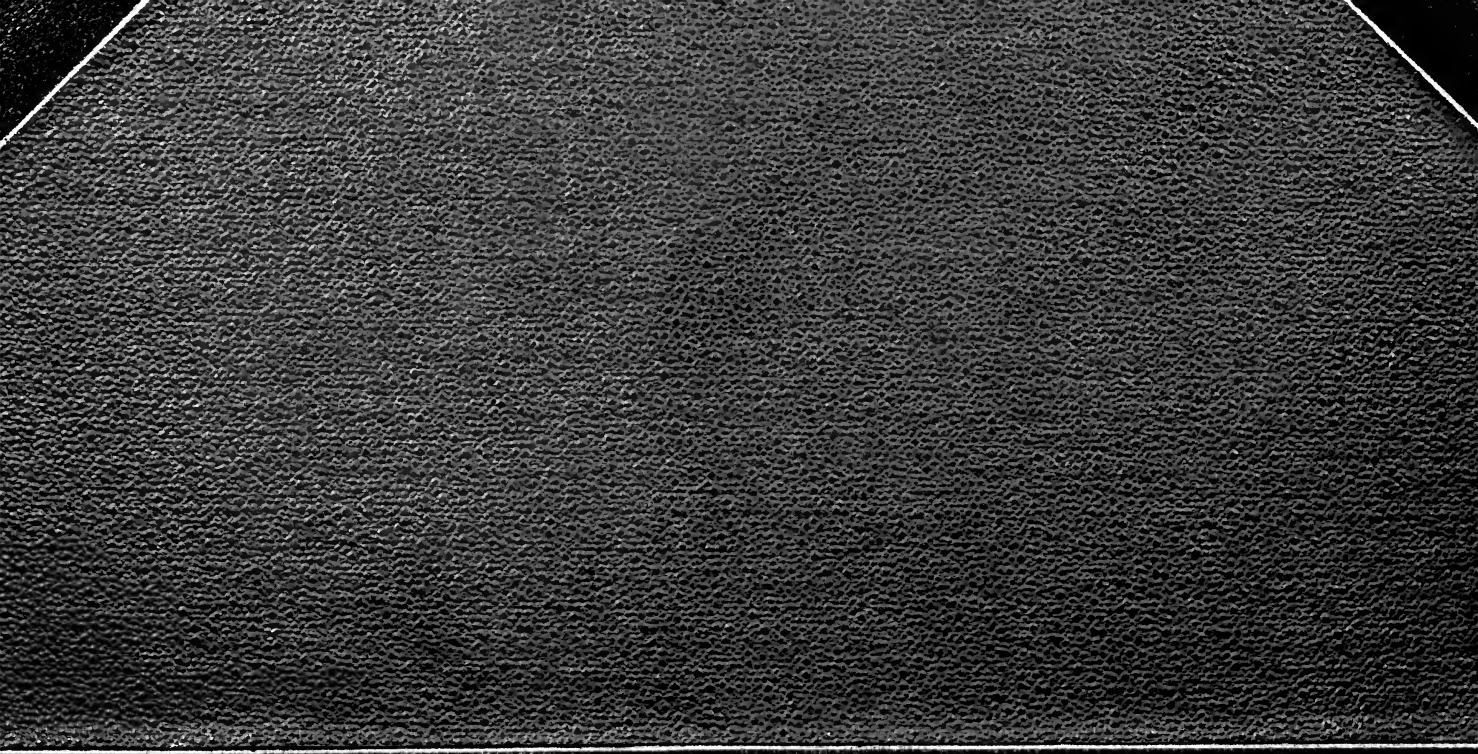


S. 100.
7.

THE

MAGAZINE OF NATURAL HISTORY,

AND

JOURNAL

OF

ZOOLOGY, BOTANY, MINERALOGY, GEOLOGY, AND METEOROLOGY.

CONDUCTED

By J. C. LOUDON, F.L. G. & Z.S.

MEMBER OF VARIOUS NATURAL HISTORY SOCIETIES ON THE CONTINENT.

BRITISH MUSEUM NATURAL HISTORY BRANCH

LONDON:

PRINTED FOR

LONGMAN, REES, ORME, BROWN, GREEN, AND LONGMAN,

PATERNOSTER-ROW.

1834.

LONDON:
Printed by A. SPOTTISWOODE,
New-Street-Square.

PREFACE.

In the course of the publication of the present Volume, we have complied with the general request of our correspondents, and brought out the *Magazine of Natural History* monthly, at a reduced price. This will enable us to give a more ready insertion to the articles of our contributors, and, we trust, will prompt them to continue and to increase their communications.

In taking a general survey of the progress of Natural History during the past year, it is gratifying to observe the establishment of Natural History Societies, one after another, in many parts of the country. The British Association has given a grand stimulus to natural history pursuits; and the personal intercourse, among naturalists, to which it has led, cannot fail to be highly favourable to science, and to good feeling among scientific men. By this means, also, the great object of science, viz., that of reducing it to practice, and rendering it available for the purposes of domestic and general improvement, is likely to be more immediately effected, than by the single influence of the press. The Natural History Societies of York, Newcastle upon Tyne, Worcester, Bristol, Belfast, and various other places, and the Entomological Society of London, are in a flourishing condition, and some of them have begun to publish volumes of their *Transactions*. Not only are new periodicals, devoted wholly or partly to natural history, being established in the metropolis, but also in the provinces. Among these deserve more especially to be mentioned, the *Entomological Magazine* of London, and the *Analyst* of Worcester.

The Continent of Europe, and more especially France and Germany, may be considered as having been long in advance of Britain in natural history pursuits. In the United States of America Natural History Societies are on the increase, and, what redounds much to the honour of a new country, *The American Journal of Science* (Silliman's) has been some years established, and continues to be respectably supported. There are societies in India which

embrace natural history, in common with agriculture and gardening; and a magazine has been commenced in Australia, in which natural history forms a prominent feature.

So congenial are natural history pursuits to the human mind, and so much do they tend to the progress of civilisation, to increased domestic comfort, to peace between nations, and to human happiness, that to us it appears that it would be treason to nature to assert that this state of things will not be progressive, and will not go on increasing, till the condition of mankind every-where is improved to an extent of which we can at present form no idea.

The more frequent appearance of this Magazine, as well as the considerable addition to the quantity of matter which will be given in the course of the year, demands corresponding exertions on the part of its Editor and Conductor; but our readers and contributors may safely rely on these being made. In conclusion, we cordially thank our contributors for their past assistance, and earnestly invite them to continue to add to the common stock of knowledge through the medium of our pages.

J. C. L.

Bayswater, Nov. 10. 1834.

CORRECTIONS.

In p. 78. line 4. from the bottom, for "Apocrinìtes" read "Apiocrinìtes."
In p. 137. line 29. for "Witton" read "Wilton."
In p. 158. line 20. for "him" read "it."
In p. 161. line 10. from the bottom, for "they were" read "it was."
In p. 161. line 11. for "octanfrácti" read "octanfrácta."
In p. 176. lines 3. and 14. from the bottom, for "Lindegret" read "Lindegren."
In p. 180. affix the *b* to figure 36.
In p. 191. line 11. place inverted commas after the word "plants"; in line 17. for "Relham's" read "Relhan's."
In p. 228. last line but one, for "His loss" read "The loss of him": in the last line, for "allowed" read "had allowed."
In p. 232. line 19. from the bottom, for "p. 233" read "p. 231."
In p. 246. line 6. from the bottom, for "speaks" read "speak."
In p. 251. line 6. from the bottom, for "1833" read "1832."
In p. 260. line 10. from the bottom. for "*Vanéssa, Antìopa*" read "*Vanéssa Antìopa*."
In p. 262. line 20. for "1133" read "1833."
In p. 269. line 28. the treatise on ants referred to as in the *Spectator*, is in the *Guardian*, Nos. 156, 157.
In p. 347. note †, line 7. from the bottom, for "field flycatcher" read "pied flycatcher."
In p. 369. line 5. from the bottom, for "parasites" read "epiphytes."
In p. 378. the antenna in fig. 49. *a* should have been shown broader at the tip than in any other part.
In p. 382. lines 3. and 4. obliterate "subsequently raised to 1*s.* 6*d.* each."
In p. 383. line 10. to "appertain" add "to plants."
In p. 429. line 22. for "grub" read "grubs."
In p. 448. line 6. from the bottom, for "reaches to A" read "reaches to B."
In p. 454. line 30. for "Nov. 18." read "Nov. 16.;" in line 35. for "could be" read "could not be."
In p. 492. lines 12. and 13. from the bottom, for "Halichóndra" read "Halichóndria:" the word is from *chalis*, flint, and *chondros*, cartilage; the cartilaginous skeleton of the creature is strengthened by siliceous spicula.
In p. 506. the first word, for "rabbits" read "rabbit."
In p. 539. line 7. from the bottom, for "570." read "510."
In p. 567. and p. 636. for "W. H. Y." read "W. H. H."

CONTENTS.

ORIGINAL COMMUNICATIONS.

GENERAL SUBJECT.

ZOOLOGY.

MISCELLANEOUS INTELLIGENCE.

REVIEWS.

LIST OF ENGRAVINGS.

LIST OF CONTRIBUTORS.

THE MAGAZINE

OF

NATURAL HISTORY.

JANUARY, 1834.

ORIGINAL COMMUNICATIONS.

ART. I. *Facts suggesting to Man his fittest Mode of defending himself from Attacks of Animals of the Feline and Canine Tribes.* By CHARLES WATERTON, Esq.

A MAN, at some period or other of his life, may have the misfortune to come in contact with the larger individuals of these two desperate and sanguinary races of quadrupeds. Perhaps a few hints, of a precautionary nature, in case of collision, may not be altogether unacceptable to Mr. Loudon's readers.

The dog and the lion are both most formidable foes to an unarmed man; and it is singular enough that the very resistance which he would be forced to make, in order to escape being worried by the former, would inevitably expose him to certain destruction from the claws and teeth of the latter.

All animals of the dog tribe must be combated with might and main, and with unceasing exertion, in their attacks upon man: for, from the moment they obtain the mastery, they worry and tear their victim, as long as life remains in it. On the contrary, animals of the cat tribe having once overcome their prey, they cease, for a certain time, to inflict further injury on it. Thus, during the momentous interval from the stroke which has laid a man beneath a lion, to the time when the lion shall begin to devour him, the man *may* have it in his power to rise again, either by his own exertions, or by the fortuitous intervention of an armed friend. But then, all depends upon quiet, extreme quiet, on the part of the man, until he plunges his dagger into the heart of the animal: for, if he tries to resist, he is sure to feel the force of his adver-

sary's claws and teeth with redoubled vengeance. Many years ago, Colonel Duff, in India, was laid low by the stroke of a Bengal tiger. On coming to himself, he found the animal standing over him. Recollecting that he had his dirk by his side, he drew it out of the case, in the most cautious manner possible, and, by one happy thrust quite through the heart, he laid the tiger dead at his side.

I will here mention a trivial row I once had with two dogs. It will tend to prove the advantage of standing up manfully, when attacked by animals of the canine tribe; and I will conclude with recounting an adventure with a lion, perhaps unparalleled in the annals of hunting.

Towards the close of the year 1823, in passing over a common, I accidentally came upon two dogs. One of them was a stout, ill-looking, uncouth brute, apparently of that genealogy which dog-fanciers term half bull and half terrier; the other was an insignificant female cur. The dog immediately bristled up; and I had just time to take off my hat, and hold it shield-wise, in self-defence, when he came on, and made directly at it. I gave him a hearty kick under the breast, which caused him to desist for a moment. But he stoutly renewed the attack, which was continued for above five minutes; he always flying at the hat, and I regularly repeating my kicks, sometimes slightly, sometimes heavily, according to our relative situations. In the mean time the female cur was assailing me from behind; and it was with difficulty that I succeeded in keeping her clear of me, by means of swinging my foot backwards at her. At last, a lucky blow on her muzzle, from the heel of my shoe, caused her to run away howling, and the dog immediately followed her, just at the moment when two masons were coming up to assist me. Thus, by a resolute opposition, I escaped laceration. But this little affair is scarcely worth relating, except that it affords a proof of the advantage to be derived from resisting the attack of a dog to the utmost.

And now for the feline tribe. The story which I am about to recount will show that nonresistance was the only plan to be pursued, when escape from death seemed utterly hopeless. The principals in this affair were a brave young British officer and a full-grown lion of India. I was at Frankfort on the Mayne in August last, and I heard the account from the officer's own mouth. I shall never forget the affable and unassuming manner in which he related it to me. I repeatedly urged him to allow me to put it on record, and, at the same time, to make use of his name; but I plainly saw that his feelings were against his complying with my request, and I think I should not have succeeded, had I not luckily brought

to my assistance the plea of benefit to natural history. With this I conquered the objections of the young soldier; and I only wish that it had fallen to an abler pen than mine to relate the following adventure.

In the month of July, 1831, two fine lions made their appearance in a jungle, some twenty miles distant from the cantonment of Rajcoté, in the East Indies, where Capt. Woodhouse, and his two friends, Lieutenants Delamain and Lang, were stationed. An elephant was despatched to the place in the evening on which the information arrived; and on the morrow, at the break of day, the three gentlemen set off on horseback, full of glee, and elated with the hope of a speedy engagement. On arriving at the edge of the jungle, people were ordered to ascend the neighbouring trees, that they might be able to trace the route of the lions, in case they left the cover. After beating about in the jungle for some time, the hunters started the two lordly strangers. The officers fired immediately, and one of the lions fell, to rise no more. His companion broke cover, and took off across the country. The officers now pursued him on horseback, as fast as the nature of the ground would allow, until they learned from the men who were stationed in the trees, and who held up flags by way of signal, that the lion had gone back into the thicket. Upon this, the three officers returned to the edge of the jungle, and, having dismounted from their horses, they got upon the elephant; Captain Woodhouse placing himself in the hindermost seat. They now proceeded towards the heart of the jungle, in the expectation of rousing the royal fugitive a second time. They found him standing under a large bush, with his face directly towards them. The lion allowed them to approach within range of his spring, and then he made a sudden dart at the elephant, clung on his trunk with a tremendous roar, and wounded him just above the eye. While he was in the act of doing this, the two lieutenants fired at him, but without success. The elephant now shook him off; but the fierce and sudden attack on the part of the lion seemed to have thrown him into the greatest consternation. This was the first time he had ever come in contact with so formidable an animal; and much exertion was used before his riders succeeded in urging him on again in quest of the lion. At last, he became somewhat more tractable; but, as he was advancing through the jungle, all of a sudden, the lion, which had lain concealed in the high grass, made at him with redoubled fury. The officers now lost all hopes of keeping their elephant in order. He turned round abruptly, and was going away quite ungovernable, when the lion again sprang at him, seized his

hinder parts with his teeth, and hung on them, until the affrighted animal managed to shake him off by incessant kicking.

The lion retreated farther into the thicket; Captain Woodhouse, in the mean time, firing a random shot at him, which proved of no avail; as the jolting of the elephant, and the uproar of the moment, prevented him from taking a steady aim. No exertions on the part of the officers could now force the terrified elephant to face his fierce foe, and they found themselves reduced to the necessity of dismounting. Determined, however, to come to still closer quarters with the formidable king of quadrupeds, Capt. Woodhouse took the desperate resolution to proceed on foot in quest of him; and, after searching about for some time, he saw the lion indistinctly through the bushes, and discharged his rifle at him; but he was pretty well convinced that he had not hit him; for he saw the lion retire, with the utmost composure, into the thicker parts of the brake. The two lieutenants, who had remained at the outside of the jungle, joined their companion, on hearing the report of his gun.

The weather was intolerably sultry. After vainly spending a considerable time in creeping through the grass and bushes, with the hope of discovering the place of the lion's retreat, they concluded that he had passed quite through the jungle, and gone off in an opposite direction. Resolved not to let their game escape, the lieutenants returned to the elephant, and immediately proceeded round the jungle, expecting to discover the route which they conjectured the lion had taken. Captain Woodhouse, however, remained in the thicket, and, as he could discern the print of the animal's feet on the ground, he boldly resolved to follow up the track, at all hazards. The Indian gamefinder, who continued with his commander, at last espied the lion in the cover, and pointed him out to the captain, who fired, but unfortunately missed his mark. There was now no alternative left but to retreat and load his rifle. Having retired to a distance, he was joined by Lieutenant Delamain, who had dismounted from his elephant on hearing the report of the gun. This unexpected meeting increased the captain's hopes of ultimate success. He lost no time in pointing out to the lieutenant the place where he would probably find the lion, and said he would be up with him in a moment or two.

Lieutenant Delamain, on going eight or ten paces down a sheep-track, got a sight of the lion, and instantly discharged his rifle at him.

" Impetus est fulvis, et vasta leonibus ira!"
" Vast is their fury and as vast their power."—EUSDEN's *Trans.*

This irritated the mighty lord of the woods, and he rushed towards him, breaking through the bushes (to use the captain's own words) " in most magnificent style." Captain Woodhouse now found himself placed in an awkward situation. He was aware that if he retraced his steps, in order to put himself in a better position for attack, he would just get to the point from which the lieutenant had fired, and to which the lion was making: wherefore, he instantly resolved to stand still, in the hopes that the lion would pass by, at a distance of four yards or so, without perceiving him, as the intervening cover was thick and strong. In this, however, he was most unfortunately deceived; for the enraged lion saw him in passing, and flew at him with a dreadful roar. In an instant, as though it had been done by a stroke of lightning, the rifle was broken and thrown out of the captain's hand, his left arm, at the same moment, being seized by the claws, and his right by the teeth, of his desperate antagonist. While these two brave and sturdy combatants, " whose courage none could stain," were yet standing in mortal conflict, Lieutenant Delamain ran up, and discharged his piece full at the lion. This caused the lion and the captain to come to the ground together, while Lieutenant Delamain hastened out of the jungle to reload his gun. The lion now began to craunch the captain's arm; but as the brave fellow, notwithstanding the pain which this horrid process caused, had the cool determined resolution to lie still, the lordly savage let the arm drop out of his mouth, and quietly placed himself in a couching position, with both his paws upon the thigh of his fallen foe. While things were in this untoward situation, the captain, unthinkingly, raised his hand to support his head, which had got placed ill at ease in the fall. No sooner, however, had he moved it, than the lion seized the lacerated arm a second time; craunched it, as before, and fractured the bone still higher up. This additional *memento mori* from the lion was not lost upon Captain Woodhouse; it immediately put him in mind that he had committed an act of imprudence in stirring. The motionless state in which he persevered after this broad hint showed that he had learned to profit by the painful lesson.

He now lay, bleeding and disabled, under the foot of a mighty and an irritated enemy. Death was close upon him, armed with every terror calculated to appal the heart of a

prostrate and defenceless man. Just as this world, with all its flitting honours, was on the point of vanishing for ever, he heard two faint reports of a gun, which he thought sounded from a distance; but he was totally at a loss to account for them. He learned, after the affair was over, that the reports were caused by his friend at the outside of the jungle, who had flashed off some powder, in order to be quite sure that the nipples of his rifle were clean.

The two lieutenants were now hastening to his assistance, and he heard the welcome sound of feet approaching; but, unfortunately, they were in a wrong direction; as the lion was betwixt them and him. Aware that, if his friends fired, the balls would hit him, after they had passed through the lion's body, Captain Woodhouse quietly pronounced, in a low and subdued tone, "to the other side! to the other side!" Hearing the voice, they looked in the direction from whence it proceeded, and to their horror saw their brave comrade in his utmost need. Having made a circuit, they cautiously came up on the other side, and Lieutenant Delamain, whose coolness in encounters with wild beasts had always been conspicuous, from a distance of about a dozen yards, fired at the lion over the person of the prostrate warrior.

The lion merely quivered; his head dropped upon the ground, and in an instant he lay dead on his side, close to his intended victim. The lieutenant's aim was so good and true, that it puts one in mind of what happened at Chevy Chace;

> "Against Sir Hugh Montgomery
> So right the shaft was set,
> The grey goose wing that was thereon
> In his heart's blood was wet!"

Thus ended this ever-memorable homo-leonine encounter. I beg to return my thanks to Captain Woodhouse for allowing me to avail myself of it. From what has been related, a proof may be drawn of the utility of lying quite still, when we have the misfortune to be struck to the ground by an animal of the cat tribe.

I bade a long farewell to Captain Woodhouse, and his two friends, Messrs. Kavanagh and Pontardent, at Frankfort on the Mayne. They were on their way to India, through Vienna and Constantinople. May honours, health, and wealth attend them!

CHARLES WATERTON.

Bruges, Sept. 25. 1833.

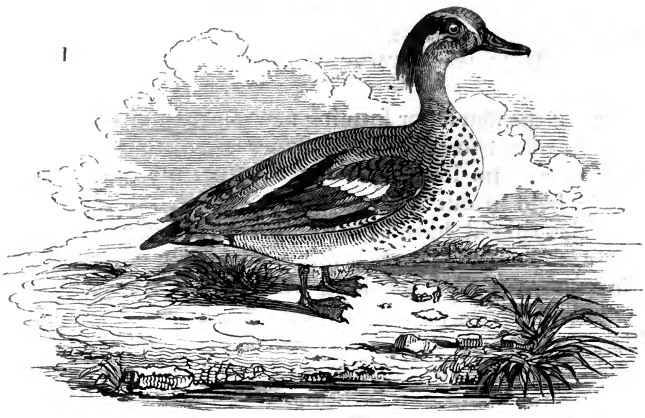
ART. II. *On the Green-winged Teals of America and Britain.* By JAMES DRUMMOND MARSHALL, M.D.

DURING the mania for forming new genera and species which seems at present to exist, when names and distinctions hitherto employed are no longer permitted to occupy the place they formerly held in our nomenclatures, it is strange that even one species should have been allowed to remain in obscurity under a different name; more particularly a species presenting so many distinguishing traits as the green-winged teal of America, the subject of the present remarks.

The similarity between this bird and the common teal of Britain has appeared so great, as to lead Wilson, and other writers on the subject, to consider them as one and the same species. Wilson says, "On an examination of the figure and description of the European teal by the ingenious and accurate Bewick, and comparing them with the present (the green-winged teal), no difference whatever appears in the length, extent, colour, or markings of either, but what commonly occurs among individuals of any other tribe; both, undoubtedly, belong to one and the same species."

Now, it is remarkable that Wilson, who has been in general so accurate an observer of nature, and whose descriptions are so correctly and beautifully given, should in this case have overlooked the disparity between these two birds; a disparity sufficiently great, in my opinion, to constitute them distinct species. On looking at the birds separately, and not having previously compared them, one would be inclined to pronounce them of the same species; but when a specimen of each is laid before you, the markings will be perceived to be in many points totally different. Latham, Forster, Pennant, Bonaparte, and the authors of the *Northern Zoology*, have mentioned some of the distinguishing marks, but have merely considered the American as a variety of the European, and not a species distinct from it. Sir William Jardine, in his beautiful edition of the *American Ornithology*, is of opinion that the species are distinct, and has accordingly given the American teal the distinguishing name of *Bóschas carolinénsis*. It shall be my aim, in the present remarks, to show that the American and European teals are in many points totally different; and that Sir William Jardine has, with great propriety, made them, for the first time, distinct species.

In length, extent, weight, and general appearance, they nearly correspond. The crest in the American species is perhaps larger than in the European, and the black extends farther down the throat. The bill is smaller and more

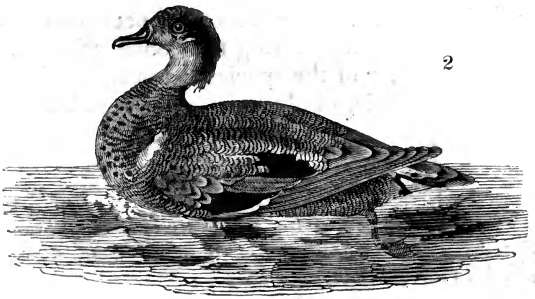


Common Teal of Britain.

slender in the American, and the edges of the upper mandible considerably overlap those of the lower mandible. In the American, the white streak is wanting which extends from the bill over the eye in the European; and the white line below the eye is also nearly wanting, being but very indistinctly marked in the American. The beautiful cream-coloured longitudinal band on the scapulars, which is so evident in the European, is totally wanting in the other; while across the shoulder, a very distinct transverse bar of white (about 1½ in. long, and three eighths of an inch broad) is noticed, no trace of which is seen in the European.

Now, to me, these marks afford sufficient evidence of the birds not belonging to the same species. When we speak of a variety of a bird, we mean a certain departure from the ordinary structure or plumage of that species; but where so many writers, for so long a period, have noticed a decided difference among the members of what was supposed the same species, we cannot surely longer continue the inappropriate term of variety.

For the better illustration of the subject, I shall accompany these remarks by figures of both the species; and any one who compares them must, I think, be struck with the difference. (*figs.* 1. and 2.) It is strange that Wilson should have given a figure of the American bird, without the white line extending over the eye, and with the transverse bar on the shoulder, two of the most distinguishing marks, and yet have called it merely a variety of the European; while in Rennie's edition of Montagu's *Ornithological Dictionary* we find an engraving intended to represent the British species, but which is evidently copied from Wilson's plate, and marked



Green-winged Teal of North America.

with the bar of white in the shoulder, which is never seen in the British teal; thus perpetuating an error, or at least giving a representation of the American bird accompanying the description of the British species. An accurate engraving of the latter may be found in Bewick, similar to the one here supplied.

In the *Proceedings of the Committee of Science and Correspondence of the Zoological Society of London*, Colonel Sykes mentions the *Á*nas *C*récca, or common teal, as being found in the Dukhun, and that his specimens appeared identical with male and female British specimens. He has also in his possession specimens resembling the *Á*nas *C*récca, but in which the proportional length of the intestinal canal differs so much from that of the *Á*nas *C*récca (3·30 to 1, and 5·57 to 1), that he is induced to believe that they may belong to a distinct species. Now, it would be well worthy of attention, to have the relative length of the intestinal canal of the American species (*Bóschas carolinénsis Jardine*) compared with that stated by Colonel Sykes, lest the teal found in Dukhun may be the same as the American, and not the European, as now supposed.

I do not mean to say that the length of the intestinal canal should be a sufficient datum to constitute a new species, but the difference in plumage may have been overlooked, as has been hitherto done, and the species thus confounded. It seems to me much more probable that the American and Indian species should be the same, than that the American should differ from both the Indian and European, and these latter be similar.

I merely throw out these hints to induce further investigation; and, should they lead some one to pursue the subject farther, they will not have been made in vain.

JAMES DRUMMOND MARSHALL, M.D.

Belfast, Sept. 20. 1833.

See, in Vol. V. p. 473., a notice of the occurrence of "vast flocks of teal" in Jamaica, during the cooler months. They are, the writer states, "of the species, I apprehend, named by Gmelin the carolinénsis, or American teal."—*J. D.*

Art. III. *An Illustration of the Structure of some of the Organs of a Spider, deemed the Type of a new Genus, and proposed to be called Trichopus libràtus.* By C. M.

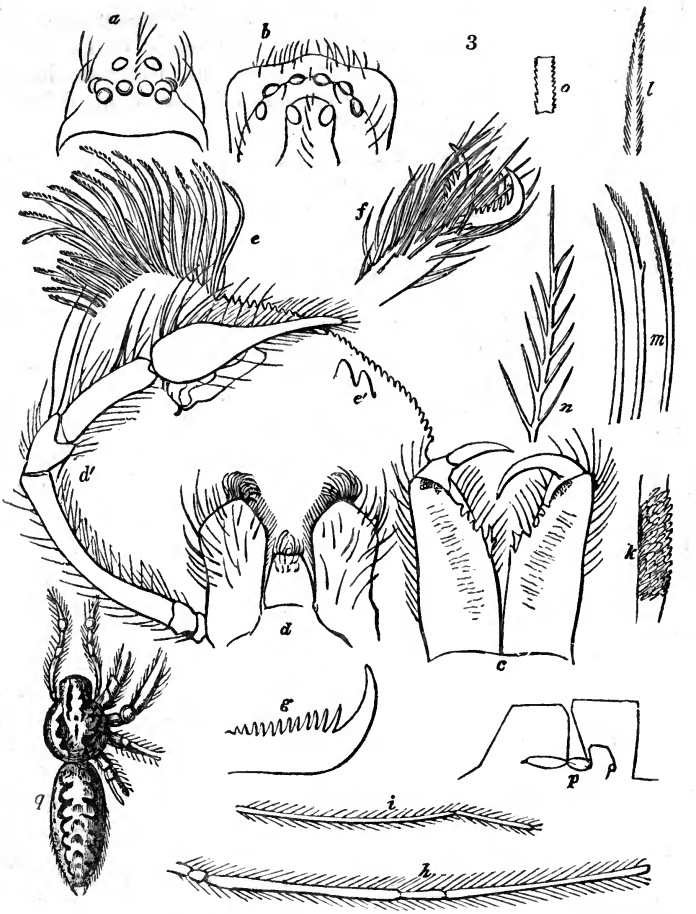
["Contrivance intricate express'd with ease,
Where unassisted sight no beauty sees."
Cowper's *Retirement.*]

Sir,

I mistook the spider of which I send you a sketch for Phólcus *p*halangiòides, which I had never met with living. The great length of its legs, the cylindric body (*fig.* 3. *q*), and the attitude, caused it to bear so considerable a resemblance to that species, that it was only on carefully examining the eyes and parts of manducation, that I discovered my error. As it agrees exactly with none of the heretofore established genera, I propose naming it

Tri'chopus. (*Thrix*, hair, *pous*, foot; legs extremely hairy, the hairs themselves branched, *n.*) *Eyes* 8, large, subequal, separated by a considerable interval from the base of the mandibles; placed in two rows, the anterior curving considerably downwards and having the eyes approximated, the posterior curving forwards and having the eyes widely separated, the exterior being placed on a species of tubercle (*fig.* 3. *a b*). *Mandibles* cylindric, cut off very obliquely beyond the middle of their inner side, and presenting a cavity toothed on both sides for receiving the strong curved hook; hairy and spiny (*c*). *Maxillæ* strong, rounded externally at the apex, and cut off very abruptly internally, contracted behind the middle, and dilated slightly where they receive the palpi (*d*). *Lip* higher than broad, narrowed anteriorly, and with a sinus at the tip which in rest receives the apex of the anterior lip (*d*). *Palpus* long, curved downwards; 1st and 2d joints short, 3d very long, 5th long, and 6th in the male elongate pyriform without a hook; spiny and hairy (*d'*). *Cephalothorax* circular or broadly oval behind, produced anteriorly. *Legs* very long and very hairy, with a few spines especially on the tibia; 1st pair (*h i*), 9 times the length of the thorax; 2d and 4th pair, 7½ times; 3d pair, 6¼ times: tarsus clawed. *Abdomen* cylindric with 2 long feelers, and short spinnerets.

Tr. libràtus. (*Libratus*, balanced; pensile appearance of insect when at rest, *p.*) Cephalothorax brownish green posteriorly, castaneous anteriorly, with 2 irregular parallel black lines running from the posterior intermediate eyes down the back, terminating half way by joining semilunar patches which occupy the remainder, and which have 3 irregular processes projecting outwards towards the origins of the legs; internally they are shaded off, but rather defined behind the middle thoracic point, which is marked by a minute short line; beneath reddish brown, darker towards the edges, but with a brighter spot opposite the origin of each leg.—Abdomen greenish; lighter in the middle, which is bounded by 2 longitudinal dark



festooned lines, the basal portions of which, taken together, seem to form 3 triangles surmounting each other, the apices deficient; behind these the central line has a series (four) of small crescents arching backwards. From the external angles of the festooned lines dark patches run outwards and backwards. Beneath concolorous; 4 parallel festooned lines running down the middle and converging towards the spinnerets. Legs greenish, very hairy, the two anterior coxæ and femora [hips and thighs] castaneous.

Habitat, Kent.

I have never seen more than two males, and, of course, am unacquainted with the female. It bears the closest resemblance in its generic characters to *Aránea* and Agelèna; but differs in the eyes being nearly equal, in the length of the lip, and in the maxillæ dilated at the apex: the palpi, too, differ considerably. From Clubiòna, to which the ap-

pearance of the maxillæ would carry us, it is easily separable by the size of the eyes, the greater curvature of the rows, the lip, mandibles, and palpi, and, above all, the great length of the legs. It weaves, in the corners of unfrequented buildings, a coarse irregular net with a recess, in which it awaits its unlucky prey. When at rest, it is usually supported by the legs, as represented by the outline *p*; and then the tibiæ, standing perpendicularly, present the appearance of a series of columns.

In examining the insect minutely with a magnifying power of about 30, I was struck with the appearance presented by the hairs about the claws: these (the tip of one is seen at *l*) were very stiff, spine-like, and serrated along the edges, especially at the apical extremity (*i*), and nearly all arose from the under surface of the tarsus, enveloping the claws (see *f*). A single claw is figured at *g*, to show its form, and the pectinated teeth, thirteen or fourteen in number. I found that, along the whole legs, the hairs had more or less of this appearance (*l*); the serræ, however, diminishing in sharpness as I approached the body; and among these, and lying close to the limb, were other finer downy hairs, from the sides of which proceeded alternate secondary hairs: a representation of one of these is given (*n*). The leg itself is shown at *h* and *i*, the latter being the tarsus. The discovery of these anomalies (anomalies from anything I had before observed) induced me to examine other portions of the body; and I found that some of the hairs, or rather spines, jutting out from the mandibles, had hairs differing from the former: from these innumerable little processes proceeded in a spiral direction, as seen at *k*, being most strongly marked towards the tip of the spine. On the palpi the spines were merely serrated (see *o*), and only on the last three joints. I could not find any elsewhere. On the exterior portions of the maxillæ, both kinds of hairs or spines were detected; but along the inner edge, the tufts were found to have hairs quite flat and smooth until within a little of the apex, where they became plumed mostly on one side alone. The longer curved ones at the extremity of the maxilla were exactly similar: they are represented at *e*, and a few detached have this portion represented at *m*. A singular appearance also presented itself in a row of sixty-eight minute blunt teeth extending the whole length of the curved extremity of the maxilla: two of these, highly magnified, are shown at *e'*. I now recollected having once before observed teeth similarly situated, but I have forgotten in what species; but it would seem likely, if detected in a few, to offer characters which might be appropriated for

generic distinctions; at any rate, directing attention to these points may, perhaps, lead to some curious particulars in allied genera. I am, Sir, yours, &c.

London, September 14. 1833. C. M.

In the *London and Edinburgh Philosophical Magazine*, vol. iii. (completed with the number for December, 1833), p. 104. 187. 344. 436., several newly discovered British and three exotic species of spider are described in great detail, and some new genera constituted of them, by J. Blackwall, Esq. F.L.S. The names applied to them are these (by B. we mean Blackwall): — Tribe Inequitèlæ *Lat.* Mandúnculus *B.* ambíguus *B.*; Neriène *B.* marginàta *B.*, rùbens *B.*, cornùta *B.*, bícolor *B.*, and rùfipes *B.* — Tribe Orbitèlæ *Lat.* Linýphia *Lat.* minùta *B.*, lutèola *B.*, marginàta *B.*, annùlipes *B.*, and fuligínea *B.*; Néphila *Leach* Túrneri B., exotic. — Tribe Tubitèlæ *Lat.* Savígnia B. frontàta *B.*; Walckenàëra B. acuminàta *B.*, cristàta *B.*, and cuspidàta *B.*; Téxtrix *B.* ágilis *B.*; Agelèna *Walckenaër* brúnnea *B.*; Clubiòna *Lat.* saxátilis *B.*, and párvula *B.*; Drássus *Walckenaër* nìtens *B.*, and sylvéstris *B.* — Tribe Territèlæ *Lat.* *Mý*gale *Walckenaër* élegans *B.*, exotic; Ctenìza *Lat.* spinòsa *B.*, exotic. — *J. D.*

Art. IV. *Illustrations in British Zoology.* By George Johnston M. D., Fellow of the Royal College of Surgeons of Edinburgh.

It is known to naturalists in general that Peyssonel, a physician of Marseilles, who had travelled into Barbary and the Levant, was the first who distinctly published the animal nature of coral and of other lithophytes; an opinion which, however true, gained no proselytes, until Abraham Trembley, a native of Geneva, had discovered the *Hy*dra and its wonderful properties; and Bernard de Jussieu and Ellis had demonstrated the existence of similar polypes in a great number of the lithophytes and zoophytes of the European shores. Since that time it has been believed that the little tenants of every zoophytical production, and all the little creatures which are found embedded in any common gelatinous mass, are polypes identical in structure, or nearly so, with the *Hy*dra; and, in this belief, many fleshy and fibrous productions which were known or imagined to be a common matrix of a numerous colony, were unhesitatingly arranged together in the same class, under the denomination of *Al*cyònium. The structure of a few of these was ascertained, and seemed to confirm the propriety of this classification; for there could be no doubt that the inhabitants of the *Al*cyònium digitàtum of Linnæus were truly polypes; and this was the best known and most easily examined species. Nor were the observations of

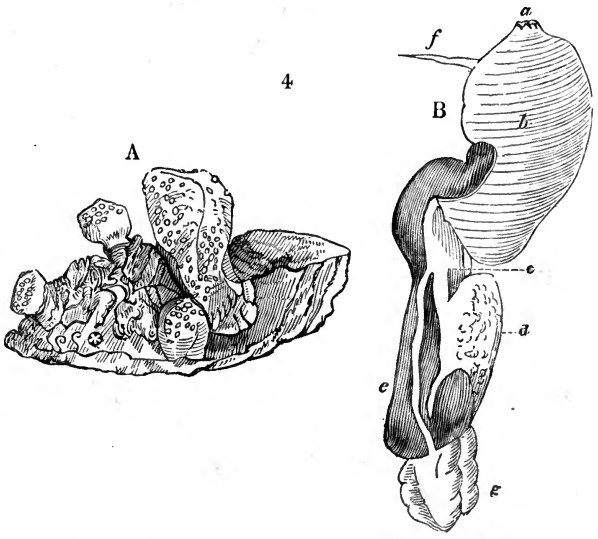
Schlosser, or of Gærtner, whose name is immortalised by his work on seeds, sufficiently precise or distinctly announced to invalidate the received notions; so that we may safely assert that, previously to the year 1815, no naturalist had even suspected that the individuals of the compound *Alcyònia* possessed any more complicated organisation than zoophytes in general.

At the commencement of the year just mentioned, Savigny read to the French Institute a memoir which at once overturned the established opinion, and which, while it forms, from the newness and importance of its matter, an epoch in the history of invertebrate animals, was also of great utility in directing the attention of naturalists to a department which had lain long uncultivated. By a series of the most delicate dissections, exhibited in engravings of equal delicacy and beauty, Savigny proved that very many of the compound *Alcyònia* possessed inmates whose structure was such as to give them a claim to be enrolled in the class Mollúsca: and the claim, although still disputed by many, has been allowed by the most illustrious naturalist of modern, perhaps of any, times. Savigny, at all events, showed that these minute creatures were organised very differently from the gelatinous polype or hydra; and that, instead of a simple stomach for its only viscus, they had both thoracic and abdominal viscera, two separate apertures for these viscera, special organs of generation, and, in some, he thought, vessels and traces of a circulating system were by no means equivocal.

Of the productions which were the subject of Savigny's dissections and enquiries, there are several species in the British seas, which the reader will find enumerated in Dr. Fleming's history of our native animals; and I believe that the two to be figured for the present series of Illustrations are additions to his list. They had, when recent, so much resemblance to a fig, that it was not doubted that one of them, at least, would prove to be identical with the *Alcyònium fìcus* of Ellis; but a closer examination showed the contrary. The naturalist, however, will not find, in our rude dissections and figures, the various organs exhibited with the clearness and definiteness they have in the engravings of Savigny: what the artist saw was correctly drawn, and, if they are found sufficient for specific discrimination, my object is accomplished. It may merely be remarked, that, in one, I could perceive, in the large thoracic cavity, traces of a netlike structure on the walls, similar to some of those figured by Savigny, and sufficient to convince me of his general accuracy; but they are not shown in our figure, as the appearances were

not sufficiently distinct to be drawn by one unfamiliar with anatomical researches.

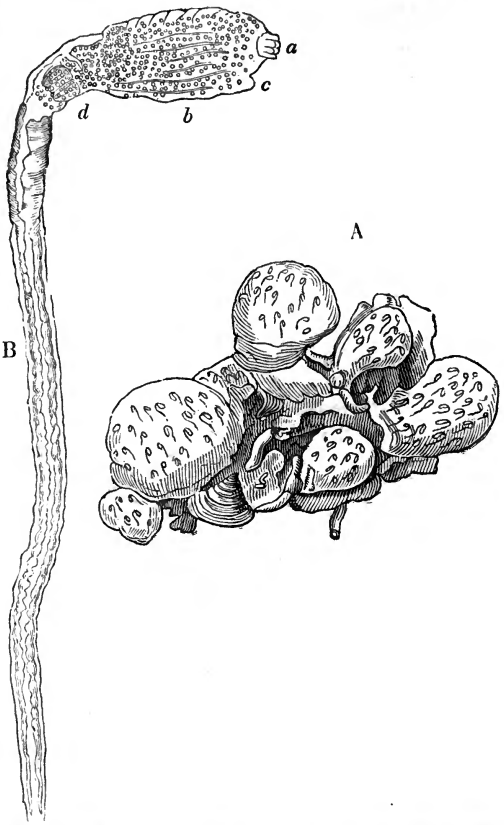
16. Apli'dium fa'llax. (*fig.* 4.)



A, The common masses, of the natural size, on a small stone.
B, A single animal removed, and much magnified.

Description. Common body subglobose or papillary, gelatinous, of a clear honey-yellow colour marked on the upper surface with white and brown specks from the contained animals; orifices circular, protuberant, plain, and entire. Animals distinct, scattered irregularly, each in its proper cell, perpendicular, about two lines long. Branchial aperture (*a*) divided into 6 equal short segments; the sac (*b*) large, white, netted on the sides with minute square meshes, which, however, are very obscure; œsophagus (*c*) narrow, entering laterally at the upper side of the stomach (*d*), which is large, yellowish brown, and mottled; intestine (*e*) dark-coloured, wide, flexuose, recurved and winding up at the side of the branchial sac; anal aperture (*f*) elongate, linear, entire, lateral, and near the mouth; ovary (*g*) white, cellulose, at the base of the intestine, with a long white tubular canal running up and along the middle of the intestine, and terminating in the branchial cavity. Differs from Aplídium fìcus in having the apertures in the common envelope entire, whereas, in the A. fìcus they are distinctly cut into 6 equal rays. See Ellis, *Corall.* tab. 17. fig. B, C, D. *Hab.* Affixed to old shells, &c. from deep water in Berwick Bay.

17. Apli'dium nu'tans. (*fig.* 5.)



A, The common masses of the natural size. B, An individual removed and magnified.

Description. Common body adherent by a broad base, knob-like or pear-shaped, nearly an inch high and half that in diameter, smooth, gelatinous, pellucid, of a straw-yellow colour tinted with brown, and marked with whitish streaks from the immersed animals. There are no fibres nor spicula to strengthen this common mass; neither are there any visible orifices on the surface; but, by ripping up the skin with a needle, the contained animals may be removed entire without difficulty. These are of a long threadlike shape, with a bulging and nutant head, scattered irregularly in the substance of the jelly, in which they lie horizontally or nearly so. The length of a single individual is about four tenths of an inch. The mouth (*a*) is cut into six equal segments, and placed on the upper side of the large branchial sac (*b*), which

is an oval bag filled, in the specimens examined, with innumerable minute granules. When the animalcule was compressed between plates of glass, these granules escaped abundantly from the mouth, and from a prominent aperture a little below it on the side. The walls of the branchial sac are marked with several lines or plaits in a longitudinal direction; but I saw no traces of any vascular network. On the inner side of the branchial sac there is an obscure appearance of an intestine or vessel winding up it to end at the anal aperture (*c*); and near the base of the sac there is a considerable orange-coloured spot marked with longitudinal lines, and presumed to be the stomach (*d*). Immediately below this, the body is suddenly contracted into a very long and linear tail, as it may be called, in which, when compressed, we perceive a dark intestine-like mark, mottled with darker and lighter shades on each side, and a clear space between them; but I cannot trace any distinct termination of these organs (which are the ovaries) in the branchial sac, although the shadings at the base of this part indicate the existence and situation of some distinct organs. This species has a great resemblance to Aplídium effùsum of Savigny, but I cannot consider them identical. *Hab.* Berwick Bay, in deep water.

Berwick upon Tweed, Sept. 1833.

ART. V. *Remarks on the Natural Productions of Lexden and its Neighbourhood.* By J. G. (Jonathan Grubb)

OUR village stands on a gentle slope, at the foot of which runs the river Colne, winding its course through a picturesque valley, fertilising many rich and verdant meadows, and turning in its passage a considerable number of mills. Our soil is generally a light gravel, and so very dry, that our usual paths are passable even in the depth of winter, and we are thereby afforded facilities for the enjoyment of sylvan scenery which but few neighbourhoods possess.

Just below the village, on the north-west side, is a considerable extent of spongy boggy soil, full of springs of uncommon purity and strength, which, in the short space of a quarter of a mile, form a crystal stream sufficient to drive a corn mill, lately erected on the spot. This stream, which affords a supply of 400 gallons a minute, is not at all affected by the seasons, being equally strong in the driest and the most rainy weather.

Our parish is particularly well wooded, producing many lofty oaks, elms, and alders; and, consequently, we have most

of the birds common to wooded districts, and some which are by no means generally diffused.

The boggy ground, in which the springs have their rise, is covered with low alders, and produces much that is interesting to the botanist. The raspberry (*Rùbus idæ'us*) abounds in it, and, when the fruit is ripe, presents a temptation to venture on the soft and treacherous soil. In spring, the brilliant Chrysosplènium oppositifòlium, with its yellow flowers and shining foliage, forms large beds of green and gold; the lowly wood sorrel (*O'*xalis Acetosélla) hangs its pale and modest head beneath the mossy stumps of the decayed alders; the beautiful ferns, Aspídium *F*ìlix fœ'mina and Aspídium dilatàtum, luxuriate in the moisture and shade so congenial to them; and the huge *C*àrex paniculàta rises to the height of four feet or more, and, with its long and elegant leaves issuing from the top of the stem, and reaching to the ground, might, by its exotic appearance, almost make you imagine that you had been suddenly transported into some tropical region, —

> " Where the huge palms extend their shady tops,
> And torrents foam o'er beds of golden sand."

But the song of the nightingale in the adjoining copse, the peculiarly joyous and happy note of the willow wren (*C*urrùca *T*rochilus), the loud and familiar laugh of the woodpecker (*P*ìcus víridis), and the often repeated note of the marsh tit (*P*àrus palústris) are sounds which will soon awaken feelings inseparably connected with " our own, our native isle." Amongst the vernal plants of our district must not be omitted the sweet Adóxa Moschatéllina, which rears its delicate flowers on the moss-grown bank of many a shady hedgerow; a mild and certain harbinger of sunny days to come. On the dry banks we have *J*asiòne montàna and the diminutive yet elegant Ornìthopus perpusíllus. Our woods abound with the anemone and the hyacinth (*A*nemòne nemoròsa and *S*cílla nùtans), and our river banks are clothed with the beautiful spikes of *L*ỳthrum Salicària, the unassuming Scutellària galericulàta, and *C*ardámine amàra with its bright purple anthers.

From the beginning of autumn to the end of the year, we see on the borders of our streams that graceful little bird the grey wagtail (*M*otacílla Boárula) taking its insect prey among the stones in the shallow water; and, in the depth of winter, the siskin (*F*ringílla *S*pìnus) abounds on the lofty alders, the seeds of which afford it acceptable food. The brilliant kingfisher (*A*lcèdo I'spida) is almost constantly to be seen skimming over the surface of our waters, or seated on

a solitary pile or naked branch, patiently watching [IV. 450.] for its finny prey, while its glossy and radiant plumage is strongly contrasted with the sober dress of the skulking moorhen (Gallínula chlóropus) which is flirting up its tail amongst the sedges hard by. We now and then see the kestrel (Fálco *T*innúnculus), the sparrowhawk (*B*ùteo *N*isus), and the hobby* (Fálco Subbùteo); and our ears are often assailed, in the stillness of the night, by the clear and plaintive hooting of the brown owl (*S*trix strídula), and the hoarse scream of its congener, the white owl (*S*trix flámmea). The nuthatch (*S*itta europæ'a) utters its shrill and frequent cry, "wit, wit, wit," in our groves; while the notes of the jay, the cuckoo, the turtle dove, and the mingled melody of a host of summer visiters, "aid the full concert," and form together a chorus which, combined with the usual scenery around, must move to ecstasy every heart that is capable of any degree of sensibility, and which ought to engage the breast in the adoration of Him who has given us all these things richly to enjoy.

Our streams afford a considerable variety of fish, but to these I have paid little attention; for, even in this sequestered spot, "far from the noise, the hum, the shock of men," the cares of life will intrude, to the exclusion of those pursuits of nature which console in adversity, and render prosperity doubly delightful.

I have sometimes been much gratified in observing that elegant little animal, the water shrew (*S*òrex fòdiens), diving and sporting under a little waterfall in one of our groves: it is one of the prettiest of our few quadrupeds, and is an animal which appears to have attracted but little notice.

We have all that can be desired in a country village, and whether our lovely scenes be visited in the glorious spring, when morning puts forth its melody from grove and park and verdant field, or in the silent and mellow autumn, when the cool air breathes vigour and health to the frame, and the brilliant dews bespangle the mossy turf, now strewed with many a yellow leaf, they cannot fail to delight and exalt the soul of every rational lover of the beauties of nature.

Lexden, near Colchester, 10 *mo.* [*October*] 22. 1833.

* A beautiful specimen of this bird was shot here last year by my much valued friend, Henry Doubleday of Epping, who, by his unwearied assiduity and acute observation, has done much to promote a knowledge of the ornithology of our island. [See, in VI. 521., a notice of Mr. Doubleday's discovering "several nests with eggs" of the hawfinch in Epping Forest.]

ART. VI. *On the Altitude of the Habitats of Plants in Cumberland, with Localities of the rarer Mountain Species.* By Mr. HEWETT WATSON.

OFTEN as the county of Cumberland has been traversed by botanists, we are, nevertheless, yet very imperfectly acquainted with the stations of its rarer plants; and there is, perhaps, not another county of England in regard to the botanical productions of which there are so many errors in print. Under these circumstances, I need scarcely apologise for submitting some observations and discoveries, made during a month's residence at Keswick, in May and June of 1833. This county is so constantly visited by the students in every department of natural history, that there will doubtless be some, among the readers of this Magazine, to whom the following notices will be useful. My attention was principally directed towards the influence of height in changing the vegetable productions; and, taking the highest stations at which particular species were observed, they may be arranged in steps of 500 ft., as follows; but Scawfell Pikes, the highest hill of the county, being only 3166 ft., the first step in our descent will be a shorter one. The names accord with those of Hooker's *British Flora*.

1. *Between* 3000 ft. *and* 3160 ft.— *O*'xalis Acetosélla, Cerástium viscòsum, *S*axífraga stellàris, *G*àlium saxátile, Campánula rotundifòlia, *V*accínium Myrtíllus and *V*ìtis idæ'a, *T*hymus *S*erpýllum, *R*ùmex Acetòsa, *S*àlix herbàcea, *E*'mpetrum nìgrum, *C*àrex rígida, *F*estùca ovìna, Lycopòdium *S*elàgo, Cryptográmma críspa.

2. *Between* 2500 ft. *and* 3000 ft. — *R*anúnculus àcris, *C*áltha palústris, *C*ardámine praténsis, *V*ìola canìna, *V.* palústris, *P*ỳrus aucupària (the highest arborescent species, and the specimens of it only stunted bushes), Tormentílla officinàlis, *G*èum rivàle, *Alchemílla* alpìna, Rhodìola *r*òsea, Chrysosplènium oppositifòlium, *H*ieràcium murórum, *S*tátice Armèria, *J*uníperus commùnis, Lùzula [Lucìola *Smith*] campéstris, L. máxima, *J*úncus squarròsus, Erióphorum vaginàtum, *C*àrex pilulífera, Anthoxánthum odoràtum.

3. *Between* 2000 ft. *and* 2500 ft. — *R*anúnculus Flámmula, *A*nemòne nemoròsa, *T*halíctrum alpìnum, Cochleària (dánica?), Stellària uliginòsa, Silène acaúlis, *R*ùbus saxátilis, Epilòbium *a*lsinifòlium, *S*axífraga oppositifòlia, *Valeriàna* officinàlis, Callùna vulgàris, Solidàgo virgaúrea, *A*chillæ'*a P*tármica, *A*párgia autumnàlis, Pinguícula vulgàris, *J*úncus effùsus, Eleócharis pauciflòra, Erióphorum angustifòlium, *C*àrex binérvis, *C.* cæspitòsa, *P*olypòdium Phegópteris, *B*léchnum boreàle.

4. *Between* 1500 ft. *and* 2000 ft. — *T*halíctrum mìnus, *A*rabis hirsùta, *P*olýgala vulgàris, Sagìna procúmbens, *R*ùbus idæ'us, *Alchemílla* vulgàris, Móntia fontàna, *S*axífraga *hy*pnòìdes, *S. a*ïzòìdes, Angélica sylvéstris, Pimpinélla *S*axífraga, *H*eraclèum *S*phondýlium, *E*rìca cinèrea, *E. T*étralix, *A*rbutus U'va úrsi, *G*naphàlium dioícum, Leóntodon *T*aráxacum, *C*nìcus palústris, *H*ieràcium paludòsum, *Verónica* officinàlis, *M*elampỳrum praténse, Digitàlis purpùrea, Pediculàris sylvática, *L*ysimàchia némorum, Oxýria renifórmis, *B*étula álba, *S*àlix (aurìta?), *O*rchis máscula, *H*yacínthus nonscríptus, Narthècium ossífragum, *J*úncus triglùmis, *C*àrex dioíca, *P*òa ánnua, *N*árdus stricta, *A*ira flexuòsa, *P*tèris aquilìna, Aspídium dilatàtum, *P*olypòdium Phegópteris.

5. *Between* 1000 ft. *and* 1500 ft. — We begin to see the oak, ash, holly, and other trees, with a large addition of smaller species; but it does not appear to be worth while for us to carry these lists below 1500 ft., since they would become more long than interesting as we descend to the low grounds.

All these species descend to the low grounds about the lakes, except the following, the inferior limit of which appears to be at or about the heights added to their names: — *S*axífraga stellàris, 500 ft.; *S*àlix herbàcea, 2400 ft.; *E*mpetrum nìgrum, *C*àrex rígida, 2200 ft.; *Alchemílla* alpìna, 400 ft. to 600 ft.; Rhodìola *r*òsea, 700 ft.; *S*tátice Armèria, about 1000 ft. or 1200 ft.; *T*halíctrum alpìnum, probably 1200 ft.; Cochleària dánica; Epilòbium *a*lsinifòlium, 700 ft.; Oxýria renifórmis, 450 ft. Silène acaúlis and *S*axífraga oppositifòlia were only seen in one station, and are fixed at about 2000 ft. by guess. *J*úncus triglùmis and *A*rbutus U'va úrsi were also seen in only one station, not actually measured. The lake at Keswick is estimated to be 228 ft. above the sea; that of Thirlmere is nearly 500 ft. All the other species were seen at or nearly on the level of one of these lakes. The early period at which the hills were visited would no doubt prevent my seeing all the species towards their summits, in the hollows near to which some patches of snow still lingered at the end of May, but quite disappeared before the second week of June. Excluding the ferns, we have, above 3000 ft., only 13 species; between 2000 ft. and 3000 ft., 53 species; and between 1000 ft. and 2000 ft. there were 150, or more. Now, by observations in the highlands of Scotland last autumn (see *Edinburgh New Philosophical Journal*, No. 28.), there are at these heights on the Scottish mountains, 80, 183, and 273 species. The small extent of surface elevated above 1000 ft. or 1500 ft. in the county of Cumberland, the dryness of the

mountain summits, and the comparative paucity of elevated valleys, deep chasms, and rocky precipices, will no doubt explain the numerical deficiency in its mountain flora. Up to 1000 ft. the vegetation of Cumberland is superior to that of the Scottish highlands. Above 2000 ft. the species are not only fewer, but, with all the advantage of a more southern latitude, they commonly fail much earlier as we ascend the hills. The average heights to which the species mentioned in the preceding lists were observed to attain in the highlands are, for the first (or those exceeding 3000 ft. in Cumberland), 3900 ft.; for the second, 3200 ft.; for the third, 2900 ft.; for the fourth, 2400 ft. By average height is meant the mean obtained by dividing the sum of the highest stations observed in Scotland by the number of species.

Mr. Winch, to whom we are indebted for the fullest and most accurate lists of species and botanical notices for the county of Cumberland, has very recently printed a thin quarto pamphlet of *Contributions to the Flora of Cumberland*, in which are enumerated all except the commoner species said to have been found in the county; but, from the author's remarks, it is pretty evident that many stations published on the authority of the late Mr. Hutton are errors, if not deserving of a harsher designation. Though I have verified many of the stations given by Winch, it is unnecessary to repeat them here; and I shall, therefore, confine myself to those not included in his *Contributions*, and mention only the mountain species; at least with a very few exceptions.

*C*ircæ`*a* alpìna. Between the Great Wood and Falcon Crag, &c. — Gàlium boreàle. In plenty on the east side of Derwentwater. — *Alchemílla* alpìna. Particularly plentiful about the Scawfell group of hills, as well as on the hills in crossing from the Vale of Newlands to Borrodale. — Lobèl*ia* Dortmánn*a*. Watendlath Tarn, and the small tarn among the hills above it. In most of the lakes. — *V*ìola lùtea. Between Castlerig and Armboth, and on the north side of Latrigg. — *Rìbes* petræ`um. Hedges of the fields between Ullock Moss and Braithwaite. — *L*ysimàchia vulgàris. I believe to have seen this between Swinside Hill and Braithwaite. "Paterdale and Keswick, Hutchinson [?]. I could not find it in either of these places." *Winch's Contributions.* — *R*hámnus Frángula. Ullock Moss, side next to Swinside Hill.— Convallària multiflòra. Castle Head Wood, near the entrance from Keswick. "*Convallària Polygónatum.* Keswick, Mr. Hutton. Not in his Herbarium." *Winch.* — *J*úncus filifórmis. Near the foot of Derwentwater, between the lake and willows, and among the willows. The

station is flooded when the water is high. — *J*úncus triglùmis. About half way up Helvellyn, ascending obliquely from the north end of Thirlmere. — Oxýria reniformis. Black Rocks of Great End, abundantly; ascending from the Vale of Newlands towards Borrodale, &c. — Epilòbium *a*lsinifòlium. Ashnessgill and west side of Helvellyn. Not seen in flower, and the species not quite certain. — *V*accínium Oxycóccos. Rare about Keswick. Only seen in a moss on the west side of the highest point of the road over Whinlatter. — *A*rbutus Uva úrsi. Descending Grassmoor to Crummoch Water; rather on the Buttermere than the Scale Hill side. — *S*axífraga stellàris. Many hills from 1000 ft. to 3000 ft. — *S. a*ïzöìdes. Black Rocks of Great End abundantly, and other hills. — *S.* oppositifòlia. Black rocks of Great End. The Black Rocks were so called by my guide. They are the walls of a deep ravine crossed in ascending direct to the summit of Scawfell Pikes from Styehead Tarn, keeping the Wastdale side of Great End, instead of the usual ascent by the upper tarn. They are near to, but not in, the Screes, where this species has been before found. — *S. h*ypnöìdes. Helvellyn, Great End, Grange, &c. — Silène acaúlis. Black Rocks of Great End. Not in Winch's list. — *R*ùbus saxátilis. Hills between Thirlmere and Derwentwater. — Potentílla alpéstris. On the steep rocks in ascending from the Vale of Newlands, over Grange Fell to Borrodale. Not in Winch's list. — *T*halíctrum alpìnum. Ascending from Styehead Tarn to Sprinkling Tarn, but nearer to the latter; also ascending from the Black Rocks of Great End to Scawfell Pikes. I showed the former station to my guide, Moore, jun., of Keswick. Mr. Winch seems to doubt the species being found in the county, and probably this is the first authentic station. — Habenària álbida. Hills to the south of Watendlath Tarn; between the latter and Borrodale, &c. — *C*ârex rígida. On various hills, near their summits, as Saddleback, Helvellyn, Great End, Scawfell Pikes, Grisedale Pike, Grassmoor. Mr. Winch only mentions Skiddaw. — Sàlix herbàcea. Summits of Helvellyn, Scawfell Pikes, Grisedale Pike, Grassmoor, &c. — Rhodìola *r*òsea. Various rocks on Great End, Scawfell Pikes, Helvellyn, west side of Grange Fell, Grassmoor. — *J*uníperus commùnis. Frequent on the hills. Within a few feet of the summit of Grisedale Pike, considered to be 2580 ft. high. Winch, in his essay on the distribution of plants in the northern counties, mentions it as if rising only to 1500 ft.; but I saw it in various places above 2000 ft. The summit of Grisedale Pike was the highest station observed. In Forfar-

shire it attains 2750 ft. — *A*splènium septentrionàle. On the steep rocks in ascending from the Vale of Newlands over Grange Fell to Borrodale. Not in Winch's list. — Hymenophýllum Wílson*i*. Black rocks of Great End, west side of Grange Fell, &c.

ART. VII. *A brief Notice of several Species of Epiphyllous Fungi which have been observed in the Neighbourhood of Oxford, and have not been hitherto generally known to occur in Britain.* By Mr. WILLIAM BAXTER, A.L.S., Curator of the Botanic Garden at Oxford.

AMONGST many epiphyllous fungi, which I have observed in the neighbourhood of Oxford, the following are, I believe, new to the British cryptogamic flora.

Dothídea *H*eraclèi, Fries Syst. Mycol. v. 2. pt. 2. p. 556. Parasitical on the under side of the leaves of *H*eraclè*um* Sphondýlium *L.* — D. *G*eránii, Fries Syst. Mycol. v. 2. pt. 2. p. 558.; Loudon's Hort. Brit. p. 458. On the upper surface of the leaves of *G*eránium rotundifòlium *L.* Summer and autumn, common. — D. *F*ráxini, Fries Syst. Mycol. v. 2. pt. 2. p. 561. On the under surface of the leaves of *F*ráxinus excélsior *L.* In the autumn, not common. Shotover plantations. Oct. 2. 1826. — D. Potentíllæ, Fries Syst. Mycol. v. 2. pt. 2. p. 563. On the leaves of Potentílla réptans *L.*

Asteròma *Prunéllæ*, Purton's MSS. Baxter's Stirpes Cryptogamæ Oxonienses, fasc. 2. n. 79.; Loudon's Hortus Britannicus, p. 459. On the leaves and stems of *Prunélla* vulgàris *L.* in the spring and summer. In damp shady places in Bagley Wood, and on Shotover Hill. This very distinct and beautiful species of Asteròma was first discovered by Mr. John Haines, of the Radcliffe Library, who pointed it out to me in February, 1824.

[" My much lamented friend, the late Thomas Purton, Esq., of Alcester, Warwickshire, an excellent botanist, and author of the *Midland Flora*, so often referred to in this work, named it A. *Prunéllæ*. It is by no means uncommon in Bagley Wood, principally upon such plants of the *Prunélla* as grow in moist places, or on the margins of rills, &c.." (Mr. Baxter, in No. xvii., for December, 1833, of his *Illustrations of British Flowering Plants*, in the text appertaining to *Prunélla* vulgàris *L.* — See a communication on British plants by the late Mr. Purton in this Magazine (VI. 57.). *J. D.*]

*Er*ýsiphe (mildew) Epilòbii *Link*, in Willd. Sp. Pl. v. 6.

pt. 1. p. 102. On the leaves and stems of Epilòbium hirsùtum *L.* Summer and autumn. — *E.* nítida, Grev. MSS. Baxt. Stirp. Cryp. Oxon. fasc. 2. n. 97. On the leaves and stems of *C*ircæ`*a* lutetiàna *L.* In the autumn, Bagley Wood (1826 to 1833).

Eríneum *R*ùbi *Link*, in Willd. Sp. Pl. v. 6. pt. 1. p. 146. On the under surface of the leaves of *R*ùbus macrophýllus *Weihe.* Bagley Wood, summer and autumn, common (1832–33). Mr. E. Jenner of Brighton has found the same Eríneum about Windsor. — E. lanòsum, Grev. MSS.; Baxt. Stirp. Crypt. Oxon. fasc. 1. n. 49.; Loud. Hort. Brit. p. 464. On the upper surface of the leaves of the common crab tree (*P*ỳrus *M*àlus *L.*) in Magdalen College Water Walks, and between Cowley Marsh and Bullington Green; September 1822 to 1833. I believe these to be the only localities at present known for this new Eríneum.

Puccíni*a S*cillàrum, Grev. MSS.; Baxt. Stirp. Crypt. Oxon. fasc. 1. n. 40. On the leaves of *S*cílla campanulàta *H. K.*, and *S*cílla nùtans *Sm.*, in the Botanic Garden, May (1823 to 1833.), common. On *S.* nùtans *Sm.*, on Shotover Hill.

*Æ*cídium *Bèhenis*, Decand. Fl. Fr. v. 6. p. 94.; Baxt. Stirp. Crypt. Oxon. fasc. 2. n. 90. Cæòma *L*ychnideàrum *Link*, in Willd. Sp. Pl. v. 6. pt. 2. p. 59. On the leaves and stems of Silène inflàta *Sm.*, in corn fields between Bullington Green and Cheyney Lane, plentiful. Aug. 1827.—*Æ.* quadrífidum, Decand. Fl. Fr. v. 6. p. 90. Cæòma quadrífidum *Link*, in Willd. Sp. Pl. v. 6. pt. 2. p. 55. On the leaves and leafstalks of *A*nemòne coronària, *L.* in gardens; not uncommon. See Loud. Gard. Mag. vol. iii. p. 490. — *Æ. A*`ri, Grev. MSS. On the leaves of *A*`rum maculàtum *L.*, Bagley Wood, rare. Mr. G. Gulliver has found the same species in the neighbourhood of Banbury.

*U*rèdo *H*ypericòrum, Decand. Fl. Fr. v. 6. p. 81.; Baxt. Stirp. Crypt. Oxon. fasc. 1. n. 42. Cæòma *H*ypericòrum *Link*, in Willd. Sp. Pl. v. 6. pt. 2. p. 24. On the under surface of the leaves of *H*ypéricum *A*ndrosæ`mum *L.* Shotover Hill, and the Botanic Garden, plentiful. June to September, 1825 to 1833. I, in June, 1831, observed the same *U*rèdo on the leaves of *H*ypéricum púlchrum *L.*, in the neighbourhood of Rugby in Warwickshire. — *U.* Nicot*iànæ*, Purton's MSS. On the under surface of the leaves of Nicot*iàna* multiválvis *Lindl.*, in the Botanic Garden, September, 1832 and 1833. — *U. S*tátices. Common on the leaves of *S*tátice Armèria *L.*, in the Botanic Garden. I am not aware that this *U*rèdo is noticed in any work on cryptogamous botany. It forms oblong rusty-coloured spots, surrounded by the ruptured

epidermis of the leaf. Sporidia globose. — *U. Bèhenis* Decand. Fl. Fr. v. 6. p. 63. Cæòma *Bèhenis* Link, in Willd. Sp. Pl. v. 6. p. 27. On the leaves of Silène inflàta *Sm.*, in corn fields between Bullington Green and Cheyney Lane, Aug. 9. 1827, rare. — *U.* pállida, Grev. MSS. On the under side of the leaves of *Con*yza squarròsa *L.*, in the Botanic Garden. Dr. Greville informs me that this *U*rèdo grows also on Solidàgo lævigàta *H. K.* and *P*yrèthrum macrophýllum *W.*

WILLIAM BAXTER.

Botanic Garden, Oxford, Sept. 28. 1833.

THAT true and elegant naturalist, Hurdis (an Oxonian), was he who said, —

> ——— " Not a tree,
> A plant, a leaf, a blossom, but contains
> A folio volume; "

and the proverbiality his saying has attained proves that the truth of its sentiment is generally felt. Mr. Baxter contributes not a little to illustrate its truth, not only in the above communication, but in the cheap and excellent periodical now in the course of publication, entitled *Figures and Descriptions of one Species in a Genus of the Flowering Plants of Britain.* In that work, a plurality of associations are drawn together and connected with each of the plants figured, and among these associations, not rarely a notice, from Mr. Baxter, of the species of fungus which have been found to inhabit the plants' leaves and herbage, is supplied. — *J. D.*

The common Berberry (Bérberis *vulgàris* L.) *is perfectly harmless to the Crops of Wheat which may grow near it.* (VI. 367.) — To Mr. Babington's pertinent practical fact (VI. 367.), illustrative of this assertion, I would add, that the parasitic fungus which diseases the leaves of the berberry is Æcídium *Berbéridis* Persoon, and is in species and genus most distinct from the parasitic fungus, Puccín*ia* *G*ráminis *Persoon*, which is frequently found infesting the herbage of crops of wheat. A figure of Æcídium *Berbéridis* is given in Loudon's *Encyclopædia of Plants*, p. 1045. No. 16676.; and one of Puccín*ia* *G*ráminis in p. 1047. No. 16710. In hedgerows around corn fields in some neighbourhoods, plants of the berberry are not rare (by Shaker's Lane, near Bury St. Edmunds, as one instance); and it is probable that the charging on the berberry the diseasing of the wheat, or other corn, which has grown near it, has arisen from the likely case of the berberry being infested with its parasitic fungus, the Æcídium *Berbéridis* Pers., at the

time the herbage of the wheat has been infested with its parasitic fungus, the Puccínia Gráminis; a coincidence which, it is presumed, ought rather to be interpreted as pointing to certain foregone conditions of the atmosphere or soil, which promoted the growth and multiplication of the respective funguses contemporaneously, each in its own appropriate soil, the leaves or herbage of the kind of plant in and on which it flourishes. That the fungus of the leaves of berberry can grow on the herbage of wheat, or the fungus of the herbage of wheat on the leaves of berberry, is an idea which the conclusions of science wholly repudiate. The first origin of the funguses, and their appointed agency, must be deemed identical, in time and source, with those of the largest of plants. — *J. D.*

Art. VIII. *A Description of a Fossil Vegetable of the Family Fucöìdes in the Transition Rocks of North America, and some Considerations in Geology connected with it.* By R. C. Taylor, Esq.

The accompanying drawing represents an interesting fossil which abounds in certain parts of the transition series in Pennsylvania. This plant was noticed, for the first time, in 1831, under the name of Fucöìdes alleghaniénsis, by Dr. Harlan, in the *Journal of the Academy of Natural Sciences of Philadelphia.*

Dr. Harlan's description of this fossil *Fùcus* is so applicable to the specimen before me, that I shall take the liberty of condensing his account. "It presents one of the richest specimens of vegetable organic remains that have hitherto come under my notice. Not only is the surface of the stone crowded with the forms of this plant, but they lie upon each other three or four layers deep, as is demonstrated by a horizontal fracture. They project in bold relief from the surface, with their distal extremities disposed in every direction; they appear to have been of different ages, and vary in size, accordingly, from 2 in. to 5 in. in length, the largest being eight tenths of an inch in thickness. In breadth they vary from one to five tenths of an inch; they are generally gently arched from the base towards the apex, and more or less recurved at top; in every instance the apex is curved downwards, and sinks into the stone. The superior surface of both the stalk and branches is cylindrical, transversely wrinkled by irregular channels, and marked by a longitudinal and depressed line. The digitations or branches are all compressed laterally as well as the stalk, and are fasciculated or

closely applied side by side at the commencement, and gradually diverge towards their distal extremities.

" In every case the stalks divide into two or more branches; the latter are more or less wrinkled, apparently according to age, the rugæ being more or less obsolete in the largest, profoundly developed in the smaller or younger specimens. The plants are fractured in many places and in various directions; but the fractured portions do not display any evidence of organisation; nor is there any appearance of leaves, nervures, or fructification."

I believe that a fossil of this description has not been noticed in any part of the transition series in Great Britain; yet, as some traces may be discovered through the aid afforded by an accurate illustration, I am induced to transmit some further notice of this fossil plant and of its geological position.

Mr. De la Beche enumerates two or three species of Fucöides in the grauwacke group of Europe. How near they may approach to the fossil which is so strikingly characteristic of a part of the same group in North America, I have no present means of ascertaining. The two species found in the transition limestone of Canada are dissimilar to the Fucöides alleghaniénsis.

The aggregate thickness of the grauwacke group is enormous in Pennsylvania; its breadth being about 120 miles, and its stratification being inclined at a very high angle, and often approaching to verticality, it is not improbable that the entire mass averages forty-five degrees. I have examined a large portion of this in detail, and have constructed a transverse section of about seventy miles, from which it appears that in about half this breadth the inclination of the rocks is towards the Alleghany chain, and in the other portion it is reversed. On the details of the subordinate portions of this group it is not my intention to enlarge. It is sufficient to observe, generally, that they consist of arenaceous, slaty, and limestone rocks, subdivided into innumerable varieties of siliceous and argillaceous beds, conglomerates, shales, clays, marbles, flinty slate and flinty limestone; and include numerous coal seams, both of anthracite and of the quality which may be termed bituminous anthracite, and large deposits of iron, both argillaceous and hæmatitic.

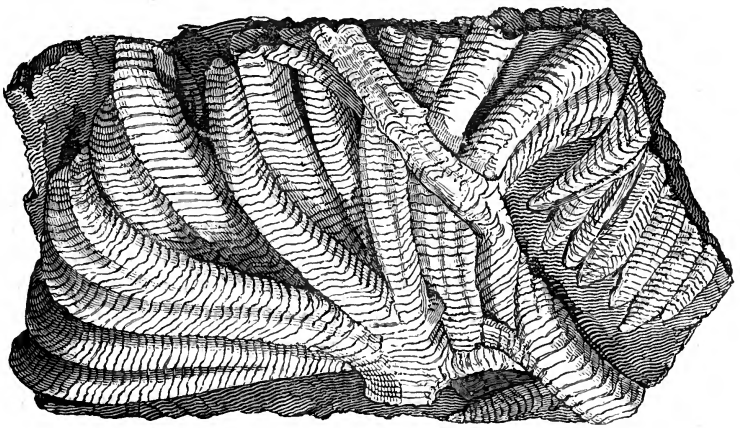
The surface of this region is broken into an infinite number of sandstone ridges and limestone valleys, all running parallel with the mountain chain of the Alleghany.

These ridges are generally 700 or 800 feet above the valleys, and are incapable of cultivation. They are covered,

to the thickness of from 10 to 100 feet, with huge blocks of sandstone. Upon their steep sides few traces of vegetable soil exist; yet the oak, the chestnut, the pines, and several other trees, have obtained a firm footing, and have extended over the loftiest crests. Embarrassed with this accumulation of debris, the geologist seeks, almost in vain, for some exposed face, some unencumbered surface, to determine the arrangement and structure of these vast and singularly prolonged masses. He finds as much difficulty in viewing the details of their geological features, as in obtaining, from amidst the ancient forests which overshadow them, an uninterrupted view of the wide-spread landscape beneath his feet.

I have observed Fucoïdes alleghaniénsis, at points 150 miles remote from each other, in the sandstone ridges that occur parallel with the eastern side of the Alleghany Mountains; but nothing resembling them can be detected in the intermediate limestone valleys. The subject of my sketch (*fig.* 6.) was

6



derived from the vicinity of this place [Lewistown], on the banks of the Juniata River, and in the same district from which Dr. Harlan's specimen was procured. Detached fragments, rolled from the mountains, and fallen slabs, exhibiting fine specimens of this fossil, are not unfrequently met with amidst the talus of the ridges; but it is only very recently that the beds in which it occurs *in situ* came under my observation. Under the conviction that these vegetable strata have hitherto escaped geological notice, I proceed to detail some circumstances relating to their position.

After passing Lewistown, the Juniata flows easterly, for

about six miles, through "the Narrows;" that is, in a deep narrow trough between the two sandstone ridges of Shade Mountain and Black Log Mountain; having, for the most part, barely space for its channel. The great western turnpike road and the Pennsylvania Canal also pass through this ravine; being, for some distance, excavated out of the base of the northern ridge, called Shade Mountain. In consequence of these public works, many of the inferior strata are here exposed; and although, in the aggregate, they do not comprise a thirtieth part of the entire elevation, they are highly interesting, in displaying beds of fossil *Fùci* in unexpected abundance.

These beds, where I first saw them extensively intersected, consist of fine-grained compact white sandstone; interstratified with greenish argillaceous seams, and some laminæ of black shale, both containing mica. Upon the upper surfaces of the argillaceous slabs are disposed innumerable groups of Fucòides. Above these layers, other courses, covered with the same fossil plants, could be traced obscurely; while masses of hard sandstone, whose figured surfaces bore rude resemblance to the Gothic tracery of ancient sculpture, had evidently fallen from much more elevated sites.

Pursuing the examination farther eastward, the beds of Fucòides were again laid bare, by the canal excavations, to the height of 50 ft. above the Juniata. Here I counted seven courses of them, comprised within the thickness of 4 ft. Among the lower beds are some of white cherty sub-crystalline sandstone, and others composed of micaceous schistose sandstone, whose upper surfaces were traversed by another species of Fucòides, distinguished by their long curving stalks; whilst upon other argillaceous slabs a third description of fossil *Fùci* crossed each other in straight lines, resembling network. It may be remarked, that no casts of shells, nor, indeed, any other organic body, occur with these deposits.

At another point, three miles eastward of that where I commenced tracing the *Fùcus* beds, numerous seams of fine white sandstone, separated, as before, by thin courses of micaceous shale and clay, are exposed. Some idea of the rapid succession of vegetable deposits will be conveyed, when it is mentioned that eight or ten were numbered within the space of 6 ft., some of them not exceeding 1 in. thick. The surface of Shade Mountain is too much obscured, by its thick covering of coarse debris, to enable an examination of its structure to be satisfactorily pursued; but there is reason to conceive that these fossils occur at various elevations, besides those of which I have spoken. I have observed them at 100 ft., 150 ft.,

and at 500 ft. above the Juniata; and specimens have even been obtained from the summit.

The strata I have enumerated dip towards the north-west generally; but local derangements have occasioned some partial curvatures and arching of the inferior strata, so as to occasion a variation from 30° N.W. to 60° S. The valley of the Juniata is remarkable for the singular contortions, on a large scale, of the strata upon its banks.

Lower down the Narrows succeeds a variety of argillaceous beds, which furnish the flagstones for the side pavements of the town of Lewistown. The surfaces of these pavements are covered with irregular protuberances, evidently of vegetable origin, and, probably, another species of fossil *Algæ*. Beyond this point another series of strata occurs. These consist of red sandstones, interlaced with numerous veins of white quartz, and conglomerates of granulated quartz, intermixed with fragments of red micaceous slate. Even these rocks occasionally exhibit coarse impressions and casts of Fucoïdes. To these succeed thick deposits of black shale, having no trace of organic remains.

The strata which I have thus briefly enumerated, although they form but an insignificant fraction of this immense series, present matter for the consideration of the speculative naturalist. It has been seen that here occur many alternating beds of Fucoïdes, and, probably, several species of these fossil plants. Hence may be inferred the existence, at various epochs, of so many separate surfaces, on which vegetation flourished at the bottom of an ancient ocean. We thus ascertain that, in those remote times, there were frequent successions of these remarkable submarine plants, and many renewals of the argillaceous surfaces upon which they took root. But it does not appear that the consequence of these frequent changes was the obliteration or destruction of the organic forms of the vegetation so overwhelmed. The entire series, from the lowest bed even to the highest, appear to retain their original distinctness of outline.

In the phenomena of deposition, and of recurring vegetation we may, perhaps, trace some circumstances analogous to the formation of coal beds.

The figure which illustrates this article represents a group of Fucoïdes, on a scale somewhat less than half their actual proportions [the drawing was about an inch too wide for our page]. An assemblage of these groups, ornamenting the surfaces of large slabs, in clear relief, forms one of the most remarkable fossil productions of this continent. Imagine beds of these Fucoïdes miles in extent, deposited, or rather accumu-

lated, layer over layer and growth over growth, until the mass contributes to form an entire mountain, and you will have one more subject for contemplation in addition to the innumerable others which result from an enquiry into "the remains of a former world." R. C. Taylor.

Lewistown, Mifflin County, Pennsylvania,
Nov. 2. 1833.

Art. IX. *Remarks and Illustrations on the Decay of the Stems of succulent Plants.* By Frederick C. Lukis, Esq.

The fossil vegetables which are found in the secondary formation, designated as coeval with the consolidation of the sandstone and coal measures, present to the eye of the observer patterns of great beauty and regularity, and display figures which have been often compared with the eccentric ornaments of ancient architecture.

Without entering into the general geological hypothesis, much may be done, in the study of these interesting remains, by close investigation and analogy; and, indeed, the nature of fossil vegetables must receive its principal elucidation from the careful examination of existing species analogous to them, when they can be found.

The physiological botanist is well aware that plants in decay are disposed to shrivel up, each in a manner peculiar to its own class, and that this operation is governed by their internal as well as external organisation, and by the circumstances under which they may be placed.

As the greater number of our fossil plants have been referred to the ferns, cactuses, and other succulent analogues, it is among these we are to look for characters of resemblance; and although many of these remains possess dimensions which baffle our conceptions, when brought in comparison with our pygmy tribes of the present economy, still the latter, insignificant as they appear, may afford us physiological types sufficiently clear to bring us near the truth. A series of observations made on the drying and decomposition of succulent plants has occupied my attention for many years, and I propose to notify some of the changes remarked in the stems and branches of the *Sempervivum arbòreum L.*, or tree houseleek, as it is called, in the course of their decay. They will suffice to show the variety of patterns which may be produced, under favourable circumstances, by a single individual of the succulent class. The result of decay in stems of this plant has been the production of exterior

markings, presenting a strong analogy to those of fossil plants; and I may venture to say that, if casts had been taken from them, they would have been mistaken for real specimens of these interesting remains.

The plants, when chosen for examination, were old, and of extremely luxuriant growth. The stems had acquired the size of a man's arm, and were about five feet in height. They were withdrawn from the hot-house during a sharp frost, by which they were soon killed. The leaves dropped off, leaving the rudiment more prominent and perfect than when their removal happened by natural decay. After the death of the plants, they were kept in the mould they occupied, and placed in a shaded situation, where decomposition was allowed to proceed slowly for the space of two years. During dry seasons they were occasionally watered, and the upper part of the stems was scooped out so as to admit moisture in the interior soft parts when required: thus a partial fermentation was continued until the medullary substance became dissolved.

The first change observable in the appearance of the epidermis was a disposition to form regular ridges or risings in the interstices between the marks left by the leaves and subspinous nerve near them, preserving a reticulated pattern. The hardness of the ligneous centre resisted decay for a long time, and allowed the cortical covering to form its pattern with considerable exactness; and at last, by its own shrinking, and the want of farther resistance from the nerve of spine and leaf, the covering contracted in a longitudinal direction, leaving the end of the wood projecting beyond the upper part of the plant.

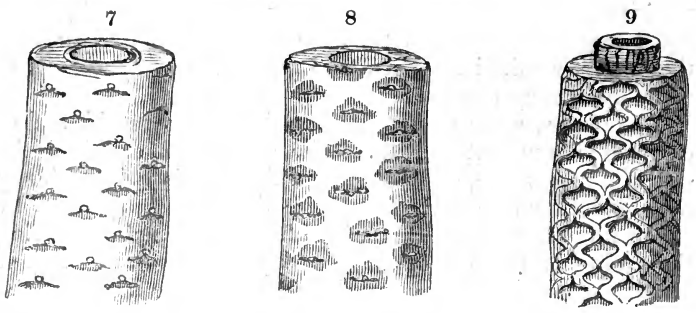
The following drawings of the plants, taken at different stages of decay, will be better understood than a lengthened description.

Fig. 7. represents the common appearance of the stem, deprived of its leaves, before decay; the tubercle and rudiment of the leaf, in quincuncial order, scarcely rising above the epidermis.

Fig. 8. This figure shows the first angular depression round the tubercle and leaf, caused by the shrinking of the interior parts of the plant: the dried state of the cortex opposing the contraction of its circumference.

Fig. 9. is part of the same stem, contracting more equally downwards, it having been more under the influence of moisture than the lower end. It had now commenced a wavy and rhomboidal cancellated figure, the elevated ridges preserving an almost united wavy line from top to bottom.

Fig. 10. The same as the last figure, having now attained



a more decided pattern, by the completing of the above-stated rhomboidal depressions, which had been assisted by a longitudinal cut of a knife, and the careful removal of the woody centre.

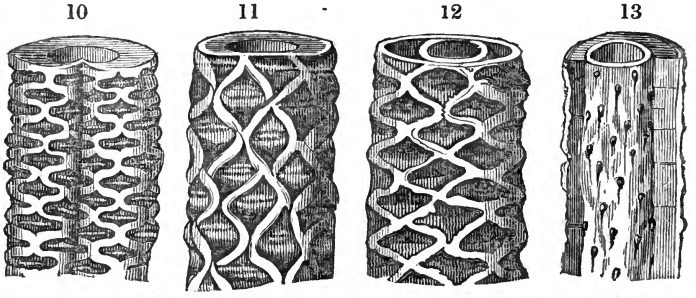


Fig. 11. Other parts of the plant produced this pattern. It appeared that the spinous processes in the interior had resisted the vertical contraction of the cortex. Here the spaces retained an oblong form, having the elevated ridges prominent, though not united throughout their diagonal direction, but breaking into distinct approximate compartments, much in the same manner as those in the Phytólithus cancellàtus. (*fig.* 21.)

Fig. 12. The most general appearance of the plants, where contraction was carried on more equally from both ends of the branch. The elevated ridges surrounding the compartments had now become dry and hard, and might be said to have arrived at the state of hay.

Fig. 13. is a vertical section of a branch, to show the ligneous centre, or woody stem, in a fresh state.

Fig. 14. The same after decay had commenced. The woody centre, in contracting, had produced lengthened lozenge-shaped elevations, retaining the spinous processes rather prominent.

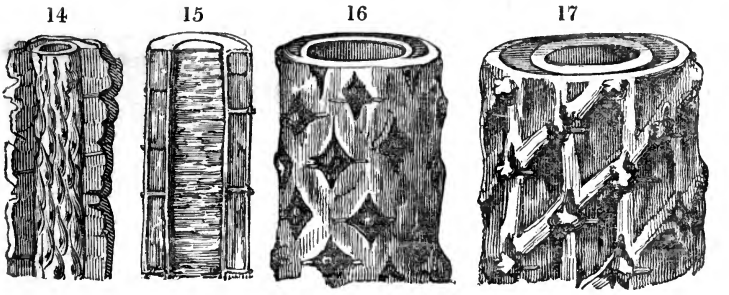


Fig. 15. A longitudinal section of a branch, to show the disposition of the medulla, or pith, in the ligneous centre, where it forms transverse cells: the cortical cells or layers, running in a vertical manner, are traversed by the spinous nerve which produced the elevations in the epidermis.

Fig. 16. represents the base of the stems of old plants. The epidermis becomes hard and leather-like, and is generally ruptured by the enlargement of the subspinous elevations. In the case under consideration, it formed lozenge-shaped openings round each tubercle, and retained a slight remain of the impression left by the original leaf across the tubercle.

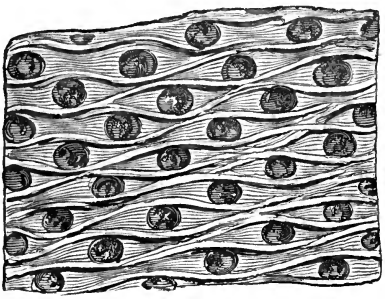
Fig. 17. In this last figure decomposition had affected the interior so as to enable the cortical covering to sink between the stiff prominent spines, which resisted decay with greater obstinacy; thus forming rhombic compartments in a reversed order to what had taken place in the younger branches, as seen in *fig.* 11.

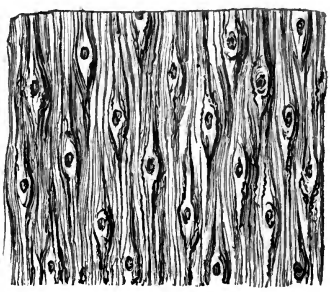
A greater variety of figures might have been produced, but as many were the same in character, under a few modifications, and in progress of decay, I have chosen the most decided patterns only. Some interior changes in the epidermis, cutis, and ligneous centre presented very regular markings during the progress of decomposition and desiccation.

Fig. 18., taken from the inside surface of the epidermis of the largest stem, will suffice to show the various changes exhibited by a single plant: in this case the cortical parts, under the epidermis, had separated in macerating, and left it at liberty to produce this pattern, although the exterior surface was not much altered from the rest of the plant.

In this figure the hollows were numerous and deeply marked. Over each a transverse, sharp, wavy, elevated line passed in regular succession; undoubtedly formed after its separation from the rest of the plant. These lines were not marked on

18 19





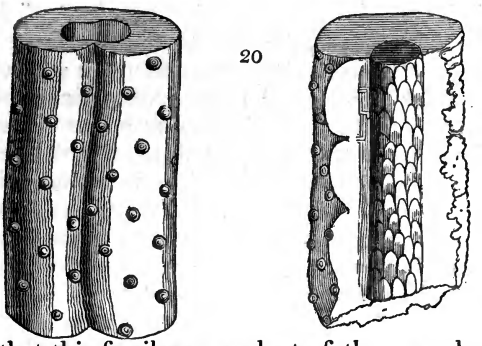
the outside of the epidermis, nor were they at all visible on the remains of the soft part which had been in contact with it.

Fig. 19. is a portion of the stem, or *lignum*, from which, when perfectly dry, its bark has been removed by peeling. It formed a hard and tough cylinder, of moderate thickness, the longitudinal striæ being only interrupted by the slightly elevated spots which held the spinous nerves as they emerged from the wood, and then passed through the bark, where they formed the external rugæ. That part of the bark which immediately covered the wood retained the same impressions on its surface, but that in contact with the epidermis had large tubercles corresponding with the outside of the plant; but in no case did this portion of the bark exhibit a pattern dissimilar from it.

In fossil plants it has been remarked that the same species may appear under three different states; such as are produced by the epidermal, cortical, and ligneous configurations: the first and the last differing much from each other; and, as Mr. Parkinson states, "it is only close observation that determines that it originates from the same plant."

Assuming that fossil succulent plants have undergone changes similar to those here represented, either before they were lodged in their matrix, or when so embedded, it will be easily perceived that one species may appear under several aspects difficult to determine. It is not improbable that, during the progress of maceration in the matrix, a variety of circumstances may have occurred to favour these changes and variations.

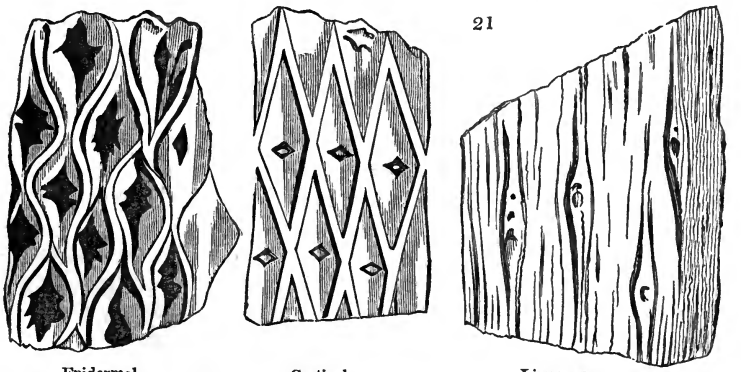
In contrasting these observations with what is visible in the submarine peat found in these islands, many indications point out a similar decomposition to be going on; and although these trees and vegetables have been buried many centuries, and are of a different description from those under notice, yet they exhibit changes nearly as difficult to recognise.



20

On referring to Parkinson's *Outlines of Oryctology* (the only work near at hand on the subject), he there states, when treating of the Phytólithus verrucòsus (*fig.* 20.), "that this fossil was a plant of the succulent tribe, differing from vegetables of the present world by its containing a more solid part within its succulent substance, from which proceeded a delicate organisation, by which a communication was preserved with the external surface." He further adds: — "It also appears that the species of this genus, distinguished by their characteristic markings, may have been numerous; that the different situations in which the internal part is found in different fossils are attributable to the resolution of the tenderly organised intermediate part, connecting the included substance with the surface, and to the other accidents dependent on partial and irregular decomposition, pressure, and distortion, occurring during its passage from the vegetable to the mineral kingdom."

M. Steinhauer has also remarked, in speaking of the Phytólithus cancellàtus (*fig.* 21.), "that the first or epidermal



21

Epidermal. Cortical. Ligneous.

configuration is formed of rhombs, divided by lines forming a network in a manner difficult to express by drawings or

description, which leaves the *rhombs still approximate;*" he again adds:— " In the ligneous, the cancellated appearance is *here entirely lost*, the surface is slightly striated, with a scarcely perceptible rising under the central ridge, and a minute but distinct raised dot in the place of the depression in the epidermis. It has all the appearance of a peeled plant, which had been furnished with small branches or spines in quincuncial order." M. Steinhauer also remarks, " that these plants were furnished in the centre with a pith of a structure differing from the surrounding wood or cellular substance, more dense and distinct at the older end of the plant."

Comparing these statements with the appearance of the plants under review, a strong analogy will be observed between them, tending in some degree to elucidate this obscure subject, and bringing their variety of configurations nearer to our minds. It may be found interesting to those who have not examined the different states of the same plant while under decay, and may prevent the multiplying the number of species, whose only difference, perhaps, exists in the degrees of decomposition of the same plant.

Guernsey, January 8. 1833.

ART. X. *A Notice of some important Geological Discoveries at Billesdon Coplow, Leicestershire; with Observations on the Nature of their Relation to the modern System of Geology.* By JOSEPH HOLDSWORTH, Esq.

IN contemplating the numerous theories of the earth's structure and materials, which have from time to time been advanced by men of profound minds, one cannot but be struck with the discrepancy of those ideas and opinions which, like the ebullitions of fancy, have successively triumphed and radiated with an effulgent brightness, until the discovery of some new, some simple unexpected fact, some sad reality, has consigned them, in succession, to oblivion.

Much, very much, however, has undoubtedly been achieved; many luminous discoveries have been made, and many surprising truths have been established, by the meritorious exertions of the scientific, as is sufficiently exemplified in the modern system of geology. This system, however, notwithstanding it is countenanced by many of the most scientific characters of the age, may be far from the climax of perfection; and the warmest advocates of it even admit that it is liable to many weighty objections. Indeed, the complex, the multifarious, the extraordinary diversity everywhere observable in

the terraqueous arcana of nature, laugh at the poverty of our ideas, and mock the futile efforts of man to reduce them to system, or to effect anything approaching to a faithful delineation of so mighty, so mystical and magnificent a prototype.

Notwithstanding this, there are certain individuals who, in their anxiety to preserve inviolate adopted principles and preconceived notions, treat with disdain or levity such actual circumstances as do not happen to accord with their prepossessions, and thereby evince a disposition to give, rather than to receive, the laws of nature. Certain geological discoveries which I have recently made in this district, and of which a short account is published in Taylor's *London and Edinburgh Philosophical Magazine and Journal of Science*, vol. iii. p. 76. 112., 1833), have met with instances of this kind of reception; and on this account, as well as by the advice of some eminent literati who have examined the discoveries, I am induced to solicit the farther attention of the unprejudiced scientific to them and to their bearing on the existing system of geology.

This system originated in the labours of Mr. Wm. Smith, an English surveyor, who in 1790 published his *Tabular Views of the British Strata;* in which he proposed a classification of the secondary formations in the west of England, and contended that the order of different groups is never inverted, and that these groups may be identified at very distant points, by the presence within them of fossils of a determinate structure, peculiar to each. According to the order of superposition and marks of identification prescribed by Mr. Smith (admitting the infallibility of the latter in the present case), it appears, from the occurrence of the Gryphæa incúrva and Pentacrinites Briàreus in the site of my trial for coal, that it is in the stratum which science denominates lias, and is situated about five miles from the eastern edge or extremity of the red marl. The last-named stratum, according to Mr. Smith's doctrine, reposes upon coal measures, and dips under the lias clays; consequently, if Mr. Smith's doctrine be true, and we assume the undisturbed presence of the above beds in this district, the lias and red marl formations must be penetrated before the old coal formation can be reached. The mean thickness of each of the two former strata is, according to the calculation of some geologists, about 500 ft.; the thickness varying extremely in different districts, even down to six or ten feet, and, in some cases, one or both of the beds are entirely wanting. At the Clutton Ridge pits, the red marl is, in some places, thirty fathoms deep, and in others but ten.

I will not stop here to question the correctness of the theory

which ascribes to every distinct stratum a new order of organic beings, nor dwell upon the unanticipated facts which my practical efforts have brought to light in this locality; but, in actual consistency with Mr. Smith's theory, I will proceed to adduce a few of the many instances which have occurred in this kingdom of the successful penetration, even from the surface of the oolite, to the carboniferous strata or independent coal formation. As instances: Paulton Hill, near High Littleton, Gloucestershire, is topped with oolite, beneath which is a bed of lias; then the newer red sandstone or marl, and finally the pennant or coal seams, at a moderate depth. In another part of the same county, the thickness of these beds, which lie above the coal, is as follows: — Oolite, 6 yards; lias 53 yards; red marl, 44 yards: in all, 103 yards to the coal formation. Coal is equally accessible through these formations near the Mendip Hills, and in some parts of Wales, &c. In the above districts, as in all others, the various superstrata of the carboniferous formation vary much in thickness, in comparatively short distances. The Walton pit, a short distance east of Clutton, and near to Midsummer Norton, descends through the red ground, containing shaly limestone, in which fossils abound, and through the like order of mill grit, shale, and sandstone, to the depth of 200 fathoms, where the main bed of coal occurs. These instances sufficiently demonstrate the probability of the existence of coal in this place, at an obtainable or definite depth, especially when we take into account its proximity to the red marl and newly discovered coalfields to the west, and distant hence about fifteen miles in a direct line; and, additional to these considerations, we may reasonably calculate upon the latent existence, and consequent assistance, of some of those wise ordinations of Providence termed faults, by means of which the coal of very extensive fields is found to be, in many instances, thrown near the surface, when otherwise it would, in consequence of its natural dip, soon be out of the reach of the miner.

In the vicinity of these natural intersections (the consequences of subterranean convulsions), vast stratified masses, several miles square, are found to have been upheaved from very considerable depths. From among hundreds of instances of this case on record, I may here adduce two or three in illustration: — The coal formation of Ashby Wolds is a curiously denudated mass, entirely surrounded by the red marl, which (if it existed prior to the catastrophe) appears to have fled from its assigned geological destination, when the volcanic thunders shook the mineral treasures of its sub-neighbours, and summoned them to approach nearer to the light of heaven. The coal measures of

Tamworth, and some others in the red marl, assume precisely the same insulated character; but the systematist affirms that these anomalous masses are peculiar to the red marl. Since, however, he attributes them to igneous causes, whose bounds no lines of demarcation can prescribe, whose power and universality no mortal dare presume to dispute, may we not reasonably infer that immense stratified masses have been subjected to the same mighty causes, not only throughout the whole of this kingdom, but in the remotest regions of the globe? So recently as the 9th of November, 1822, an earthquake happened in Chile, South America, which furnishes an amazing example of the extensive effects of the tremendous explosive powers by whose agency such awful catastrophes are operated. Mrs. Graham, who was an eye-witness of the above, relates that, "on the morning of the 20th, it appeared that the whole coast, from north to south, to the distance of above one hundred miles, had been raised above its former level; at Valparaiso, the alteration of level was about three feet, and at Quintero about four feet. She found good reason to believe that the coast had been raised by earthquakes, at former periods, in a similar manner; several ancient lines of beach, consisting of shingle mixed with shell, extending, in a parallel direction to the shore, to the height of fifty feet above the sea." These phenomena may be regarded as of frequent occurrence in the formations of all ages, and as indicating the most effective of the numerous disturbing causes by which the earth's surface has been affected.

I am prepared to show the igneous effects of these revolutionising catastrophes in the vicinity of Billesdon Coplow. At an apparent fault, which intersects the southern extremity of the Coplow basin, where many of its deep measures are promiscuously thrown up, are found large masses of fused matter, muscle shells, coal, and oyster shells, in conglomerated masses; fragments of fir trees, partly carbonised and striated with sulphur; all evidently having been subjected to the powerful action of fusible heat. From what I have adduced respecting the universality of lands uplifted by subterranean convulsions, and from the signs of these convulsions having at some remote period exercised their powerful and mystical effects in this district also, is it not reasonable to infer that immense anomalous masses are as likely to expand their denudated bosoms in the centre of the lias marls, oolitic, or other ranges, as they are well known to do within the limits of the red marl? However, there can be no necessity for resorting to such violent hypothesis, as the instances we have quoted are sufficiently in point to warrant fully (with a full and un-

compromised admission of the undisturbed order of superposition of the British series of strata) the conclusion that coal may be reached and worked to advantage from the surface of the lias, and even oolitic, ranges of this kingdom. But however powerfully and clearly the inferences drawn from the general laws of an established science may tend to justify such a decision, the prudential calculator and nice observer of nature's laws would certainly not feel himself justified in the adoption of expensive practical experiments to prove the real existence of an object which natural deductions, derived from theoretical principles, had shown to be probable. "No;" he would naturally enough say, "I must first be convinced, by indubitable evidence, of the real merits and stability of this grand and orderly structure which the inductive spirit of modern geology has called into being; and even then, before I proceed to act upon principles of so general and comprehensive a character, I shall require a mass of actual evidence (of a local nature) perfectly analogous to those infallible criteria which are known to direct and reward the researches of the practical geologist and mineral explorer." Such, I confess, were the sentiments which dictated my examination for coal strata in this hitherto untried district.

I will now proceed to consider whether or not the discoveries already made are calculated to affect or confuse the order of superposition of the British series of strata, so systematically arranged by modern science, and also endeavour to demonstrate the presence of valuable coal strata in this district, by existing evidence, of such an incontrovertible nature as, I flatter myself, cannot fail to remove the prejudices of the most determined sceptic.

The marks of identity by which the respective formations are distinguished, and their geographical extent ascertained, are, as I have before observed, the fossil exuviæ they individually contain. Such being the case, I would ask the founders of the existing system to account, by reasonable inferences, for the assemblage here of the Círrus acùtus of the mountain limestone; the *P*écten fibròsus of the under oolite; the Trigònia costàta of the upper; the Mytilòides labiàtus, from the chalk and superior strata; with madrepores, muscles, corals, and oysters from the coal formation, found, apparently, not in the diluvium or adventitious deposits, but in the regular strata, constituting a part and portion of the ponderous formation denominated lias?

In relation to this question, I shall here introduce an extract from the Rev. Mr. Scutcliffe's *Geology of the Avon* (p. 24.):—"With regard to organic remains, the marble, often alternating

to magnesian limestone, the shaly limestone, and the oolite, contain the genera, the families, and species of shellfish, madrepores, coralites, encrinites, pentacrinites, far beyond what scientific men have attempted to distinguish. Mr. John Walcott has very accurately painted and engraved about sixty shells, besides leeches, bones, and palates; Mr. Sowerby, in his beautifully coloured work on shells, has published many others: but these do not contain the fourth part of the species which exist in gentlemen's cabinets. This science, which merits the most enlightened classifications and the best powers of the pencil, is yet in a state of infancy. But of seeing it brought to perfection one can have little hope; learned men having unaccountably committed themselves, by contending that in every fresh order of strata we meet with an entire fresh order of extraneous fossils. It is granted, at once, that we do meet with such order; for the works of the Creator are immense. We meet, also, with fresh plants in every continent. Nevertheless, in all these fresh orders of strata, we meet with many shells and plants found nearly in all the other orders. These are facts founded on personal examination and the severest scrutinies. These are facts which command the judgment, and must eventually supersede the contumacy and novelty of our modern theories. No man will surely tell us that the belemnites, the ammonites, the ostracites, the trochites, the nautilites, and the gryphites, found in the lowest strata of the alum shale of Yorkshire are of a totally different order from those of the same name in this district, and in the chalk and limestone ranges of the south of England. I have seen three of the Yorkshire ammonites, which differ from those of the south; one of which had mouldings on the whole spiral coil, resembling the edges of the oak leaf."

Of vegetable fossils, embedded in the same mass, many occur; some of a species of fir, and of other dicotyledonous woods; also detached leaflets of the osmund filicite upon nodules of ironstone, and other vegetable impressions upon the sandstones (found on the spot where the coal and its concomitants crop out to the surface); which fossils are described by geologists as belonging to the old coal formation. To these I may add the extraordinary circumstance of the presence of an immense number and great variety of tropical fruits, with knots of wood, and other vegetable fossils, found in a most perfect state, embedded in the regular stratifications, about fifteen feet from the surface of the earth, and on the spot where the boring for coal was performed. These fossils have been pronounced fruits of a tropical climate by many eminent scientific men in London and Edinburgh, where they

have been shown, and are universally allowed by the initiated to be the first discovered within the lias range. The records of geology furnish us with a description of a similar discovery of the organs of fructification belonging to a tropical climate being made in that division of the British strata (superior to the chalk) termed the London clay, which is, according to the present system, a deposit of a much more recent epoch than the lias. In reference to these fossils, which were found in the Isle of Sheppey, the following remarks are extracted from Conybeare's *Geology of England:* — "The evidence of a neighbouring region of dry land seems attested by these vegetable remains, which, from the state in which they are found, can scarcely be supposed to have been drifted from any great distance. . . We can scarcely resist the temptation of asking, What was that ancient land? Had any part of England then raised its head above the waves? Does it not sound extravagantly, even to enquire whether its oldest and highest mountain tracts then formed a group of spice islands, frequented by the turtle and the crocodile? Speculations like these, though unavoidably suggested, almost give the features of romance to the sober walks of science."

According to the author above quoted, beginning with the coal formation as the plane of superposition, the lias is the second, and the London clay the fifteenth in the geological series of English strata; consequently, according to the doctrine of the relative ages of strata, a series of epochs transpired, or geological catastrophes performed their respective revolutionising effects on the face of this country, during the immense period which intervened between the formation of the lias and London clays. Now, bearing in mind the data (fossils) from which these inferences are drawn, the following queries naturally suggest themselves: — How are we to account for the presence, in strata deposited subsecutively to the carboniferous strata, of some of the identical fossils (of tropical origin) which characterise the carboniferous formation? From whence came, and at what particular epoch flourished, the tropical organs of fructification, &c., found in the lias? What are we to infer from the circumstance of analogous vegetable products of the same climate being found embedded in strata supposed to be formed at periods so remote as is ascribed to the deposition of the submedial and superior formations?

Whilst indulging in such speculations as the above, we have, for argument's sake, admitted the modern doctrine of a series of subaqueous catastrophes and progressive changes having, in the course of an immeasurable space of time, coated the globe with regular and well-defined strata, whose order of

superposition is never inverted, and, being countless in number, her incalculable age is, of course, understood. But the mind, in its eager pursuit after secondary causes (forgetting the First Great Cause), is speedily lost and confounded in a labyrinth of soaring conjectures and humiliating reflections; and truly, then, "may the sober walks of science be said to assume the features of romance." But, if we refer to the sublime and consistent records of the inspired writer for assistance, the daring phantasm of system vanishes into thin air, under the profound declarations of the sacred page. Moses, in speaking of the grand catastrophe whose impetuous waters overwhelmed the primitive world and its inhabitants (of which event we have such abundant evidence), declares that "the windows of heaven were opened, and the fountains of the great deep were broken up," and that "the high hills under the whole heavens were covered;" and he further affirms that the great turmoil of waters "prevailed," or, in other words, continued their impetuous course, for a space of 270 days around the nucleus of the revolving globe. Surely such a mighty circumfluent mass would be quite sufficient to produce, during the above period (under the energy and guidance of Him whose "spirit moved upon the face of the waters;" who said, "Let there be light, and there was light;" whose creative fiat willed all things into being), the whole of the terrestrial formations, with the peculiarities ascribed to each; all the astounding phenomena which the philosopher labours in vain to define; all the magnificent framework of the world, so greatly to be admired for the beauty and diversity of its materials, and for the provident and orderly arrangement of its structure. The Rev. Mr. Scutcliffe observes (in his valuable geological essays), that "the Mosaic theory of stratifying the earth, by the long-continued action of tremendous tides, is the only one which can correct the contradictory theories of geologists, and illustrate the phenomena of the stratified earth." He also remarks, "that whatever earths the impetuous tides of the deluge washed from one place, they must, of necessity, deposit in another. This is an invariable law of the ocean. Hence, one tide would bring gravel and marine exuviæ, already worn by the action of the billows rolling on the shore; another would bring sand, and another clay. But though all alluvial strata were formed of the detritus of the old earths, they would repeat the first formation, by combination; they would change into a variety of silica, rocks, marls, and minerals; while others, falling on more neutral earths, would remain in their primitive state. Thus, also, the deeper strata of the earth would be laid on while the

waters were rising; and all the more loamy earths by the gradual retreat and subsiding of the waters. These long-continued actions and deposits of the water are a sure guide in accounting for all the conformations and heterogeneous masses found in most parts of the alluvial earth."

Thus, with the semblance of truth on our side, and reason for our guide, we may unhesitatingly infer that the tropical fruits, plants, and other fossils, which we find so indiscriminately scattered in the submedial, medial, and superior strata of geologists (and many others, which may also arise from their fossil tombs, at some distant day, to prove the fallibility of modern theories), were upborne to their respective destinations by the levelling floods of the Noachian deluge; and, consequently, are, like the strata in which they are embedded, of contemporaneous origin; and were, in all probability, deposited at a period when no portion of England had raised its head above the waves. May we not also fairly surmise that the sportive element, which had arbitrarily disposed of the fossil exuviæ, would also, by a succession of retiring tides, leave, indiscriminately, its vast flotillas of the uprooted spoils and refuse of the antediluvian forests in the deeper recesses of the earth, in the insulated situations they now occupy in the character of coals; and of the immediate existence of which we have certain infallible indications, ordained by the all-wise Director and Disposer of all created things for the direction and assistance of the "practical explorer;" who, by the evidence of these indications has been led to the discovery of those immense treasures which have proved the mainspring of the activity, prosperity, and glory of the British nation.

I will now proceed to show that "local indications" are to be found in this district, presenting their silent but *incontrovertible testimonies* of the immediate presence of mineral riches, concealed here, in the subjacent regions of the earth. Passing over the numerous veins, detached masses of smuts and coal (as being indicative, only upon more general principles, of a coal neighbourhood) so numerously scattered throughout the diluvium or compound beds which principally constitute the multifarious undulations of this (the eastern) division of Leicestershire; the first thing worthy of notice is the circumstance of the vestigia of coal, and *all its concomitants*, being found, generally speaking, immediately below the surface of the ground, *in one continuous line*, traversing this field in a direction due N.E. and S. W.; five miles of which have been minutely explored by myself, and its real character and importance ascertained and declared by several experienced scientific and practical men. From the outcrop, these

measures decline rapidly to the S.E.; but in traversing the lower grounds, where the greater portion of them have been actually proved, by boring, to lie in regular stratified order, they dip but about five inches in the yard to the above point of the compass. In regard to the quantity of coal, I may adduce the single fact of the vestigia of certain of its concomitants, of considerable thickness (say from three to eighteen feet), proved in the deep, being found throughout the whole of the longitudinal line of the bassets, bearing a proportion short of the coal vestigia there scattered. Reasoning from this fact*, in conjunction with coexisting evidence, it is demonstrable to a certainty that the latter are portions of a very considerable and valuable stratum of coal, occupying its individual station, as a part of the mass of stratification partially explored, and whose bassets, or vestigia, were evidently deposited at the same period and by similar means. As a concurrent proof that these vestigia have been carried but an extremely short distance from their respective beds, I need only remind the initiated (who are aware of the extraordinary chafing or decomposing power which impetuous waters exert upon some of even the hardest minerals brought from any distance) that the various freestones, shales, coal, &c., found at the crop, are not in the slightest degree worn by attrition: even of the binds, which are of an extremely friable, tender, and soluble nature, I have numerous specimens, whose angles and asperities are of the most acute description.

About 400 yards beyond the first basset another coal appears to the day; which, in some places, has been discovered two feet thick, and also accompanied by its immediate con-

* An exactly analogous line of coal vestigia, and *all its concomitants*, varying from about 10 yds. to 30 yds. wide, traverses the *new* Leicestershire coalfield, in a direction due N.E. and S. W.; which vestigia are thrown up to the surface through the red marl formation; a very considerable thickness of which entirely conceals the superficies of the substrata (carboniferous) over a great extent of country. The important characters of these bassets were first noticed, examined, and appreciated by Mr. Williamson (an experienced practical coal discoverer and miner), who, placing that implicit confidence in them which experience in exactly similar evidence (or laws of nature) had taught him to entertain, was thereby encouraged to persevere in a long and tedious trial (by boring) for coal in Bagworth Lordship (made a few hundred yards to the west of the above line), which, after penetrating through about 103 yards of red marl, ultimately led to the discovery of the vast stores of coals now working there; and other collieries subsequently opened in the immediate vicinity. Accompanied by Mr. Williamson, the discoverer of the above coalfield, I have recently traced and very minutely examined the aforenamed carboniferous bassets, and found them, in *every peculiar and essential character*, precisely analogous to those which traverse this district.

comitants, and resting upon a clunch, the usual pavement of coal: this has also an almost vertical dip to the S.S.E. Here, as in the first bassets, confusion and disorder are apparent; but this, as Williams asserts, in his *History of the Mineral Kingdom*, is common to all strata which, as in this instance, come in contact with the base of hills or other previously formed elevations.

In reference to the measures proved by boring, it may be necessary to state, that men of unquestionable judgment have not only recognised them as the identical strata represented by their vestigia at the surface or line of bassets, but pronounced them to possess, collectively, precisely the same mineralogical characters, &c., which so definitely distinguish the old coal formation. It may be important to remark, that, in the course of our penetrating the upper beds of this formation, marine exuviæ were found tolerably abundant, but decreased until we arrived at, apparently, the old coal formation, where they entirely disappeared, and were succeeded by those of vegetables alone. The carbon, which gradually increased in the measures, was, in the last * fifteen or twenty yards, extremely abundant; indeed, quite equal in quantity (as proved by the common process of washing) to any of the strata in the immediate vicinity of the coal beds of the explored coal-fields. This lower series also contained two or three thin veins of coal, commonly called breeders. Can any thing be more clearly demonstrative of the total absence of the red marl (in this vicinity) from its assigned geological position? However, there appears nothing extraordinary in this circumstance, when we take into consideration the extremely variable thickness of all the secondary formations, and particularly the red marl, or new red sandstone, which, it is well known, is frequently found terminating abruptly, forming thin beds, or swelling into considerable thickness, in the comparatively short space of a square mile or two.

To revert to the fact of the bassets of the coal and all its concomitants, accompanied by the characteristic fossils of the old coal formation, traversing this district in a direct line: whether they result from igneous or aqueous causes; whether they are calculated to break or disarrange the concatenations of the modern system, or whether they can be reconciled thereto, I leave to the learned to determine. That the

* After this interesting enquiry had been prosecuted to the depth of more than 100 fathoms, it was unfortunately terminated by the introduction, by some malicious person, of a quantity of iron and steel into the boring-hole.

facts are substantial and stubborn ones, I am fully prepared to prove, and I shall also be most happy to give ocular demonstration of all that I have advanced respecting the geology of this neighbourhood.

In the contemplation of unanticipated or unpalatable truths, the determined sceptic and uncompromising systematist should ever bear in mind that there are many phenomena in the magnificent arcana of nature which the accumulated wisdom of ages, even to the end of time, shall fail to demonstrate; that "the book of nature," as Bishop Pontoppidan observes, "contains many leaves which no mortal ever yet perused;" and, consequently, it behoves the votaries of system, who aim at perfection, so to construct their scientific temples that the admission of any of the unexplored truths contained in her sacred pages may not sap their foundation, nor disturb the general harmony of the structure. That this would be a hard task is admitted; but, in contemplating the extreme jealousy and pertinacity sometimes evinced by the privileged few who are permitted to assume the banner of science, one can scarcely resist the inclination to indulge in such reflections. In a complex subject like geology, the abstruse disquisitions of the theoretic must ever remain subservient to the actual discoveries of the practical. However at variance such discoveries may happen to be with the previously adopted notions, prevailing opinions, or vested interests of individuals or societies, they will ultimately, despite of every disparagement, *prevail*, and find their way into the stores of public knowledge; where unshackled liberal and inquisitive minds will appreciate them according to their worth, and where, perchance, they may occasionally merit to be received as new data, whereon to found speculations and enquiries which may ultimately tend to the farther developement of science and the extension of national wealth.

Coplow House, Leicestershire,
Nov. 18. 1833.

J. HOLDSWORTH.

THE Geological Museum of Gideon Mantell, Esq., of Lewes, of which an account is given in III. 9. to 17., VI. 75., is about to be transferred to Brighton. Mr. Mantell, after twenty years' extensive and successful practice in the medical profession in the eastern side of Sussex, is removing to Brighton; where we trust that, consistently with his professional engagements there, he will make some arrangements which may allow scientific enquirers to visit his museum, without any sacrifice of his own time.—†††

ART. XI. *Some Observations on a very interesting Aurora Borealis, witnessed at Hull on the Evening and Night of October* 12. 1833. By GEORGE H. FIELDING, Esq. M.R.C.S.L., Member of the British Association for the Advancement of Science, Treasurer and Hon. Curator of Comparative Anatomy to the Hull Literary and Philosophical Society, &c. &c.

ON the evening of Saturday, Oct. 12. 1833, we had the most brilliant exhibition of the aurora borealis I have ever seen. The evening was remarkably bright and clear; the sky presented a deep blue tint, and the stars were uncommonly brilliant; the air felt sharp, the temperature being about 40°; the pressure of the atmosphere 29·832; the wind rather brisk, and from the north-west. At half past 8 P.M. there was a broad, irregular, semicircular belt of vivid white light, stretching across the northern hemisphere of the heavens. The span of the arch was from 70° to 80°, its upper edge reaching as far as the star Eta in Ursa Major, about 18° above the horizon; and the breadth of the belt, which varied, I should state to be about 5°. It was exactly similar to a rainbow in shape, but of pure white light.

Below the bow I at first thought there was a dark black cloud; but, on minuter investigation, I found this to be a deception, caused by the extreme brilliancy of the aurora, which threw the surrounding medium into shade, and obscured the lustre of the fixed stars so much as to make them seem blue. By degrees the arch extended itself towards the zenith, and included the whole constellation of Ursa Major: it also gradually filled up the concavity down to the horizon, until it finally presented the magnificent appearance of an arc of an immense globe of fire.

During the whole time of my observation, brilliant radii were shooting up towards the zenith from the convexity of the arch, sometimes broad, sometimes narrow, sometimes vanishing immediately, and at others remaining visible for a minute or more, to an altitude of 60° or 70°, and seeming like pillars of flame. The radii mostly disappeared at or before they had attained, an altitude of 90°, but might occasionally be traced in very narrow wavy streaks into the southern hemisphere.

The most extraordinary appearance, however, was a rapid undulatory motion, accompanied with frequent brisk flashes *,

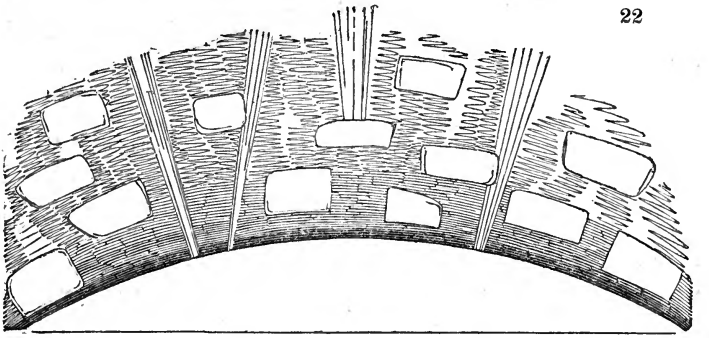
* These flashes resembled, both in duration and colour, the silent lightning frequently seen in the horizon on warm summer evenings, apparently at an immense distance, and when not a cloud is visible.

I cannot but consider the aurora as an electrical phenomenon, and think that, were it not at such a remote distance, we should have explosions audible as in a thunder storm. This, however, is mere conjecture; but I

which extended through the whole length of the curve. These immense flashes reached an altitude of 80° or 90°, and were often divided into numbers of square portions, or flashes, separated by broad dark lines. This singular phenomenon I should judge to be owing to the intervention of patches of dense vapour between me and the aurora; and, as not a cloud was visible during the interval between the flashes, and as the stars preserved their brilliancy, the height of the aurora must have been immense.

As a diagram, however rough, excels description in these matters, I add a slight sketch (*fig.* 22.) of the appearance when the square masses were given off.

22



I think the exhibition was the most splendid about 10 P.M., although it continued very beautiful till after 2 A.M. There was not the slightest corresponding appearance in the south, nor could I distinguish any sound I could attribute to the aurora: in fact, the latter is perhaps hardly to be expected, as the mean distance of the aurora from the earth, as calculated from the observations of twenty different philosophers in the same century, is, according to Sir Richard Phillips, 500 miles; the distance observed varying from 100 to 1000 miles.

With respect to the very remarkable changes in the weather, and especially in the temperature, which immediately followed this certainly uncommon exhibition of the aurora in these latitudes, and which I am about to detail, a large share, in the absence of any other known cause, may fairly be attributed to this phenomenon. During the night the temperature fell to 34°, being the lowest degree of cold I have registered

hope soon to see the matter fully explained, as Captain Ross (whom I had the pleasure of seeing immediately on his arrival at Hull, after his long absence and perilous adventures) himself informed me he had obtained ample and satisfactory information respecting it and its causes.

this season: the barometer rose slightly. On the following morning, at nine o'clock, the northern hemisphere of the sky was studded with the *mottled cirrostratus;* the wind was brisk from the west, but tending to the south; the pressure of the air 30·096; the temperature 41·9°, being 7·2° *lower* than the preceding morning at the same hour. The temperature remained low the whole day, the sky wild, and the wind increasing until the evening, when it blew strong from the south-west in gusts, and was accompanied with showers of rain, the temperature increasing considerably. At nine A. M. the following morning the thermometer stood at 58·8°, being 16·9° *higher* than the preceding morning: the barometer showed 29·417, being a fall of ·679, or rather more than half an inch. The early part of the day was bright, with a fresh breeze from the south-west: at two P. M. it became overcast, and a heavy shower of rain fell: at night it blew strong from the south-west, accompanied with showers of rain, and once of hail. On the 15th, at nine A. M., the temperature was 46·1°, a *decrease* of 12·7° from the preceding morning: the barometer 29·132, and ultimately sinking to 29·118. These great and sudden differences in temperature are very uncommon at this time of the year, and actually greater than many of the same parallel hours in June and January of the present year, as I have found by referring to my own observations.

Hull, Oct. 18. 1833.

Art. XII. *Short Communications.*

Birds.— *A Notice of some rare Species of Birds observed or killed in the County of Suffolk, and adjoining Borders of Essex, during the Winter Months of* 1832 *and* 1833. [*By J. D. Hoy, Esq., of Stoke Nayland, Suffolk.*]

Two Eagles of the cinereous or white-tailed Species (*Fálco Albicílla*), but in the plumage of the sea eagle (F. *Ossífragus*), were, in December, 1832, trapped on a large rabbit-warren, near Thetford [and, it may be assumed, from Mr. Hoy's heading, on the Suffolk side of this town, which itself is just within the boundary of the county of Norfolk]. They had been observed for some time in the neighbourhood. One of the eagles carried a heavy trap a considerable distance, I believe, nearly half a mile, and was secured with some difficulty. One was apparently in its first year's plumage: the other, from its lighter-coloured feathers, and the tail-feathers possessing much more white, was probably a year older. They were both presented to me by G. Gardiner, Esq., of Thetford.

They are the very birds to which the remarks and query (VI. 448.) of H. T. of Bury St. Edmunds relate.

A Goshawk (*A'stur palumbàrius*), an adult male bird, in most beautiful plumage, was, on March 16. 1833, caught by a gamekeeper of Sir Joshua Rowley, Bart., of Stoke Nayland, in a trap baited with a red-legged partridge, which it had killed. I believe its capture to be an exceedingly rare occurrence in this part of the kingdom. I am not aware of more than two or three instances of the goshawk's being killed in the southern parts of Britain; and, in those instances, I am inclined to suspect they might be birds escaped from falconers, as the goshawk has been trained and flown, at no very distant date, in the counties of Norfolk, Cambridge, and Herts, in which counties also the specimens were killed.

The Merlin (*Fálco Æ'salon*) seen.

The Peregrine Falcon (*Fálco peregrìnus*) seen.

The Hawfinch (*Fringílla Coccothraústes*) [VI. 520., and, in addition to the references there given, III. 436.] visited us in small flocks, and many were seen and shot in different parts of the county. Although the whitethorn berries were abundant, the seeds of the sycamore and maple appeared to be their favourite food, more particularly those of the sycamore. A flock of eight or ten frequented some plantations near Ipswich during a great part of the winter, and seemed to feed almost entirely on the sycamore seeds. They were shy, and difficult of approach.

Siskins (*Fringílla Spìnus*) were very abundant through the winter, feeding principally on the seeds of the alder.

Snow Buntings (*Emberìza nivàlis*) in large flocks, in marshes and fields contiguous to the coast.

The Great Butcher Bird (*Lànius excùbitor*) seen in Tendring Hall Park, Sir J. Rowley, Bart., in February, 1833.

[For mentions of its occurrence in various parts of Britain, see I. 395.; III. 436.; V. 567. 723. Lànius excùbitor, in IV. 449., is wrongly introduced by myself: the author's bird was Lànius Collùrio. — *J. D.*]

Least Woodpecker (*Pìcus mìnor*). Two specimens were shot. It is a rare species in this locality.

Little Gull (*Làrus minùtus*) shot.

Little Gallinule (*Gallínula minùta*) shot near Yarmouth.

Gadwall Duck shot.

A Black Stork (*Cicònia nìgra*) was shot, in October, 1832, in the parish of Otley, about eight miles from Ipswich, in this county. I was informed of the circumstance by E. Acton, Esq., of Grundisburgh, who can bear testimony to the fact, having seen the bird, when in a high state of putrefaction, sus-

pended from the bough of a tree, where it had been placed by the person who had shot it. Atkinson, in his *Compendium of British Ornithology*, mentions a bird of this species being killed in Somersetshire a few years since.

Crossbills (*Lóxia curviróstra*) were shot in the same plantations [which are spoken of in p. 53., in the notice of the hawfinch], where they were often seen during the last winter, and generally feeding on a variety of spruce fir bearing a small cone. I have invariably found the crossbill preferring the larch to every other tree of the pine tribe, except in this instance, when the seeds of the small cones of this variety of spruce fir appeared to be their favourite food. I have seen them feeding on the common spruce fir, and occasionally on the Scotch and Weymouth pines, but seldom on the two last mentioned.

Rusticus (of Godalming), in his esteemed communication (VI. 111—116.) of "More about Birds," in speaking of the habits of the crossbill, says (VI. 113.), that the idea of its "holding the fir cone in the claw, and extracting the seeds with the beak, must have been suggested by some wag to a credulous naturalist." Now, I do not in the least doubt but Rusticus is perfectly correct, as far as he may have had opportunities of observing the habits of this species, and, as he mentions the acts of individuals which he observed feeding on the Scotch pine, he may not have closely watched the movements of this species when on the larch.

From October, 1821, to the middle of May in 1822, crossbills were very numerous in this county, and, I believe, extended their flights into many parts of England. Large flocks frequented some plantations of fir trees in this vicinity from the beginning of November to the following April. I had almost daily opportunities of watching their movements; and so remarkably tame were they, that, when feeding on fir trees not more than fifteen or twenty feet high, I have often stood in the midst of the flock, unnoticed and unsuspected. I have seen them, hundreds of times, when on the larch, cut the cone from the branch with their beak, and, holding it firmly in both claws, as a hawk would a bird, extract the seeds with the most surprising dexterity and quickness. I do not mean to assert this to be their general habit; but it was very frequently done when feeding on the larch. I have never seen them attempt the like method with cones of the Scotch or other species of pine, which would be too bulky for them to manage. Their method with these, and, of course, most frequently with the larch, was to hold firmly on the cone with their claws; and, while they were busily engaged in this

manner, I have captured great numbers; many with a horse-hair noose, fixed on the end of a fishing-rod, which I managed to slip over the head when they were feeding, and, by drawing it quickly towards the body, I easily secured them; others I took with a limed twig, fixed in such a manner in the end of the rod that on touching the bird it became immediately disengaged from it, adhered to the feathers, rendered the wings useless, and caused the poor bird to fall perfectly helpless on the ground. In this manner, in windy weather, I have taken several from the same tree, without causing any suspicion of danger. On warm sunny days, after feeding a considerable time, they would suddenly take wing, and, after flying round for a short time in full chorus, alight on some lofty tree in the neighbourhood of the plantations, warbling to each other in low pleasing strains; they would also fly from the trees occasionally for the purpose of drinking, their food being of so dry a nature.

In captivity they were quickly reconciled, and soon became very familiar. As, at first, I was not aware what food would suit them, I fixed branches of the larch against the sides of the room in which I had confined them, and threw a quantity of the cones on the floor. I found that they not only closely searched the cones on the branches, but, in a few days, not one was left in the room that had not been pried into. I gave them canary and hemp seed; but, thinking the cones were both amusement and employment, I continued to furnish them with a plentiful supply. I had about four dozen of them; and frequently, whilst I have been in the room, they would fly down, seize a cone with their beak, carry it to a perch, quickly transfer it to their claws, and, in a very short time, empty it of its seeds, as I have very many times witnessed, to my surprise and amusement. As the spring advanced, the male birds in the plantations were frequently singing on the tops of the firs, in low but very agreeable notes; yet they continued in flocks, and were seen in some parts of the county until the beginning of June. I had hopes of their breeding in confinement, and I accordingly kept them in different rooms, fixing the tops of young fir trees in the floor, and against the walls, and supplying them with as great a variety of food as possible; but all to no purpose, as neither those I had confined in this manner, nor those in cages, ever showed any inclination to breed. They are amusing birds in confinement, as they have some of the habits of the parrot tribe; climbing about the cage with both beak and claws.

Since 1822 I have seen but few crossbills: small flocks have occasionally visited the fir plantations in the neighbourhood, but have remained only a short time. During the early

part of last winter, a small flock took up their abode in some plantations near Ipswich; and, in the beginning of September of the present year, several specimens were seen, and one killed evidently in nestling plumage much resembling in markings the young greenfinch.

When every part of our islands shall have been visited by naturalists with ears alive to every note, and eyes that mark the species by the passing glance, at rest or in the distant flight, then may we expect to hear of different localities, where the crossbill may occasionally breed; which may probably be in some of our mountainous districts; more especially as the sides of the hills, in many parts of the empire, are now covered with rising woods of larch and other species of the pine tribe. — *J. D. Hoy. November* 28. *and Dec.* 4. 1833.

Notices of the occurrence of the crossbill will be found in I. 394, 395.; II. 89. 268.; III. 176.; IV. 163. 449.; V. 555.; VI. 112. In some of these places, facts are added on the food and manners of this species. From these, and the present one by Mr. Hoy, it seems that, although the crossbill may prefer the seeds of the common larch for its food, it will, in the absence of these, partake of the seeds of any species of pine, fir, or larch; and, it is highly probable, of the seeds of any plant included in the natural order *Abiétinæ*. Mr. Yarrell has, in the *Zoological Journal*, iv. 459. to 465., described, and illustrated by seven coloured figures, the structure of the crossbill's beak, and the form, office, and relative action of each of the bones and muscles which subserve the bird's act of extracting and taking its food. Mr. Yarrell has quoted Mr. Townson for some facts on habits. From both authors we have learned as follows: — The structure of the beak in the two British species of crossbill, and in these alone of all British birds, is such as supplies a capability of lateral motion, and of a surprising degree of power in a lateral direction. These avail the bird in the acquisition of food, thus. It first fixes itself across the cone, and then brings the points of its mandibles from their crossed or lateral position, so that they are immediately over each other. The bird then insinuates its beak, thus reduced in compass, between the scales of the cone, and then opening its mandibles, not in the manner of birds of other species, but by drawing the lower mandible sidewise, it forces the scales asunder. It now applies its tongue, which has at the extremity a peculiar appendage resembling a cutting scoop; this is inserted underneath the seed, which, by it, is dislodged and conveyed to the mouth. — *J. D.*

The Plectróphanes lappónica (VI. 482. 486.) *has been captured, along with Larks, near Preston, Lancashire.* — As Mr.

John Harrop, son of the sub-curator of the Manchester Museum of Natural History, was, on Oct. 18. 1833, passing through the Manchester fish and game market, he was struck with the appearance of a bird among a number of larks. He obtained it, and it turns out to be Plectróphanes lappónica. Mr. Harrop, on dissecting it, could not determine whether it was a female or a young male; he thought it the latter. On comparing it with the figure in *Fauna Boreali-Americana*, I should say that the figure is highly coloured; while the colours of the specimen are more brilliant than those in Wilson's figure. The specimen is now in the Museum of the Manchester Natural History Society. The bird was taken near Preston, in this county.

While writing, I would ask T. K. (VI. 519.) to examine the works of Messrs. Harrop. — *J. O. Manchester, Nov.* 11.

Crossing and Lengthening in the Mandibles of Birds; Remarks on the Causes of, and Conditions observable in. (III. 402.; VI. 517.) — In the numerous instances which have fallen under my observation, it has always appeared to me that excess of nutriment has been the principal, if not the sole, cause; as in every case the individuals have been in good plump condition. Monstrosities of this kind, consequently, are much more common among birds in captivity than birds in a state of nature: and it may be generally observed, particularly in soft-billed birds, that the under mandible is more subject to grow out than the upper. I have repeatedly noticed this in the redstart and robin, and have now, in confinement a pied water-wagtail, in which I find it necessary to cut off, every three or four weeks, nearly a quarter of an inch of horny substance at the extremity of the under mandible. In a twite (Linària montàna), also, which I possess, the lower mandible grows out still more rapidly than in the wagtail, and has continued to do so for upwards of a twelvemonth; though the upper one has ever retained its natural form. In the bullfinch and in the oxeye I have known the upper mandible to increase, and not the under; but these are the only instances. The goldfinch and the siskin are very apt to have both mandibles grow out; one of the former, in my possession, has, at this time, its bill nearly half as long again as it ought to be, but the mandibles do not cross. An old favourite siskin, which I long kept in confinement, was a perfect Lóxia in this respect, and its mandibles became, in time, so much decussated, as seriously to inconvenience the bird. While removing the excrescence, I chanced, unfortunately, to pass the knife rather too deep; and, though the wound was so small as to be scarcely visible, the poor little creature bled to death. I mention this as a caution to others who may find it

necessary to use the knife in similar cases. When once the bill of a bird has begun to grow out in this manner, it will always continue to do so; and, though cut, will very soon increase again; in the instance of the goldfinch above-mentioned, the lower mandible continued to grow out for six or eight months before the upper one commenced, but both now increase equally fast. This elongation of the mandibles has never taken place in any of the numerous species of warblers (Sylviànæ) which I have kept, and now keep, in captivity; though the birds of the robin kind appear extremely subject to it. Among other species, I have noticed it in the tree sparrow (*P*ásser arbòreus, *F*ringílla montàna *L.*)—*Edward Blyth. Tooting, Surrey, Nov.* 26. 1833.

The crossing of the mandibles in the crossbill itself seems liable to a variation in the mode. Mr. Yarrell, in his Treatise on the beak of the crossbill, *Zoological Journal*, iv. 459., has this remark: — "In some individuals the upper mandible is turned to the right, the lower mandible curved to the left; in others, the position of the mandibles is reversed as to their direction."

In continued frosts, one occasionally sees a robin, or other species of bird, with the distal half, more or less, of one, usually the upper, of its mandibles absent; broken off, perhaps by a shot, perhaps by the bird's violent application of it to the ground, then frozen "hard as a stone," to remove thence some object of food. As the portion which is left of the fractured mandible usually exhibits some bloodiness, the bird, the fate of Mr. Blyth's siskin suggests, bleeds to death. If not, it may be presumed that it must die of starvation, from its inability, from the absence of the more prehensive part of one mandible, to pick up a sufficiency of food for sustaining itself.—*J. D.*

Excrescences on the Head and other Parts of the Common Hedge Chanter (*Accéntor modulàris* Cuv.) (VI. 153.) — In the instances which have come under my notice, I am confident they were of extremely rapid formation. A short time since, one of these birds was brought to me, weak and exhausted for want of food; really a hideous object, with numerous large excrescences on different parts, some of which completely blocked up the nostrils, and twisted the beak out of all form, completely incapacitating it from taking any kind of food, but which was nevertheless extremely plump and in good condition. I once observed excrescences somewhat similar rise in the course of four days on the head and knee (the real heel) of a tree pipit (*A*nthus arbòreus), one of which was very nearly as large as the head itself. — *Edward Blyth. Tooting, Surrey, Nov.* 26. 1833.

ENTOMOLOGY.— *The Entomological Society of London* held the first meeting, of their first session, in the evening of Nov. 4. 1833, at 17. Old Bond Street. Messrs. Kirby and Spence, the distinguished authors of the *Introduction to Entomology*, and thereby the founders, it may be said, of this science in Britain, were present, and the members assembled, about fifty in number (including Messrs. Stephens, Hope, Walker, Westwood, Yarrell, Dr. Horsfield, and Col. Sykes), testified their sincere gratification at this circumstance. The Rev. Mr. Kirby, who had been unanimously chosen honorary president of the Society, and to whom the chair, first taken by J. G. Children, Esq., was resigned, stated that he would do all in his power to advance the interests of the Society; but that he felt that, at seventy-four years of age, much would not be expected from him. He could not, however, refrain from observing, that science was indebted for the most interesting and valuable portions of the work to which his own name appeared conjointly as author, to his friend beside him; and, here, Mr. Kirby laid his hand on the shoulder of Mr. Spence.

The meeting elected Mr. Spence an honorary member, by general acclamation; and Mr. Spence, in returning thanks, avowed that he came to the meeting, and had brought his two sons, for the express purpose of joining the Society. He then produced a letter, which was read by one of his sons, detailing so much of the proceedings at the late meeting of naturalists at Breslaw as referred to entomology, and with which, he said, he had been favoured, previously to leaving Paris, a fortnight ago, by M. Lefebvre, the secretary of the Société Entomologique de France, who, as well as many others of the principal members, had expressed to him their high gratification at the institution of the Entomological Society of London, and their ardent desire that a frequent intercourse between the two Societies might promote the objects which both have in view.

Mr. W. B. Spence (eldest son of Mr. Spence) was then elected foreign secretary of the Society, and the members, after going through the by-laws and other routine business, separated, highly gratified at the very auspicious circumstances under which the meetings of the new Society had been commenced.

The second meeting took place on Dec. 2. "The room was considerably crowded." Some scientific communications were read. For the details, see the *Entomological Magazine* for January, 1834. The Society's future meetings are to be held on the first Monday in every month, and the chair to be taken precisely at 8 o'clock in the evening.

[*A Pupa of* B*ómbyx menthástri, Six Pupas of the* O*`phion vínulæ, and a Pupa of* B*ómbyx vínulus, all found in company within, and bred from, the hard Cocoon of the* B*ómbyx vínulus.* (IV. 267., V. 592., VI. 378.)]—In p. 378., I forgot to give the extracts from Dr. Leach's and Mr. Kirby's letters about the ophions and *B*ómbyx menthástri that were found in company within the cocoon of *B*ómbyx vínulus. Mr. Kirby says: — "I shall be glad to learn whether the pupa you found in vínulus turns out lepidopterous, as it will furnish a new circumstance in entomology, if it so turn out." (Dated May 22. 1820.) Dr. Leach says: — "Respecting the *I*chneùmon, the fact of six being found in one pupa, and a lepidopterous insect within, is very curious, and quite new to me. I have found one, frequently, in the form of pupa, within the perfect pupa of a *C*óssus, which must have entered in form of egg deposited by the parent." (Dated March 10. 1820.) The *B*ómbyx menthástri bred June 8. 1820; but the ophions did not appear till the 28th. The larva of *B*ómbyx vínulus I took at Whittlesea Mere, July 24. 1819. Another person has said there must be some mistake; but I can assure him it is a fact, although I cannot account for it. — *J. C. Dale. Sept.* 1833.

*An Instance of Variation in Shape in the Upper Wings of two Males of the Lycæ`na díspar.* — Mr. Kirby has said,— "Colour, I believe, often varies in Lepidóptera, but I cannot think that shape does." Now, I have taken two male specimens of Lycæ`n*a* díspar, near Trundle Meer, in Hunts, in which the outline varies much; the upper wings of one being long and acute, the upper wings of the other short and obtuse; but in no other respect do they vary. [A sketch, which accompanied this communication, exhibited a very obvious degree of variation. Mr. Dale has drawn the outline of the smaller within the outline of the larger.] The second dot in the upper wings [exhibited in the sketch] always shows more or less in Lycæ`n*a* díspar male, but, I believe, never in L. Hippóthoe male. (Is it quite true that L. Hippóthoe is British?) Edùs*a* varies the same. — *Id.*

*Cordùlia Curtís*ii Dale, *a Species hitherto undescribed, characterised by Mr. Dale.* — On June 29. 1820, I discovered a new Cordùlia on Parley Heath, Hampshire. It is one of the finest insects I have ever found; and I had proposed to name it after a certain friend, but objection has been made to its bearing his name, "he not being the captor." As it has remained a nondescript up to this time, and is unnoticed, so far as I can find out, by Vander Linden, Charpentier, and other writers, I now venture to describe and name it after a friend whom I saw capture it: and, as some jealousy has

been displayed on account of my having given a *manuscript* name only to Halictóphagus Curtísii, I request the favour of the following appearing in *print*: —

Genus Cordùlia *Leach*, &c.; Libéllula *Lin.*, &c. Species Curtísii Dale. Viridi-ænea; abdomine medio flavo-maculatis (♀ compresso et alis flavescentibus.) Habitat: Parley Heath, Hants, in June, J. C. Dale: Ramsdown, Hants, in May, J. Curtis, Esq.; Braunton Burrows, Devon, J. Cocks, Esq. About the size of C. æ`nea. Brassy green; body compressed, with a row of oblong yellow spots down the back, absent on the 7th and 8th joints only; head notched in front: wings very pale greenish yellow, slightly yellow at the base in the male; yellow-brown in the female, along the costa of all the wings, suffused to their centre; stigma and nervures piceous.

The above is sufficient, I believe, to distinguish it from all other species at present known; but I hope my friend Curtis will now be enabled to give us a figure and a better description, without having his modesty called in question by being gratuitously made subject to the imputation of his naming an insect after himself. — *J. C. Dale. Sept.* 1833.

Of the Genus Oxýcera Mr. Dale and myself have [in 1832] succeeded in making out eight or ten species (I believe only three have been noticed by Mr. Stephens), and we are yet in hope of discovering more; although at Pinny Cliff, near Lyme, where I first discovered one new species last year, they are extremely local, and almost confined to one or two trees. — *Francis Orpen Morris. Charmouth, Dorset, Sept.* 1832.

Two Facts on the Dung-fly (*Scatóphaga stercorària*). — I have frequently found this insect, when dead, firmly attached round the stem of an ear of corn, &c., and its body here and there covered with a white dust resembling mould. During last year, 1832, I met with only one example; but, during the previous year, I must have noticed a hundred at least. They are fixed in precisely the attitude of life, as if only resting for a short time; and, from this appearance, may have escaped general observation.

While standing (in 1832) under an oak tree at Hampstead, something fell down from the boughs upon the grass, in which it produced a loud humming noise. I searched for it, and found it to be a common bluebottle fly, spinning round upon the earth, and uttering that peculiar buzz which it makes when struggling with a spider; and firmly attached to it was a dung-fly, which was rather reluctant to loose its hold: before, however, I could open a pill-box to receive them, they had separated, and flown off in different directions. What could be the purpose of the attack? — *James Fennell.*

MISCELLANEOUS INTELLIGENCE.

Art. I. *Retrospective Criticism.*

Observations on Classification, in reference to the Essays of Messrs. Jenyns (VI. 385.), *Newman* (481.), *and Blyth* (485.). — Sir, The two great defects of modern systems appear to be, the want of simplicity and of uniformity; and I cannot but think that both these may be in great measure attained, without any violence being offered to the "natural system."

Mr. Jenyns (VI. 385—390.) appears to have blended together two distinct causes of complaint: first, that in modern systems genera are founded upon characters of unequal value (*e. g.* Emberìza and Plectróphanes); and, secondly, that several genera are placed in the same family, certain of which are more nearly allied to each other than they are to the remaining ones (*e. g. T*étrao, *L*agòpus, *P*érdix, *C*otúrnix). In making the first complaint, Mr. Jenyns seems to have overlooked the fact, that, when a systematist separates a new genus from an old one, he must necessarily restrict the characters of the old genus, as well as establish those of the new; or else the species in question might be referred as correctly to one genus as the other. Linnæus founded the genus Emberìza on a peculiar form of the bill. He is silent concerning the other characters of the bird. Now, if we define the genus Plectróphanes to possess that peculiar bill and a long hind-claw, it is plain that we must add to our definition of Emberìza the character of having a short hind-claw. When this is done, the two genera become of equal value, be the number of species in each what it may, since they are founded on characters of equal importance, and they are therefore no longer liable to Mr. Jenyns's objection. Whether the characters of these groups are of sufficient value to constitute genera, is another question; and I fully agree with Mr. Jenyns in deprecating the practice of multiplying genera *ad infinitum* upon the most trivial and unimportant characters.

Let us now turn to Mr. Jenyns's second cause of complaint. The genera *T*étrao and *P*érdix, if restricted as shown above, may be rendered of the same value as their offsets *L*agòpus and *C*óturnix; but still *L*agòpus will be more nearly related

to *T*ĕtrao than to *P*érdix. If we place these genera, as Mr. Newman (p. 484.) proposes, in two distinct families of Rasòres, viz., *T*etraónidæ and *P*erdícidæ, still these two will be more nearly connected with each other than they are with *P*hasiánidæ, or any other collateral family. Or if we follow Mr. Blyth (p. 487.), in making them into subfamilies, *T*etraònæ and *P*erdiciànæ, of the family *T*etraónidæ, we shall diminish the simplicity of our system by multiplying our groups, and its uniformity by introducing a new kind of group, the subfamily, which it will be impossible to apply to every branch of the animal kingdom. We ought, I think, to adopt no more gradations of groups in any one class than admit of being established in every class. It therefore only remains to make these minor groups into subgenera or sections of the larger ones, *T*ĕtrao and *P*érdix. Subgenera are practically useful for facility of reference; and they are useful to the more philosophic naturalist, by bringing into one view those species which are nearest allied; thus giving a right direction to his comparisons and observations: but it is, I think, of the utmost importance that these subgenera should not have names imposed upon them. The needless multiplication of names is the very bane of science; loading the memory beyond its powers of endurance, and degrading the philosophic naturalist into a walking dictionary. Careful and minute observations on animals cannot be carried too far; they enrich the descriptions of species, and supply characters for subgenera; and hence Mr. Blyth deserves much praise for his careful remarks upon the habits of birds, in Rennie's *Field Naturalist's Magazine;* but I cannot agree with him, that because distinct, and even natural, groups can be formed upon these minor characters, therefore every such group is to be made a genus, and honoured with a name. Suppose that, instead of studying one order of birds alone, Mr. Blyth was to extend the same principle to the whole animal kingdom, we should have, perhaps, 50,000 or 60,000 genera! Who, then, could be an ornithologist, much less a zoologist? Language itself would fail in finding names for such a countless multitude.

Another strong objection to naming subgenera is, that the generic and subgeneric name are continually confounded and used promiscuously. This is often the case with the French writers; and even the immortal *Règne Animal* of Cuvier is not free from this blemish. The confusion which hence arises is evident. Mr. Jenyns's plan seems, therefore, to be the best; to distinguish subgenera, or, as I would rather call them, sections, by signs or letters. But now comes Mr. New-

man's difficulty; how are we, in writing or conversation, to indicate subgenera? I think that, for common purposes, it is not necessary to do so at all. When the name of a genus is mentioned, a knowledge of the larger groups in which it is contained is presupposed. If, therefore, we carry the standard of our genera too low, it is probable that none but those few who have leisure to make themselves perfect in zoology will know the class or order of a genus which another person may casually mention. If a naturalist at Calcutta is told that the *F*ringílla cœ̀lebs is common in England, he at once recognises the general characters of the bird; but if it were called Schìza cœ̀lebs, as Mr. Blyth would call it, it is a great chance whether he would be the wiser for the information. But, if greater accuracy be required, the informant may add that it belongs to section A or B; and, if he were describing a new species, he would, of course, either indicate the section, or describe it with sufficient accuracy to enable any one to refer it to the right one.

In offering these remarks, I am far from desiring the Linnæan genera to be retained unaltered, but merely wish the practice of forming new genera not to be carried too far.

Mr. Newman says (p. 480.) that the orders *F*èræ, *A*ccípitres, and Coleóptera are not of the same value, because the latter contains many groups analogous to the two former, and others quite different. He seems to have overlooked the remark of Decandolle, in Mr. Jenyns's paper (p. 389. note *), "that the same characters are not of equal value in different groups." Hence there can be no doubt that it is far more natural to found the orders of insects upon the structure of their wings, than to put *V*éspa, Libéllula, and *C*icindèla into one order, on the ground of being rapacious; and *A*̀pis, *P*apílio, and *C*hrysomèla into another, because they are herbivorous.

Mr. Newman objects to uniting the *C*etàcea with the other Mammàlia; but if we attend not only to the number of characters which they have in common, but to the value of those characters, that is, to the high station which they hold in the scale of existence, there can be little doubt that this is a natural union. The claim of the Marsupiàlia, and especially the Scansòres, is more doubtful; founded, as they are, on single characters only, and those not, perhaps, of very great importance. I am, Sir, yours, &c. — *H. E. Strickland.*

Classification (VI. 385. 481—488.)—Mr. Newman (p. 480.) appears to me to have misunderstood the observations of Mr. Jenyns. (p. 385.) Mr. Jenyns refers, I presume, to a plan similar to that adopted in botany; where subgenera (or, as they

are there called, sections) are very generally used and named: the sectional names being merely intended for convenience in description and reference, and not to be retained in the memory. The sections are founded upon characters which are considered of subordinate value to those used in distinguishing the genera: the latter depending almost solely on the construction of the flower and fruit, and the former upon the general habit of the plant, the form and character of the leaves, stipules, &c., and such variations in the fructification as are found to be but of little value in the natural order to which the plant belongs. The advantage of this plan appears to be, that the genera in each order, all depending upon modifications of the same parts, are of nearly an equal value, and the sections are only employed where there is a marked difference in subordinate characters or habit between the parts of a genus. Some genera will therefore contain many of these sections, and others only one; in the same manner that an order is sometimes found to contain only one genus. Or, perhaps, it would be more correct to say, that we are not yet acquainted with the other sections of the genus or the other genera of the order. In illustration of this, I give the characters of the genera and sections (subgenera) in the tribe *Th*laspídeæ, order Crucíferæ.

The tribe is divided into two parts: — 1. Cells of silicle two- or many-seeded; 2. Cells of silicle one-seeded.

I take the former of these, because it contains three British genera: the characters are —

*Th*láspi. — Silicle emarginate at the apex, valves winged at the back; cells two- or many-seeded.

Hutchíns*ia*. — Silicle elliptical, valves wingless; cells two-, rarely three-, seeded.

Teesdàl*ia*. — Silicle oval, emarginate at the apex; cells two-seeded; stamens each with a scale on the inner side at the base.

Platyspérmum. — Silicle oblong, crowned by the short thick style; cells four–five-seeded; seeds with a broad margin.

The genus *Th*lápsi is divided into the following sections (subgenera): —

Sec. 1. Pachyphrágma. — Silicle broad. Style none. Dissepiment thick, double, furnished with three longitudinal plates. Seeds four, not striated.

Sec. 2. Carpóceras. — Valves expanding at the end into a hornlike wing. Dissepiment membranous, oblong. Seeds four, striated.

Sec. 3. Nomísma. — Valves with a wing along the whole back. Seeds numerous, striated.

Sec. 4. Neurótropis. — Silicle orbicular, with a narrow recess; back of

the valves with a broad wing, circumscribed by a nerve. Seeds numerous, not striated.

Sec. 5. Pterótropis. — Silicle somewhat obovate, with a broad recess, or truncate; back of the valves with a wing not circumscribed by a nerve. Seeds not striated.

Hutchíns*ia* is divided into

Sec. 1. *I*beridélla. — Style filiform. Leaves entire or toothed. Flowers purplish, resembling those of an *I*bèris.

Sec. 2. *N*asturtìolum. — Leaves pinnate, lobed. Flowers small, white, like those of *D*ràba and Teesdàl*ia*.

Teesdàl*ia* and Platyspérmum have no sections, or, rather, each contains only one.

According to the plan proposed by Mr. Newman, the above sections must, I presume, be formed into genera, and the genera themselves will become families; therefore the two (Teesdàl*ia* and Platyspérmum), which have only one section, must have new names invented, to mark the difference between the family and the genus. I cannot see what additional advantage would result from this plan, to compensate for loading the memory with additional terms.

In speaking of a plant, the generic and specific names alone are used; the sectional one being only employed in description, to avoid repeating the same character in numerous species, or to communicate a general idea of a plant without giving a detailed description. This plan, of named genera and sections, has been partially adopted in entomology. See the genus Colymbètes, in which the generic character depends chiefly on the formation of the mouth, and the sectional upon that of the legs. — *Charles C. Babington*, M.A., F.L.S., &c.

Mr. Audubon and his Work, the Biography of Birds. (VI. 550.)— One glance more at testimonies relative to Mr. Audubon's claim to the authorship of the *Biography of Birds.*

" I have read Mr. Audubon's original manuscripts, and I have read Mr. Waterton's original manuscripts; and both before they were published.* I think the English of the one is as good as the English of the other." (*W. Swainson*, in VI. 550.)

" Mr. Audubon is the son of French parents. He was educated in France till the age of seventeen. At that time he could not speak the English language. It cannot, therefore, be the least disparagement to Mr. Audubon, if, when he had a valuable work to publish in English, he should wish to receive

* Mr. Mawman, who published the *Wanderings*, was bound down not to make any alterations in the *Wanderings*.

the assistance and correction of a native." (*R. B.*, in VI. 371.)

" Tanta est discordia fratrum ! " *Ovid.*

What proof of discord here we see
'Twixt Mr. Swainson and R. B. !

Here I beg to remark, that Audubon told Cuvier that he had resided for twenty years in the woods of America, living in a rude hut, constructed by himself, for the purpose of studying the habits of birds. Now, let us put these twenty years to seventeen, and we get thirty-seven. Then let us take into consideration the time which Mr. Audubon must have spent in his " counting-room" in Louisville, and in buying and selling goods in other places: for be it known that he kept a shop for many years in the United States. This is far from being a discreditable circumstance; I merely introduce it to show that his avocations of a commercial nature might possibly have interfered with those of a literary nature. The contradictory, ungrammatical, ill-constructed paper, signed " Audubon," on the habits of the turkey buzzard, which appeared in *Jameson's Journal* for 1826 [reviewed in VI. 162—171.]; in which paper, by the way, Mr. Swainson found a " freshness and an originality," which he pronounced to be " delightful to the general reader," [I. 45.] seems to bear me out in my surmise. Enough. " How blind is that man," said Don Quixote, " who cannot see through a sieve ! " — *Charles Waterton. Walton Hall, Nov.* 7. 1833.

Mr. Audubon, jun. (VI. 550.) — How extremely forgetful it was in this gentleman, when he attempted (VI. 551.) a defence of his father's account of the rattlesnake, never once to have alluded, in the slightest manner, to the momentous descent of the large American squirrel, tail foremost, down the rattlesnake's throat ! To have touched upon the minor parts of that very startling narrative, and not to have bestowed a solitary word on the tail-foremost feature of it, is as defective in Mr. Audubon, jun., as it would be in a surgeon who should try to dissect the fibrous roots only of a cancer, and leave the cancer itself to eat into the vitals of his unfortunate patient. Nobody doubts that rattlesnakes swallow squirrels; but every body must condemn Audubon's account of a rattlesnake chasing a squirrel, and then swallowing it tail foremost. Tail foremost ! Why, as long as this foul stain on the page of Audubon's zoology remains unblotted out, of what use is it in his son to tell me that his father has explored the " Floridas, the Keys, and the Tortugas Islands ? " The story of the rattlesnake will always appear against him, as a phan-

tom of bad omen, and it will warn me how I put confidence in other narratives which may come from Mr. Audubon's zoological pen. Indeed, if even his friends should be rash enough to call me to account for incredulity on future topics, my short and simple answer will be, that Mr. Audubon's story of a rattlesnake swallowing a large American squirrel, tail foremost, still sticks in my throat, and that positively I cannot try to gulp any thing else till they manage to ease me of that foreign body.

In the very face of this reptile stinging his father's reputation, Mr. Audubon, jun., has the temerity to hint at fables in the *Wanderings*. Will he have the goodness to point them out? Should he succeed in proving a fable in one single instance, be it ever so trivial, I will renounce all claim to veracity, and never more write another word to meet the public eye.

Mr. Audubon, jun., remarks, that what little information I have given of the American birds is positively useless until I publish an Indian vocabulary. In the same breath he adds, that Azara has given us both the Indian and scientific names of the birds. To crown all, he pronounces Azara "the very first authority on these matters;" after telling us that Azara affects to despise system. Again, he appears shocked at my want of science, just, by the by, after he has most unhappily quoted his father's own words, to prove to us that his father himself stood in absolute need of a scientific assistant; while his friend Swainson fully confirms this arrant ignorance in the great American ornithologist, by telling the world that he was expected to have given assistance to Audubon in the scientific details of his work.

Systematic arrangement, in moderation, is useful and desirable; still it would not suit the *Wanderings*, a work which professes to be nothing but a sketch. Were I to sit down expressly to describe the habits of those birds of which I have a knowledge, I should begin by saying, Preserve me from bewildering Mr. Loudon's readers in the mazes of modern divisions and subdivisions of birds, and hard names, and mathematical sections of bill and toe; till, at last, we hardly dare pronounce a crow not to be a magpie! These arcana of foot and front are, and ought to be, the exclusive property of those "eminent and scientific naturalists of the metropolis," who inspect bird-skins in closets. Young Mr. Audubon has applied, in his hour of need, to these grave doctors in nomenclature for their opinion on me. Eheu! I am condemned. Well, it is some consolation, at least, to have one's death-warrant pronounced by the first judges of the land *in foro*

ornithologico. Lausus, son of Mezentius, was my prototype in the olden time, as far as regards the dignity of my demise. "Be comforted, poor Lausy," said the Trojan, "for behold, 't is the hand of the great Æneas that fells thee to the ground!"

> "Hoc tamen, infelix, miseram solabere mortem;
> Æneæ magni dextra cadis." *Virg.*

I will now proceed to give Mr. Audubon, jun., proof sufficient that I can detect a fable from genuine ornithology, without having recourse to the pages of Azara, in order to learn my lesson. Ere I commence, however, I must just hint to Mr. Audubon, jun., that he has not succeeded in convincing me of his father's "fair fame." I myself, with mine own eyes, have seen Wilson's original diary, written by him at Louisville; and I have just now on the table before me the account of the Academy of Sciences indignantly rejecting Mr. Audubon as a member, on that diary having been produced to their view. — *Charles Waterton.*

Aerial Encounter of the Eagle and the Vulture. (See Audubon's *Biography of Birds*, p. 163.) — Next to the adventure of the rattlesnake and squirrel, I am of opinion that this presents the toughest morsel ever offered to the proverbially wide gullet of Mr. Bull. Audubon says: — "Many vultures were engaged in devouring the body and entrails of a dead horse, when a white-headed eagle accidentally passing by, the vultures all took to wing, one, amongst the rest, with a portion of the entrails, partly swallowed, and the remaining part, about a yard in length, dangling in the air. The eagle instantly marked him, and gave chase. The poor vulture tried, in vain, to disgorge, when the eagle, coming up, seized the loose end of the gut, and dragged the bird along for twenty or thirty yards, much against its will, till both fell to the ground; when the eagle struck the vulture, and in a few moments killed it, after which he swallowed the delicious morsel." In his strange paper on the habits of the turkey buzzard, Mr. Audubon tells us "that if the object discovered is large, lately dead, and covered with a skin too tough to be ate and torn asunder (cart before the horse), and afford free scope to their appetites, they remain about it and in the neighbourhood." Now, reader, observe, that, the dead horse being a large animal, its skin, according to this quotation, must have been too tough to be torn asunder by the vultures, until putrefaction took place. If, then, these vultures really commenced devouring the dead animal while it was yet fresh, Mr. Audubon's theory, just quoted, is worth nothing. If, on

the contrary, the horse in question had become sufficiently putrid to allow the vultures to commence operations, then I will show that the aerial account of the eagle and the vulture is either a mere imaginary effusion of the author's fancy, or a hoax played off upon his ignorance by some designing wag.

The entrails of a dead animal are invariably the first part to be affected by putrefaction. Now, we are told, that a piece of gut had been torn from the rest, and swallowed by the vulture; a portion of the said gut, about a yard in length, hanging out of his mouth. The vulture, pressed hard by the eagle, tried in vain to disgorge the gut. This is at variance with a former statement, in which Mr. Audubon assures us that an eagle will force a vulture to disgorge its food in a moment: so that the validity of this former statement must be thrown overboard, in order to insure the safety of the present adventure; or, *vice versâ*, the present adventure must inevitably sink, if the former statement is to be preserved. Be this as it may, the eagle, out of all manner of patience at the clumsiness of the vulture, in his attempt to restore to daylight that part of the gut which was lying at the bottom of his stomach, laid hold of the end which was still hanging out of the unfortunate rascal's mouth, and actually dragged him along through the air, for a space of twenty or thirty yards, much against the vulture's will. Now, though the eagle pulled, and the vulture resisted, still the yard of gut, which we must suppose was in a putrid state, for reasons already mentioned, remained fixed and firm in the vulture's bill. With such a force, applied to each extremity, the gut ought either to have given way in the middle, or to have been cut in two at those places where the sharp bills of the birds held it fast. But stop, reader, I pray you: speculation might be allowed here, provided this uncommon encounter had taken place on *terra firma*; but, in order that our astonishment may be wound up to the highest pitch, we are positively informed that the contention took place, not on the ground, or in a tree, but in the circumambient air!

Pray, how was it possible for the eagle to progress through the air, and to have dragged along a resisting vulture, by means of a piece of gut acting as a rope, about a yard in length? Birds cannot fly backwards; and the very act of the eagle turning round to progress after it had seized the end of the gut, would have shortened the connecting medium so much, that the long wings of both birds must have immediately come in contact; their progress would have been prevented by the collision; and, in lieu of the eagle dragging the resisting vulture through the air, for a space of twenty or thirty

yards, both birds would have come to the ground, or the gut would have given way.

I have never read any thing in the annals of ornithology that bears any similarity to this aquila-vulturian exhibition progressing through the vault of heaven. Verily, "there is a freshness in it."

When we reflect that Mr. Audubon is an American; that he has lived the best part of his life in America; that the two birds themselves were American, and that their wonderful encounter took place in America, we Englishmen marvel much that Mr. Audubon did not allow the press of his own country to have the honour to impart to the world so astonishing an adventure. — *Charles Waterton. Walton Hall, Nov.* 7. 1833.

Audubon's Humming-bird. (See his *Biography of Birds*, p. 248.) — Mr. Audubon tells us, that in one week the young of the ruby-throated humming-bird are ready to fly. One would suppose, by this, that they must be hatched with a good coating of feathers to begin with. Old Dame Nature sometimes performs odd pranks. We are informed that our crooked-back Dicky the Third was born with teeth; and Ovid mentions the astonishingly quick growth of certain men. He says, in his account of the adventures of Captain Cadmus, who built Thebes (my native town*), that the captain employed some men as masons who had just sprung up out of the earth.

I have read Mr. Audubon's account of the growth of the humming-bird, and I have read Mr. Ovid's account of the growth of Captain Cadmus's masons, and both very attentively. I think the veracity of the one is as apparent as the veracity of the other. What, in the name of skin and feathers, I ask, has Mr. Audubon found in the economy of the ruby-throated humming-bird to enable him to inform Englishmen that its young can fly in so short a space of time? The young of no other bird that we are acquainted with, from the condor to the wren, can fly when only a week old.

The humming-bird, in every part of its body and plumage, is quite as perfect as the eagle itself; neither is it known to differ in the duration of its life from any of the smaller birds of the forest which it inhabits. Like them, it bursts the shell in a state of nudity; like them, it is blind for some days; and, like them, it has to undergo the gradual process of fledging, which is so slow in its operation, that I affirm, without fear of

* See the last Number of this Magazine (VI. 552.), in which Mr. Audubon, jun., styles me the "learned Theban."

refutation, it cannot possibly produce, in the space of one short week, a series of feathers capable of supporting the bird through the air.

Again, the precocious flying of the young birds argues precocity of feathers; and this would authorise us to look for precocity of lustre in the male. But Mr. Audubon informs us that the male does not receive its full brilliancy of colour until the succeeding spring: and I myself can affirm, from actual observation, that the additional plumage which adorns some humming-birds does not make its appearance till towards the middle of the second year.

Were it necessary, I could show to naturalists their error, in sometimes mistaking a male humming-bird of the first year for a full-plumaged female. I am fully satisfied in my own mind that the internal anatomy of all humming-birds is precisely the same, except in size; having found it the same in every humming-bird which I dissected in Guiana and Brazil. Now, as the young of the humming-birds in these countries require more than a week to enable them to fly, and as Mr. Audubon's humming-bird differs not in internal anatomy from them, I see no reason why the young of his species should receive earlier powers of flying than the young of the humming-birds in the countries just mentioned.

A word on the cradle. Mr. Audubon tells us that the little pieces of lichen, used in forming the nest of the humming-bird, "are glued together with the saliva of the bird." Fiddle! The saliva of all birds immediately mixes with water. A single shower of rain would undo all the saliva-glued work on the nest of Mr. Audubon's humming-bird. When our great master in ornithology (whose writings, according to Swainson [I. 45.], will be read when our favourite theories shall have sunk into oblivion) saw his humming-bird fix the lichen to the nest, pray what instrument did it make use of, in order to detach the lichen from the point of its own clammy bill and tongue; to which it would be apt to adhere just as firmly as to the place where it was intended that it should permanently remain? — *Charles Waterton. Walton Hall, Nov.* 19. 1833.

The Virginian Partridge. — "Nantes in gurgite vasto." *Virgil.*

"Like the turkeys, many of the weaker partridges often fall into the water while thus attempting to cross, and generally perish; for, although they swim surprisingly, they have not muscular power sufficient to keep up a protracted struggle." (See *Biography of Birds*, p. 388.)

Birds which can "swim surprisingly" will never "perish"

by the act of swimming; neither would they be under the necessity of having recourse to "a protracted struggle" in a movement which requires no struggle at all. A bird struggling in the act of swimming, in order to save itself from drowning, is about the same as if we were to struggle in our usual act of walking, lest we perish therein. The very mention of "a protracted struggle" argues that the partridge cannot swim. A partridge on the water is nearly in as great a scrape as a shark on shore. The latter, by floundering, may, perchance, get into the water again; still we cannot say that a shark moves surprisingly on land: and the former, by help of its feet, may possibly reach the river's bank, through an element as fatal to it as the shore is to the shark. All birds, whether alive or dead, must naturally float on the surface of the water; but all birds cannot swim: otherwise those birds which we commonly call land birds would have to be new-modelled in form, and would require a very different kind of plumage.

We startle at the novel information of a partridge "swimming surprisingly," and we are anxious to know what sudden change has taken place amongst the birds in the western hemisphere, whilst our eastern birds remain *in statu quo.* For example's sake, let us examine a waterhen, which, like the partridge, is not web-footed; still it swims remarkably well. Its body is nearly similar in shape to a boat; the arrangement of its feathers is most admirably calculated to resist the entrance of the water; while its every motion, when in the act of swimming, is full of gracefulness and confidence. It moves to and fro by a very gentle action of the feet, and it may be seen, for hours together, enjoying itself on the deep in perfect security. This bird may be truly said to swim surprisingly; but it is never doomed to keep up a protracted struggle by means of muscular power, in order to save its life, on an element where it runs no risk of perishing.

Now let us look at a partridge floating on the river. The form of its body is very unlike that of the waterhen, and, though it cannot possibly sink, still it is in the utmost fear of death, and tries to reach the shore by an evident and vehement struggle. Its feathers immediately become saturated with water, whilst the cold strikes deeply into its body. Death is fast approaching; the wings are soaked with flapping on the water, and at last appear extended quite motionless on the surface of the stream; the legs are cramped and stiffened; the mouth is open; the head falls, and, after a few convulsive efforts to support itself, down it drops for the last time into the water, and the bird dies. This is the fate of the partridge which Mr. Audubon assures us can "swim sur-

prisingly." The mere motion of its legs, to propel its floating body towards land, in order to escape from certain death on an element where it was never intended by Nature to exist, even for the space of one short hour, has been magnified by Mr. Audubon into an important act of "swimming surprisingly."

If the admirers of Mr. Audubon should try to force us to agree with their great naturalist, that partridges can "swim surprisingly," then it behoves us to call upon them to declare that every bird in the creation can swim. Our little tomtit, till now a land bird, must be proclaimed to swim surprisingly, and have a place amongst the waterfowl; because, on tumbling accidentally into a washing-tub, he has "muscular power sufficient to keep up a protracted struggle" till he reaches the side.

How delighted Ovid would have been, had he seen a partridge swimming surprisingly, or a goatsucker flying off with a mouthful of eggs! We are told in ancient history that the stomach of Mithridates was poison-proof: I wonder if his leg also was poison-proof; so that he could have danced, without danger of sudden death, in the fatal American boot mentioned by Mr. Audubon in his wonderful story of the rattlesnake's swallowing a squirrel tail foremost. — *Charles Waterton.*

The Wandering Albatross (*Diomedèa éxulans* L.) (VI. 147.); *its size* (VI. 372, 373.)—I have a stuffed specimen, which was given me by your correspondent, "A Grenada Subscriber." Its dimensions are: —Length from the tip of the bill to the end of the tail, 4 ft. 2 in.; expansion of wings about 11 ft. 4 in.; the humerus measures 17 in. in length, the radius 18½ in., and the pinion, with its quills, 27½ in.: the tail is very short, not exceeding 4 in. — *A Subscriber. Vale of Alford, Nov.* 20. 1833.

The Bird called "Booby" by Sailors (VI. 373.) is the *Pelecànus Sùla:* it is often caught, while asleep, on the yards.

The Noddy (*Stérna stólida*) is also frequently captured in the same manner. I have seen both so taken. — *Id.*

The Booby is not a Name, even among Sailors, for the Albatross. (VI. 373.) — J. D. has, I think, been misinformed as to the application, by sailors, of the term "booby" "to any long-winged bird of a whitish colour," and to the albatross as one such. Although the ornithological terms of sailors are probably usually applied indefinitely enough, it appears, from Pennant's *British Zoology*, that the solan goose, or gannet, is the "booby." In a work called *The Natural Historian* the characters of the booby are given technically and in detail, but the scientific name is omitted. The albatross and the penguin have both obtained, among our sailors, the name of

Cape sheep (see Rennie's *Architecture of Birds*, p. 37.); and the gannet is designated the "booby." — *James Fennell. Aug.* 1833.

The late Rev. Lansdown Guilding, in a communication lying by us, made in relation to the admirable remarks of K. in II. 186., on the acquired wariness of birds, has remarked: — "The booby, and other birds celebrated for their stupidity and contempt of the destroyer man, are cunning enough in places much frequented: it is only when they are met with in desert places, or during the season of incubation, that they exhibit a stupid inattention to danger." — *J. D.*

Mr. Blyth's Identification (VI. 516.) *of the Species of Thrush which W. L., who describes* (VI. 218.) *its Migration, deems an unrecognised one, with the Redwing* (*Túrdus ilìacus*). — Sir, If W. L.'s species of thrush (VI. 218.), of which he saw "thousands" in the Island of Harris, in the month of June, prove to be not a new species, but merely the redwing (*Túrdus ilìacus*), as suggested by Mr. Blyth (VI. 516.), it will go near to establish the fact (hitherto, so far as I am aware, not known to naturalists) of these birds remaining throughout the summer, and breeding in the northern parts of Great Britain. It is much to be wished that W. L. had procured a specimen of his thrush, in order to put the point beyond dispute. Of the musical powers of the redwing I entertain no doubt; for even in winter, when the weather is very fine, and still more in the spring, they will congregate on the top of a large tree, along with their friends the fieldfares, and begin to tune their pipes, uttering in concert a low, murmuring, half-stifled song, as it were an earnest of what they can do when in full voice. Many birds, as the chaffinch, blackcap, nightingale, &c., when first they commence their song in the spring, sing but imperfectly, giving only detached fragments of their melody; as if, from disuse, they had partly forgotten their notes, and were out of practice. Yours, &c. — *W. T. Bree. Allesley Rectory, Nov.* 6. 1833.

Dates of the Redwing's Appearance. — Among those I have given in VI. 516., for "months," in that for 1832, line 14. from the bottom, read "weeks." — *Edward Blyth. Nov.* 26. 1833.

The Distinctions and Synonymes of the British Species of Sýlvia. (VI. 447. 521.)—Mr. Blyth's words, in VI. 521., represent me as adducing, in VI. 447., Professor Rennie's paper in No. 2. of *The Field Naturalist's Magazine* "as a correct elucidation of the species of the genus" Sýlvia. My words in VI. 447,448. are, "Professor Rennie's admirable elucidation of the species Sýlvia hippolàis and rùfa."

Mr. Blyth asserts (VI. 521.) that "the common chiffchaff of this country, S. lòquax *Herbert*, S. hippolàis *of other British authors*) is a distinct species from the S. rùfa." I agree in the opinion that the S. lòquax is identical with the S. hippolàis of British authors; but I do not stop here, as I consider the S. rùfa identical with it also, from the fact that the song, habits, and manners of the chiffchaff, as long known to me, accord fully as well with the descriptions of S. rùfa, as these are given by Continental authors, as they do with those of the "S. lòquax of Herbert," or "the S. hippolàis of other British authors:" in addition to which, the dimensions and plumage of the specimen that I most particularly examined, and which was shot when in the act of uttering its singular song, coincided with those of the S. rùfa as they are detailed by Temminck, Rennie, &c. — *W. Thompson. Donegal Square, Belfast, Nov.* 28. 1833.

The Red Viper. (VI. 399. 526.) — Another specimen of this viper was brought me on Sept. 13. 1833: its length was 9½ in. E. N. D. asserts (VI. 526.) that the red viper is the young of the common one; but I cannot consider this as proved, till the vipers of intermediate size are captured and described. I have never been able to procure any but full-grown vipers, and young ones yet unborn: the latter are greyish, with dark markings, and show no signs of the peculiar colour of the red viper. Now, although colour alone is not sufficient to characterise the species of *O*phídia, yet any marked difference of size would certainly form a specific distinction. If, therefore, the red viper should prove never to exceed 10 in. in length, or if a series of young common vipers could be procured, of various sizes, but uniform in colour with the old ones, the distinctness of the red viper would be proved. I trust some of your readers may be able to decide this question. I am obliged to E. N. D. for his "information" that the number of scuta in snakes is variable; but if he will look at my communication, in p. 400., he will find that I have there stated the same thing.

The Black Viper, mentioned by Mr. Blyth (VI. 527.), differs from the common one *only* (I believe) in being of a darker colour; and is, therefore, deservedly considered a variety. — *H. E. Strickland. Nov.* 22. 1833.

The Black Viper. (VI. 527.) — When E. N. D. says (VI. 526.) "there is but one species of viper or poisonous reptile in England, he forgets the black viper (*C*ó*luber P*réster of Linnæus); to the existence of which, in the west of England, Mr. Blyth also alludes doubtfully, in VI. 527. Of this species, I have seen, at different times, alive and at large, two specimens in the Isle of Wight, one of

which I succeeded in killing on Oct. 12. 1804. I was, at the time, in company with a gentleman resident in the island, who seemed to be familiar with the reptile, and informed me that it was very venomous; of which fact I entertain no doubt. "Os armatum est veneno diro," observes Linnæus, in *Fauna Suecica;* he gives, as a synonyme, "Vipera anglica nigricans" of Petiver: the animal, therefore, has long been known as a native of England. On a transient view, this species appears entirely of a uniform deep black colour, as described by Linnæus, "ater toto corpore;" but, on closer inspection, a row of angular spots, similar to that on the back of the common viper (*C. Berus*) is discernible, being of a still more intense black than the rest of the body. In size, shape, manners, and habits it seems exactly to resemble the common species; of which, I think, I have heard that it has been sometimes considered only a variety, and from which I am not aware that it differs, except in colour.

The red viper, mentioned in VI. 399. 526., I should suspect, was only the young state of the common species; the smaller specimens of which, I have observed, are generally of a brighter colour than the full-grown ones, and have the spots more inclining to red.—*W. T. Bree. Allesley Rectory, Nov.* 6. 1833.

Leptocéphalus Morrisii Pennant (V. 313. 742., VI. 531.) seems doomed to be never accurately represented by the engraver. The cut, in VI. 531., which professes to be a copy of my drawing, is defective in one most essential point: the engraver has neglected to represent the pectoral fins, and has rendered the lateral line too strong. The engraving, with these exceptions, is very like the fish.—*Henry Vietz Deere. Nov.* 15. 1833.

The Authorship of the Prefixes, pro, meso, and meta, to the Limbs of Insects belongs to Mr. Newman; not to Mr. Haliday. I observe that Mr. Westwood has appended to some technical descriptions in VI. 495, note †, a remark expressly for the purpose of depriving Mr. Newman of the merit of the above prefixes, and of giving the said merit to Mr. Haliday. Mr. Newman *first* published the names in question at p. 400. of the *Entomological Magazine* (July 1. 1833). Mr. Haliday has nowhere published them, that I can find. Indeed, at p. 516. of the same magazine, published three months subsequently (Oct. 1. 1833.), he follows Meigen, in applying the term *metatarsus* to the last articulation of the *tarsus;* so that it is evident that Mr. Haliday not only did not originate these terms, but declines employing them.—*Lacon. Newcastle, Nov.* 5. 1833.

"The barbarous nature of these compound Latin and Greek names [mesothorax and metathorax] (which may be remedied by employing the terms medithorax and postthorax)". — *J. O. Westwood.* (VI. 495. note †) In what lexicon does Mr. Westwood find *thorax* absent, and *medi* and *post* present, as Greek words? — *Discipulus. Nov.* 26. 1833.

The additional British Species of Cicindèla, alluded to, in VI. 533., as being enumerated in p. 554., is only a variety (of *C.* hýbrida *Linn.*), as Mr. Stephens has indicated (p. 554.) by the parenthesis. I am glad to see that Mr. Curtis's view of the subject has been adopted by E. N. D., in p. 532., and that he is borne out by the testimony of the Linnæan cabinet. — *Corroborator.*

Hypercómpa domínula, the singular Variety of, described in VI. 540, 541. — The engraving (*fig.* 72.) in p. 541. represents the black blotches on the primary wings far too distinct and well defined: these markings, in the real specimen, are by no means so discernible. — *W. T. Bree. Nov.* 6. 1833.

Encrinite versus Cyathocrinite (VI. 560., *and the previous Discussions there indicated*). — A few additional words appear necessary to set myself right with Mr. Gilbertson. I cannot exactly comprehend Mr. Gilbertson's description, at p. 561. He says, "the line of dots from *a* terminates at the alimentary canal; that from *b*, upon one of the five plates surrounding it, which form the pelvis; *c* is placed upon the costals," &c. Now, according to this description, I find (as I am able to understand it) that the pelvis, in this specimen, formed a circle of less circumference than the vertebral column, and, consequently, was entirely hid by it. Is this fact, or is it error? Is this ever known to be the case in any crinoideal animal? It is not the case in any of those figured or described by Miller, nor in any instance that has come under my own immediate observation. Mr. Gilbertson proceeds to say, that, in my figure, "the whole of the pelvis, and nearly the whole of the costals, are hid by the column." This, I presume, is erroneous: if the enlargement of the column, in my specimen, is natural, and not formed of extraneous matter, I think the above statement of Mr. Gilbertson would not be in accordance with the facts in our possession upon the subject. Does it not always follow, as a matter of course, that, where the column is enlarged and expanded at its junction with the pelvis, the pelvis is also widened and enlarged in the same proportion? as in the genus Apocrinites. This, I think, cannot be denied. The relative size of the bones, in my specimen, will, I think, prove that this opinion of Mr. Gilbertson is not tenable. The scapula (according to

Mr. Gilbertson's idea), which he describes as being in its proper place, in my figure, on the left of the column, is nearly as large as that part of the column which I have supposed to be extraneous. This scapula must rest upon a costal, and this costal upon a pelvic bone, or rather upon two pelvic bones; the costal upon which this scapula rests must be as large as the scapula itself; and the pelvic bones upon which the costal rests must be of equal dimensions: therefore, if the scapula be nearly equal in size to the column, the scapula, costal, and pelvis, united, must of necessity be much larger; and yet Mr. Gilbertson says, that, in my specimen, the column hides nearly the whole of these bones: this is a physical impossibility, for the thing covered is of greater magnitude than that which is said to cover it. Again: that the angular bones, in my specimen (VI. 126.), and to which I have referred in VI. 472., are really the bones of the pelvis, is, I think, absolutely proved by their position. The costals are placed upon the pelvis, I believe in every instance, in this way: one costal rests upon part of two pelvic bones, and covers the joints formed between them; and thus locks them together, precisely in the same way as a bricklayer places one brick to cover portions of two others, in laying one course over another, in building a wall: and this is exactly the position they occupy in my figure. If this bone were the scapula, the angular bone (the costal of Mr. Gilbertson) must have had a joint in the angle, in a line with the joint between the supposed scapulæ; but in my figure there is no such division. If the column absolutely "covers the whole of the pelvis, and nearly the whole of the costals," it appears to me difficult to account for the use of the pelvic or costal plates; for by this means they would be united into one solid mass, and, therefore, their division into plates would appear to be almost useless. In conclusion, Mr. Gilbertson accuses me of *constructing a nondescript*. Whether he means this in good part or not, I can hardly say. I have already acknowledged that, in my opinion, it had not "hitherto been figured or described;" and it was because I considered it a nondescript that I communicated it to this Magazine, and endeavoured to furnish a description of it. If nothing is to be made public but what is already described, then must science have already reached its limits; and the naturalist may sit down in listlessness, and exclaim, "There is no new thing under the sun!" Mr. Gilbertson sums up his observations by stating, that it is a desire to check the progress of error that alone has induced him to controvert my statements; I beg to inform him that there is no other motive influencing me. I am not at all anxious to prove that I am in possession of the lily encrinite

from a new locality, and to make my specimen a lily encrinite, whether or not; for this would be mere childishness. The fact is this: the remains of a crinoideal animal fell into my hands; I fancied it to be more nearly allied to the genus Encrinites than to any other; this opinion I have given; I have given my reasons for that opinion; and I have defended it: whether that opinion be right or wrong, others must judge. That it is a nondescript is no fault of mine; I have argued for its being such: and, if Mr. Gilbertson would, in some way, publish figures of his specimens, which "have a much greater claim" to be considered as encrinites than my specimen, perhaps the other opinion which I have stated (VI. 474.), that the encrinites pass by a regular gradation of form into the cyathocrinites, would receive additional confirmation, if not full proof. Mr. Gilbertson says that both specimens are the same; that is, that mine is Cyathocrinites tuberculatus. This is impossible: the name itself contradicts it. There is not a single tubercle upon my specimen: it is almost as smooth as the paper upon which I am writing. Mr. Gilbertson has not noticed the relative proportions of the bones which I have pointed out in the different specimens. I should be extremely glad to be put in possession of figures of the specimens mentioned by Mr. Gilbertson; and I think he would be doing the world a service by publishing them. Let us be put in possession of as much knowledge as possible, in order to come to a clear understanding of these singular animal remains.—*C. Conway. Nov.* 12. 1833.

ART. II. *Queries and Answers.*

"*On the supposed Connection of Vicissitudes of the Seasons and prevalent Disorders with Volcanic Emanations,*" *&c.* (VI. 289 to 308.)—Although the author (the Rev. W. B. Clarke) of that interesting communication does not positively maintain a closer connection between events which are apparently dissimilar than that of juxtaposition, I think he has established a high degree of probability that the connection is that of cause and effect, in numerous instances which he has adduced. I propose, at a future time, to offer a few observations on some of the facts stated by Mr. Clarke, my object in the present letter being merely to request farther information from that gentleman respecting the "symptoms of renewed action in the extinct craters of the Eifel;" and, again, "symptoms of renewed action in the extinct craters of Auvergne." (VI. 301.) The date of the latter is given Dec. 9. 1828; but no authorities for either event are stated. It would

greatly oblige me if your ingenious correspondent would state the circumstances which have been called renewed symptoms of action more fully, and also the authorities by which they are supported. It could surprise no one who has attentively examined the extinct volcanoes in central France to be informed that they had broken forth into renewed activity after a period of repose of many hundred, if not thousand, years. Vesuvius is known to have had periods of repose for many centuries; and the lava of some of the volcanoes in Auvergne appears as fresh as if it had been very recently erupted: indeed, it is very difficult to conceive how it could preserve such a fresh appearance after exposure to the atmosphere for ages. In my *Travels in the Tarentaise*, published in 1823, I stated that "there is nothing in the appearance of the volcanoes of Auvergne which can lead the observer to the conclusion that their eruptions will never be renewed: the springs of hot water in this district indicate that the source of subterranean heat beneath it is not extinct. The most abundant and best known of these springs are Mont d'Or and Vichy; they have a temperature of from 120° to 125°; and there are many other springs of equal temperature. Should the volcanoes of Auvergne resume their activity, such an event would not be at variance with our present knowledge of volcanic operations." (vol. ii. p. 379.) Many of the eruptions in Auvergne must have taken place in a recent geological epoch; for lava has flowed into the present valleys, and the heaps of fresh scoriæ that are spread loosely, near the mouths of the craters, and volcanic vents to which they can be traced, prove that the country has not been since subjected to diluvial currents, for these would have swept them away. They prove, also, another fact of some interest: many of the most recent eruptions appear to have taken place from volcanic openings, which were closed before craters could be formed round them; for, had craters been formed, and afterwards destroyed by inundations, the same causes would have removed the lava and scoriæ. In other instances, volcanic craters were formed by repeated eruptions, and remain nearly perfect to the present time.

The occurrence of volcanic mountains, over a space of several thousand square miles in central France, should induce us to receive with caution the accounts of the increase of temperature in Artesian wells in France, at a rate of about 1° of Fahrenheit for every 45 ft. of depth; for this increase may depend on local causes, which may not extend into other countries. It is greatly to be regretted that few experiments on the temperature of Artesian wells have been made in England. If any correspondent could furnish information on this

subject, he would supply what is much wanted at the present time. — *Robert Bakewell. Hampstead, Dec.* 7. 1833.

Mr. Clarke has in preparation a sequel to the very original and valuable communication which Mr. Bakewell has so justly commended. In that sequel, Mr. Bakewell's queries and suggestions will, we are certain, receive Mr. Clarke's best attention. In the meantime, we are quite sure that Mr. Clarke will concur with Mr. Bakewell in soliciting all possible information on the temperature of Artesian wells, and on any point in the subject under consideration, from any correspondent. — *J. D.*

To prevent Martins and Swallows affixing their Nests, Mr. Whiddon (VI. 456.) should spread a thick coating of soap upon the sides of the places which he wishes free from nests. The muddy materials applied by the birds will moisten the soap, and its sliminess will cause the muddy materials to fall. I believe this to be an old plan, and an effectual one. — *James Fennell.*

Polyómmatus Aléxis, Icarus, and Icàrius. (VI. 544.) — In reply to Mr. Conway, I must observe that Polyómmatus Aléxis of Stephens *is* P. Icarus of Lewin, Haworth, and others. Accordingly, no species is enumerated under the specific name of Icarus by Stephens nor by Wood; each of these authors, however, gives P. Icàrius as a species, though the former, at least, doubts its being really distinct from P. Aléxis. "It approximates," says Mr. Stephens, "so very closely to the following species [P. Aléxis], that, I conceive, it will eventually prove a mere variety of that insect." Probably the similarity between the names of Icarus and Icàrius has misled Mr. Conway. I cannot but join this gentleman in his regret (VI. 542.) that the under sides of more of the Papiliónidæ are not figured in Wood's *Index Entomologicus*: "a deficiency greatly to be lamented," and one which, I hope, may yet be supplied.

Melitæ*a* Silène, in p. 541., should be M. Selène. — *W. T. Bree. Nov.* 6. 1833.

Véspa campanària. (II. 404., III. 94. 195. 476., VI. 536, 537, 538.) — Where is this insect described? I have not heard of it before. — *Querist.*

Querist does not mean the acts and habits of the insect which has been so called, or we could reply, in Knapp's *Journal of a Naturalist*, p. 333., with a figure of its nest in pl. 7. of that work: this is taught in our Vol. III. 195. 476. Querist, however, means the distinctive features of the insect's external anatomy, as compared with those of other recognised species of Véspa: this question stands with entomologists. — *J. D.*

REVIEWS.

ART. I. *Catalogue of Works on Natural History, lately published, with some Notice of those considered the most interesting to British Naturalists.*

BYLANDT, Le Comte de: Résumé Préliminaire de l'Ouvrage sur la Théorie des Volcans. pp. 50. Naples, 1833.

This "*avant-propos*" details a forthcoming work in 4 vols. with plates, the result of more than thirty years' researches into the causes and effects of volcanic phenomena. If the work fulfil the expectation which this bill of fare induces, the author need not despair of being rewarded with the title of "*laborious.*" But it cannot be supposed that, till we have perused it, we should recommend the adoption of the views which it contains, some of which we can hardly appreciate from this preliminary abridgment. It shall be our business, however, to dissect hastily and briefly these fifty pages of prospectus: —

The groundwork of M. de Bylandt's reasoning process are the principles, that accurate observation is the basis of truth in science, that every thing in nature has an ordained end and object, that nothing happens by chance, that there are an equilibrium and a harmony between all the divisions of matter, and that there is neither increase nor decrease in its composing particles. (p. 1—7.) These principles are next applied to the doctrine of volcanoes. (p. 8.) To investigate these, he is led to consider the doctrine of the elevation of mountains. (p. 11.) This elevation our author attributes to *four causes*, sometimes isolated, sometimes united. The eruption of the central fire (*feu igné central*) at "the beginning;" the sinking down of the mineral crust after its stretching to the top of its elasticity; the "*éboulement*" of a part of the strata into profound depths, produced by the pressure of waters, which explains the obliquity of contradictory beds in the same mountain; and the lifting up of the outer crust by interior pressure in the direction of certain radii of the globe, when the diminution of the central fire could only elevate those points which offered least resistance, to which is attributed the vertical direction of certain rocks and strata.

To investigate this, the author visited all the mountain chains of Europe, from the Caucasus to the Pyrenees, the analysis of the latter of which, during two summers, he compared with the studies of nine consecutive years amongst the Alps. There he observed the play of the elementary fluids; and noticing that the mountains possess a particular attraction from the west, declining to the south, and that it is imperceptible to the east, and null towards the north, he discovered that the electric fluid constantly follows the sun, rises with him to the zenith, sinks with his rays, and disappears in his absence. (p. 12.) This phenomenon attaches only to mountains of the second and third classes as to height; for in snow-clad mountains an electric current is perceptible from N. to S. at from 7000 to 8000 feet, corresponding to the latitude of from 60° to 70°. Now, the aurora borealis shows that this fluid there abandons the globe, and therefore it ought to bend from N. to S. at an angle of 45°. The tables given by Franklin and Back show that the auroræ which appear between 60° and 70° cease at 70°, and their axes are directed to the S., reappearing at the equator, at the height of 17,500 ft., under the name of the zodiacal light; which exactly agrees with the inferences derived from the currents in the polar seas, whose influence diminishes inversely with the angle of direction, ceasing at 55° N. and 40° S. Humboldt remarked the force of electricity at the height named; and M. de Bylandt on Mont Blanc, at 8700 ft., which corresponds there with the latitude in question. (p. 13.)

M. de Bylandt then states, that in 1818, at the height of 20,700 ft. under the equator, which correspond with 10,500 ft. of Mont Blanc and 85° N. lat., the caloric had not enough activity to form ice, but that above there was nothing but perpetual snow. Parry, Heemskerke, Franklin, &c., are brought in to show there is a great correspondence between the glaciers of the Alps and the Polar Sea.* It seems that our author compared his calculations with Captain Back's at Naples, and also in London with those of Parry and Franklin, and that the results were *wonderfully coincident*, so that he assumed the magnetic pole from 81° 57′ to 83° N.

* Of this the writer of these remarks has no doubt. The coast of Greenland was first frozen up in the year 1348 (the year of the "black death"), and in 1817 (the year of the cholera) that coast began to be disengaged. Now records attest that, previously to 1348, a straight path lay over Mont Blanc, where now the glaciers are, into Italy; and it is known that recently there has been a diminution of ice and snow on the same mountain. This is not the place to avail himself of the deduction he wishes to draw; but these facts correspond with the observations of M. de Bylandt. — *W. B. C.*

discovering that on Chimborazo the magnetic power ceased at 20,700 ft. corresponding with 10,500 ft. of Mont Blanc, and the level of the sea at 83° N. lat. (p. 14.) Captain Ross has recently determined the magnetic pole to be more southward, in lat. 71°—72°. But this by no means throws over *all* the count's arguments. Our author proceeds (p. 15.) to treat on the fluids by whose separation matter was originally developed: — 1. The ethereal universal fluid; 2. Caloric. 3. Light; and, 4, 5, their auxiliaries, the electric and the magnetic fluids; lastly, that fluid which is combined of all, *volcanic fire.* Under these impressions he investigated the course of natural phenomena, and the results will be laid before the public in the forthcoming work. Some of them we state here. The parallelism of volcanoes is the first: they never appear *isolated.* The fluids above-mentioned depend on the sun; and their influences cease at 80° N. and 65° S. The points of intersection of the equator and the ecliptic are correspondent with similar points of intersection between the equator and the course of the volcanic fire, the latter of which are visible; the line of junction of these points making an angle of 5° with the earth's radius, and this angle being the constant measure of the divergence of all the volcanic radii, horizontal or vertical. (There is some difficulty in understanding the count's meaning in this place, arising from a want of perspicuity.) But he states that the slopes of the summits of volcanoes, opened by the flow of lava, are *all* towards the equator, with a trifling inclination to the west. (p. 17.) He next assigns to the Gulf of Mexico, as M. de Humboldt has done before, the central seat of volcanic fire, taking the correspondent inverse focus to be in the Archipelago of the Molucca Islands. Forming a circle on the volcanic equator round these islands as a centre, and dividing it into segments of 10°, he found that radii drawn through these points passed through the lines of direction, and to the limit of all the volcanoes in the globe. 1st, to 90°, passes by the Philippine Islands, Manilla, and China. 2d, to 80°, follows a nearly similar course. 3d, to 70°, commences at the Isle of Niphon and finishes at Japan. 4th, to 60°, forms the chain which passes through the Kurile Islands and extends to Kamtschatka about 70° N. lat., which with Iceland and Jan Mayen's Island (about 70°) seems to limit the volcanic action to that latitude. 5th, to 50°, passes by Magellan's Island to Behring's Strait. 7th, to 30°, forms the volcanoes of the Marian Islands. 8th, to 20°, forms the volcanoes of the Caroline Islands. 9th, to 10° extends to the Sandwich Islands. (p. 19.)

The same division is made from the Gulf of Mexico as a centre, and a similar result obtained. (p. 20.) The currents of the ocean are attributed to the volcanic action, which is said to correspond exactly with the lines of magnetic and aerial phenomena. (p. 22.) The author flatters himself that he has discovered a volcanic canal flowing round the globe between two parallels, and concludes that volcanoes are like knots on a string, which must partake any shock communicated to either extremity (p. 24.), quoting his examples from the known localities. (p. 26.)

He next proceeds to examine the nature of the volcanic fire, which, he says, is purely material, arising from infiltration and fermentation (p. 26.) of gases, and water, and the materials of the strata it traverses; these being dissolved, combined, and reunited. To volcanoes acted on by the sea, the author attributes the great partial catastrophe which has desolated our hemisphere, and which, by the junction of the two oceans, under the name of the great cataclysm (the deluge), has produced the diluvial effects which the earth exhibits. (p. 28.) He explains by this means the currents directed towards the west, and the immense ravages in the coasts of the continents of Africa, America, and Europe, and the separation of the two former quarters of the globe, once united, as proved by the traces of African civilisation in Mexico. (p. 30.) The elevation of mountain chains is also made to result from this *cataclysm*, and the Pyrenees are quoted as the example. (p. 31.)

M. de Bylandt next classifies volcanoes into — I. Submarine; II. Volcanoes "*à decouvert;*" which are subdivided into — 1. Direct volcanoes, situated on the great canal; 2. Indirect, on the extremities of the lateral branches; 3. Volcanoes in permanent action; 4, Extinct or mud volcanoes; 5. Volcanoes of air; 6. Volcanoes of smoke; 7. False volcanoes, or simply burning hills (such, we suppose, as the cliffs near Weymouth). (p. 32.)

A long illustration of another position follows, namely, that the size and height of volcanoes are proportioned to the force of the volcanic fire and the depth whence it rises. The formation of volcanic cones is next mathematically shown by a system of triangles upon the base of the volcano, and the height of the cone and depth of the crater proved to be proportionably determined by a general law, whilst the depth of the crater is made to be a *third part* of the primitive height of the volcano. (p. 35.) Here, again, we are a little at fault. Vesuvius is the subject of the experiment to exhibit the truth of these theories.

A singular fact, before pointed out by other writers, is next commented on; viz., that all volcanoes to the north of the equator have all their orifices to the west, and constantly discharge their lavas to the south; while those to the south of the equator as invariably follow an opposite direction. (p. 35.) Strombolo being an exception, the author accounts for it by assuming that the great cataclysm removed the original crater and made a breach lower down in the N.N.W. side. The action of the ejected materials is said to be spiral in the crater, and the parabolas described by the projectiles to be from an axis turned to the south. (p. 37.) The exciting cause of volcanic action is attributed to sea water finding its way to the fermenting matter, producing increased heat and dilatation of gases; the change being proportioned to the calibre of the volcano, and when it exceeds this destroying the volcano. (p. 37.) This spiral motion of the materials in action may, perhaps, be borne out by the circular motion in earthquakes; but M. de Bylandt does not allude to it. A second cause of excitement is attributed to atmospheric air rushing down so as to produce regular *respirations*. The detonations are referred to the noise occasioned by the separation of the molecules in the rocky masses acted on, and the evolution of hydrogen gas, combined with electric shocks. (p. 38.) The flow of lava is said to be uniform, and to follow the direction of the axis of the crater; and examples are quoted where lava streams have been diverted from their direction, by walls at an angle; as in the case of the eruption of 1669, when the garden wall of the Benedictine convent saved the city of Catania. In 1831–32, the author also tried the experiment, and says that it is possible, by taking advantage of the slowness of the current, to prevent its ravages. (p. 39.) We have no space for the calculations of the author on the heights and forces of volcanoes: but we may mention that he divides lavas, as follows, into seven classes: — 1. Lithoid; 2. Compact; 3. Trachites; 4. Basaltic; 5. Obsidian or vitreous; 6. Scoriæ; 7. Pumice. He, moreover, adds, that the materials differ according to different situations and different epochs of each. (p. 42.)

Such are the principal subjects to be discussed in M. de Bylandt's work, of which the "*avant-propos*" gives an outline. The first volume is to contain an introduction in connection with La Place's theory of the world, ending with an account of the causes and effects of the currents of the sea and the trade winds, and Captain Franklin's tables of magnetic phenomena. (p. 43.) The second volume is to embrace the effects of water in motion, the parallel between the

Alps and the Pyrenees, and the application of the theory to the volcanoes of Europe, commencing with Sicily; noticing, also, the circumstance of the decreased action of volcanoes in extent of country affected being counterbalanced by the proportionate increase of force. Etna and Vesuvius are also to be carefully considered. (p. 46.) The third volume is to contain the volcanic history of France, Dalmatia, and Italy. The fourth volume is to treat of the branch of the counter-current which passes under the Gulf of St. Euphemia, in lat. 39° N., embracing Calabria, &c., and concluding with an analysis of all particulars connected with Vesuvius. (p. 47.)

A classification of the operations of volcanoes is also added, in eight distinct portions:— 1. Real eruptions. 2. Demi-eruptions. 3. Eruptions in the radial lines. 4. Partial eruptions from interior galleries. 5. Interior eruptions not ejecting lavas. 6. Eruptions of water, cinders, and mud. 7. Lavas of reconstruction. 8. Emanations of inflammable gas. A body of maps will be appended, to illustrate the subject, drawn up after careful surveys and accurate comparison with undoubted authorities.

Such a work, if properly accomplished, must be an acquisition to science; and, for the facts introduced, must be valuable. Of the opinions or theories of M. de Bylandt we cannot here speak; the *brochure* before us is but a concise abridgment by way of prospectus, and we have given attention to it in this second "*Résumé Préliminaire*," in the hope of calling the attention of our readers to an interesting subject, on which we have at present no positive information; volcanoes being, like comets, subject hitherto to as many speculations as there are investigators. "Quot homines tot sententiæ." Count Bylandt adds another to the list of commentators, and if his doctrines obtain the weight he attaches to them, he may indeed exult in his proof of the epigraph on the present pamphlet: —

> "There are more things in heaven and earth
> Than are dreamt of in *our* philosophy."

The italics are his own. We must wait to see to whom the "*our*" applies. He seems to himself to have cut the Gordian knot, and, in a strain of anticipated triumph, reminds us of the risk we run in adding more, quoting, in conclusion, the words on the tomb of Marshal Saxe —

> "La critique est aisée, et l'art est difficile."

W. B. C.

A Fellow of the Linnæan Society: The Naturalist's Poetical Companion, with Notes. Foolscap 8vo, 360 pages. Hamilton & Co., London; Knight, Leeds; 1833.

The date of publication of this book marks an epoch in the progress of natural history in Britain.

One of Euclid's postulates is, "a circle may be described from any centre, at any distance from that centre:" so, in nature, there is not an object which may not become the centre of a thousand associating circumstances. The systematist encircles every object with a series of considerations on its affinities and distinctive characters; the economist, with his calculations on the answers it will bear to his grand testing question of *cui bono?* the sentimentalist, with his halo of "pleasing thoughts and kindly emotions;" others with other considerations, but none with evil ones; for, as Sir James Edward Smith has said, "in nature, all is elegance and delight; and none but the most foolish or depraved can derive any thing from it but what is beautiful, or associate with its lovely objects any but the most amiable or most hallowed images." Thus far good and true; and it only remains that each party perceive the propriety and the duty of deprecating, in spirit and in practice, that exclusive feeling, which, if not deprecated, would lead him to deem the circle described by the student of a taste distinct from himself, less noble in diameter than the circle which he himself describes. This premised, it is time to state that the volume before us is one filled to overflowing with a collection of the "pleasing thoughts and kindly emotions" which sentimental naturalists have, from time to time, encircled around, and associated with, certain and many of the innumerable objects of nature.

Sentimental naturalists, at least those of them who have described the feelings and ideas which natural objects have excited within them, have been fewer; have awakened into action later; and, consequently, have fewer followers, admirers, and pupils, than other students in nature, who have been longer in the field, and have, by their more multiplied researches and discoveries, rendered themselves more rich and more capable of enriching others of tastes congenial to their own. The present little volume shows something, a good deal — for, perhaps, two more such volumes would hold all — of what has been done in sentimental natural history; and the reason why we think that it marks an epoch in the progress of natural history in Britain is, that it is significant to see the teachers in the sentimentality of natural history so numerous as this little volume shows them to be, and the day arrived when the (other or) precursory branches of natural history have been so

familiarised "to the business and bosoms of men" as to make it safe to risk the expense of publishing a volume of sentimental poems, and scraps of poetry, on the objects with which natural history acquaints us. We wish the author of the compilation all success: he deserves it.

Jardine, Sir *William*, Bart. F.R.S.E. &c.: The Natural History of Humming-birds, Vol. II.: illustrated by 31 plates, coloured; with a portrait and memoir of Pennant. Small 8vo, 166 pages. Edinburgh, London, and Dublin, 1833. 6*s*.

Very cheap, the pictures striking, and doubtless as accurate as the nature of the materials and facilities extant, which, we believe, are neither excellent nor numerous, for producing such a work, will admit. Stuffed specimens, and the plates of M. Lesson, in his work on the Trochilides, most of these probably derived from stuffed specimens, are the main sources of the figures. In the existence of this case, we presume it is necessary to associate with the pictures the consideration of the possibility of error in the attitude, and symmetry of disposition of the parts, of almost every bird. Indeed, we have learned that the birds are placed on the branches in a very faulty manner. In the pictures, their feet and legs are obvious enough. In life and nature, when the birds are upon branches, you never can have a view of their thighs or legs; and, at the very farthest, you can only now and then get a sight of their toes. A remarkable feature in the humming-bird is the shortness of its legs, which are always concealed in the thick and puff-like plumage of the abdomen; so that, when the bird is sitting or flying, you can never see its legs; and the only means to get a view of them is catching the bird itself.

The spirit of the text is the names, synonymes, dimensions, proportions, colours, structure, and systematic affinities of the species; but is devoid of those poetical notices of habits which, in a treatise on such lovely creatures, we can but wish were supplied. At the end of the volume there is a systematic synopsis of the species of humming-birds, with their names and distinctive characteristics. The memoir of Pennant, prefixed to the volume, imparts much useful information. The frontispiece is a portrait of Pennant.

The *Natural History of Humming-birds*, notwithstanding the qualifying considerations which we have suggested to appertain to its merits, will, we conceive, conduce to two excellent effects. It will lead general admirers of the forms and hues of created beings to examine them in the spirit of the science of natural history, and thus extend that science; and the work will, at the same time, become a point to which those of British naturalists who may have opportunities to supply

corrective and additional information may refer it, until a more perfect history can be produced from the materials thus accumulated.

Lauder, Sir *Thomas Dick*, Bart. F.R.S.E. and *Brown*, Capt. *Thomas*, F.L.S.: The Natural History of Parrots, Vol. I., illustrated by 35 plates, coloured; with a biographical sketch and portrait of Audubon. Small 8vo, 170 pages. Edinburgh, London, and Dublin, 1833. 6*s*.

The contents of the volume are, a chapter on the physical characters of parrots, a chapter on the intellectual and imitative faculties of parrots, a chapter on the geographical distribution of parrots, and, then, descriptions and coloured figures of thirty-five species of parrots. At the end of the volume are illustrations of the terminology used in describing birds; at the beginning, a portrait and a biographical sketch of Audubon.

In the commencement of the enumeration of physical characters, "the toe of the parrot is made to tread" somewhat "too near the heel of the courtier;" for there is grave talking about an analogical connection in structure between man, monkeys, and parrots. The rest of the "physical characters," although they are not sorted into the most orderly succession, nor unclogged with some repetitions which betray crudity, are worthy of regard, and of a proportion of the book's price.

The dissertation on the "intellectual and imitative faculties of parrots," we leave to — to whom?—It may be disrespectful to our grandams to say.

The "geographical distribution of parrots" is inane enough. In the pictures, prodigious capacity of claws is given to some of the birds; most of them grasp, as a perch, a tree with ease. Plates 14. 9. 29., and some few others, are more consistent with common sense in this particular. It is needful that the reader pay attention to the dimensions of each bird as set down in the text; for, in the pictures, one of 6 in. in length is pretty well of the same magnitude as one of $2\frac{1}{2}$ ft. or 3 ft. Birds have great versatility of neck, we know; and we presume that plate 13. is an illustration of an extreme instance of this versatility.

Various Contributors: The Entomological Magazine. In Quarterly Numbers, each 3*s*. 6*d*., containing 104 or more 8vo pages, and four of the five numbers published, a plate of figures each.

No. v., Oct. 1833, was not sent us in time to be noticed in our last; it has been too long before the world to be noticed in detail now. It is a richly stored number, of great value to every naturalist, and of extreme value to entomolo-

gists. This number completes the first volume of the work, and has a full accompaniment of titlepage, indexes, errata, &c., together with "a list of the genera and species described in the volume, for the purpose of labelling cabinets." All these things seem given, that is, supernumerary to the quantity of pages assigned to a number.

With this number, which completes the first volume, price 18*s.*, there is also given an appeal "to all lovers of natural history, all lovers of science, all who have the welfare of entomology at heart," to afford, by the purchase of the first volume, those who have originated this work and advanced, voluntarily and for the sake of science alone, their responsibility for its pecuniary support, "the means of continuing their exertions, and prosecuting their undertaking." This appeal we are happy to be able, on the best authority, to state has not been made in vain. Owing to the liberal support advanced by a few true naturalists, there is now no prospect of the cessation of the *Entomological Magazine*. This is gladdening news.

No. VI., for January, 1834 (the first number of the second volume), will and does (for we have been shown the land of promise) contain the following communications: — 1. Colloquia Entomologica; by Corderius Secundus. Four lovers of nature, of natural history, entomology, and the *Entomological Magazine*, are made to discourse much (12 pages), and merrily, on men and things thereto appertaining. — 2. Monographia Chalcidum; by F. Walker, Esq. F.L.S. In this continuation of the monograph (from vol. i. p. 446.), the families Leucópsidæ and Chalcídidæ are described. The first includes but the genus Leucópsis; the second, seven genera. The characters of the genera and species are given in great detail, and numerous synonymes are cited. Mr. Walker describes several species from the neighbourhood of Paris, communicated by M. F. de Laporte, and some derived from the Island of St. Vincent, taken there by the late Rev. Lansdown Guilding (p. 13. to 39.).—3. Capture of Insects at Burghfield; by the Rev. C. S. Bird, M.A. F.L.S. This is a most interesting communication. Mr. Bird supplies a list of those of the species of insects, not quite common, which he has captured during ten years' residence at Burghfield. He has been most successful in the order Lepidóptera. "This success I owe to the use of a lamp to attract moths. During the moonless nights of summer, I sit with a sinumbra lamp, and perhaps one or two smaller lamps, placed on a table, close to the window. The moths speedily enter the room, if the weather be warm. I have had a levee of more than a hundred between the hours of ten and

twelve. In the spring, too, and autumn, I have been frequently fortunate, though generally having my patience sufficiently tried. . . . If, at any time of the year, a warm mist pervade the air, there is almost a certainty of success." At cool times of the year, the window is kept shut till the moths knock for admittance. Reading and writing may be combined with this plan of mothing. "Moths are extremely sensible of any keenness in the air: a north or east wind is very likely to keep them from venturing abroad. Different species have different hours of flight. . . . I have, for experiment's sake, sat up in the summer till three o'clock, when the whole heaven was bright with the rising sun, and moths of various kinds have never ceased arriving in succession till that time. Some of them must come from a considerable distance. Scotóphila porphýrea, being a heath moth, must have come nearly a mile." Not only the Noctúrna have come to Mr. Bird in the night, but "the Semidiúrna, the Geométridæ, accompany them at all hours. Many coleopterous insects are also attracted . . . sometimes swarms of gnats . . . the house cricket once or twice. Redùvius personàtus has been amongst my captives. A few common ichneumons and Tĭpulæ are frequent guests." What a world of interest these successive visiters must induce in a summer's night. Surely an entomologist must, while thus sitting and observing, have, like Shakspeare, a rich "Midsummer Night's Dream" of his own! Mr. Bird illustrates many of his remarks (and we have given but a sample of them) by adducing the names of the insects whose manners those remarks describe. His list follows, with those species distinguished "which he does not take by the lamp." — 4. Thoughts on the Geographical Distribution of Insects; by Delta. This is professed to be written with a trembling hand; but the author seems to have fortified himself very strongly with an extensive and intimate acquaintance with the nature of his subject. Will not the paper in our Vol. V. p. 149., collateralise a little with this? Delta's essay is to be continued. — V. Entomological Society: an account of its meetings and transactions. These have been, and promise to continue to be, very interesting, and of excellent effect. — VI. Osteology, or External Anatomy of Insects; by E. Newman, Esq. F.L.S. Letter 2. On the Head of Insects. We have, in VI. 435., given our humble opinion of this author's first letter on the osteology of insects. The present second letter, like the first, is of the highest possible value, and, therefore, interest, to every student in entomology; and who in entomology is not a student? It is a most elaborate production, very long (more than 20 pages), and yet, at every step through-

out, teems with facts, comparisons, contrasts, arguments, deductions, and information; with, here and there, discursive notices in illustration, written playfully and pleasingly, in agreeable relief to the severer, that is, more strictly technical, nature of the thesis. Would we had volumes full of such notices on insects as that supplied on the dragon fly in p. 67. The end for which Mr. Newman labours is the establishment of a uniform nomenclature of the parts of insects; for, until we can speak of the various parts of insects in common terms, a reciprocal communication of ideas between those who study insects (and every one who loves nature must) cannot take place. We wish his amiably intended, and, we believe, excellently executed, labours all regard, and cordially commend them, and the nomenclature he has proposed for the parts of the head of insects, to the analytical examination of every entomologist.—VII. Essay on the Classification of parasitic Hymenóptera; by A. H. Haliday, Esq. M.A.—VIII. Varieties. Among the contributors of the communications under this head are, Messrs. Swainson, Westwood, Babington, Cooper, Denny, Wood, Walker, and others.

Bushnan, J. Stevenson, F. L. S., Surgeon to the Dumfries Dispensary, &c.: the History of a Case in which Animals were found in Blood drawn from the Veins of a Boy, with Remarks. 8vo, 74 pages; 1 plate, exhibiting the one species of animal found, of the natural size and magnified, both coloured. Highley, Fleet Street, London, 1833.

The history of the particular case which led to the production of the book is of less interest than the remainder of the book's contents. The author has passed in review, and taken the essence of the evidence supplied by, every author who, from the earliest records till now, has written on, or in any way mentioned cases of, the occurrence of entozoa and other animals within the veins, arteries, heart, stomach and intestines, uriniferous organs, &c., skin, &c.; and his book is valuable, were it only as supplying a concise and essential abstract of the facts on this subject, which are scattered up and down in numerous and expensive books on medicine.

The history of the recent case, and the abstract of the previously recorded ones, occupy 40 pages. Pages 41. to 74. are occupied with a review of the "very different opinions which have at different times been entertained with respect to the origin of the proper entozoa of the human body," and with the author's own opinion on the subject. He arranges the opinions which have prevailed, according to the principle they involve, and makes five of them; and pro-

ceeds to argue the untenableness of four of these, and the tenableness of the fifth, with which his own coincides. This is that of Rudolphi and Bresmer, "that the entozoa in general are generated primarily, not from ova at all, but spontaneously in each organ in which they are found."

Wyatt, Mary, Dealer in Shells at Torquay: Algæ Damnonienses, or Dried Specimens of Marine Plants, collected, principally, on the Coast of Devonshire. Vol. I., containing specimens of fifty species. Simpkin and Marshall, London.

We have announced this work in VI. 445. Mr. Babington has contributed the following remarks on the first volume of it: — "The plants are carefully dried, are very fine and perfect specimens, and most of them are beautifully in fructification. The names adopted are those used in Dr. Hooker's *British Flora*, vol. ii., and a reference is also given to Greville's *Algæ Britannicæ*; Sowerby's *English Botany* and Dillwyn's *Confervæ* are also quoted in some places. Many of the plants in this volume are rare, such as Nitophýllum oceánicum and *u*lvöídeum, Laurénc*ia* obtùsa and tenuíssima, Gigártina aciculàris and Teèd*ii*; and the three following new species described by Hooker in his *British Flora*, Mesogloía purpùrea, Griffiths*iàna*, and viréscens. The work is known to be under the superintendence of a lady justly celebrated as a marine botanist." [Mrs. Griffiths.]

Finch, I., Esq., Cor. Mem. Nat. Hist. Soc. Montreal, &c.: Travels in the United States of America and Canada, containing some Account of their Scientific Institutions, and a few Notices of the Geology and Mineralogy of those Countries: to which is added, an Essay on the Natural Boundaries of Empires. 8vo, 455 pages. London, Longman, 1833.

The "essay on the natural boundaries of empires" should be our quarry, but we can only note its drift. "The limits of empires are controlled by the physical geography of the soil, and the power of man: the first is eternal, the last variable. The decisions of nature soon cut asunder the artificial arrangements of man. To acquire a true knowledge of the history of nations, we must study the physical structure of the soil, for this is the leading feature on which historical details are always dependent. Mountains, seas, and oceans, rivers, lakes, deserts, and forests, form natural divisions on the surface of the earth, which serve as boundaries to the several empires." The relative influence of these is then

considered in detail, and connected with the evidences of history. Each kind of boundary is the theme of a distinct chapter. The entire essay is made to occupy upwards of 100 pages.

ART. II. *Literary Notices.*

"*VOLUMES on Entomology and Ichthyology*, by J. Wilson, Esq., F. R.S.E., W. Macgillivray, Esq. M.W.S., the Rev. W. Duncan of Applegarth, and the Rev. J. Duncan, M.W.S., will appear at an early date. The next volume will contain the

Natural History of the Felinæ, *or Lions, Tigers*, &c. A portrait and memoir of Cuvier will accompany the volume." (*Extract from Jardine's Natural History of Humming-birds*, vol. ii. Nov. 1833.)

An Introduction to the Study of Nature, illustrative of the Attributes of the Almighty, as displayed in the Creation, by J. Stevenson Bushnan, F.L.S., &c., is announced to appear in the spring of 1834, uniform with the Bridgewater Treatises.

Cuvier's Classification of the Animal Kingdom. — An abstract of this is given in No. 63. of the *Penny Cyclopædia:* it occurs under the article Comparative Anatomy.

The Parent's Cabinet of Amusement and Instruction: No. XIII., price 6*d.*, of this excellent monthly periodical, contains some information on snails and spiders, which render it a fit present for juvenile naturalists.

A Teacher's First Lessons on Natural Religion; by Charles Baker, head master of the Yorkshire Institution for the Deaf and Dumb, &c. &c. Price 3*d.*

Geological Positions in direct Proof of an Important Part of Scripture Chronology. A circular containing these positions, classed under two lines of argument, has been sent us; and it is there stated, that "a detail of the facts on which the above positions are founded, has been sent to the Editors of the *London and Edinburgh Philosophical Magazine and Journal*, in which work they will probably soon appear, in the form of two papers."

Of Curtis's *Illustrations of British Entomology* the 10th volume is just completed and published.

Of Stephens's *Illustrations of British Entomology* it is stated, in No. v. of the *Entomological Magazine*, that a number, in resumption of the work, is about to be published.

THE MAGAZINE

OF

NATURAL HISTORY.

MARCH, 1834.

ORIGINAL COMMUNICATIONS.

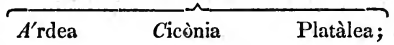
ART. I. *On designating Genera and Subgenera, and on the Principles of Classification which they involve.* [VI. 385. 481. 485., VII. 62. to 66.] By the Rev. LEONARD JENYNS, A.M. F.L.S.

MR. STRICKLAND seems (VII. 62.) to infer, from what I have written (VI. 385.) on the subject of classification, that my plan is "to distinguish subgenera by signs or letters." I beg to state that he has misunderstood me entirely. So far from adopting this plan, I am of opinion that in all cases subgenera should be named. What I remarked (which, I presume, led Mr. Strickland to this inference) was, that many modern genera had been established on characters too trivial and unimportant to entitle them even to the rank of subgenera; and I intimated that, where such had been adopted principally with a view to convenience, and because of the large number of species contained in the old groups of which they formed portions, it would have been better to have substituted for them mere sectional divisions, indicated by signs.

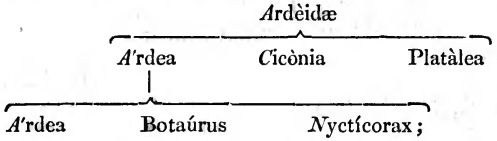
With respect to the much agitated question as to whether we are to employ the name of the genus or subgenus in designating any species we may wish to speak of, it appears to me it must be left in a great measure open for each individual to decide as he pleases. It would be difficult to lay down any rule, on such a subject, which would be generally adopted. For my own part, I should say, that, on all ordinary occasions, it is quite sufficient to use the former only; but where I was naming the species, with the particular view of pointing out its affinities and its exact situation in the system, I should there employ both; and I should write the name of

the subgenus in a parenthesis.* Thus, I should usually say (speaking of the Lapland bunting), Emberìza lappónica; but, in the particular instance just alluded to, Emberìza (Plectróphanes) lappónica.

I cannot forbear adding, on this occasion, that I fear I have been much misunderstood on the subject of the division of genera. The object of my former communication [VI. 385.] was not so much to find fault with the subdividing of old genera, where there may appear just ground for the subdivision, or the calling of the new groups by this title, if we object to the adoption of that of subgenera, as with the not appreciating the relation which these new groups bear to the old one, and to the other genera in the same family with which this old one was considered of equal value. Perhaps, however, my meaning will be rendered more intelligible than it was in that article, by the assistance of a diagram. Let us, then, suppose the family of *Ar*dèidæ, for instance, and three of its included genera, to be represented in the following manner, —



assuming that the above three groups, placed in the same line, are of equal value amongst themselves, but all subordinate to the one above, in which they are included, and which we here designate by the name of family. Suppose that, on farther investigation, we find that, in like manner as this family includes three genera†, so that one of these genera, say *A'*rdea, includes also three subordinate groups. What do we do? We attach the same name, *A'*rdea, though in a restricted sense, to that subordinate group which is more typical than the others; while to the remaining two we affix, perhaps, the new names of Botaúrus and *N*yctícorax; and we carry on the diagram in this manner, —



in which we still have the old group *A'*rdea held together by certain characters as before; only we distinguish in it three

* This is what Cuvier recommends, in his *Histoire des Poissons*, 4to edit. tom. ii. p. 41. note 1. In a former work he advises that, on ordinary occasions, the name of the subgenus be suppressed. (*Règ. An.*, tom. i. p. xvii.)

† I am not really asserting that there are no other existing genera in this family, but merely selecting these three as sufficient for my argument.

minor groups, each of which has some additional characters peculiar to itself, of less importance than those common to all. Now, it is perfectly arbitrary in what point of view we choose to consider these three new groups; we may either affix names to them or not; we may call them genera, if we please, or subgenera, or mere sections of the old genus *A*rdea: but what we must *not* do (and here, I would observe, is the principal ground of my complaint) is, having determined them to be genera, first to abolish the original group *A*rdea, and then to place them on the same footing with *C*icònia and Platàlea *, in this manner, —

*A*rdèidæ

*A*rdea Botaúrus *N*yctícorax *C*icònia Platàlea;

or, raising *A*rdea to the rank of a family, and the group which we here call *A*rdèidæ to one of a still higher denomination, not to raise *C*icònia and Platàlea also; for these three groups, *A*rdea, *C*icònia, and Platàlea, having been assumed to be of equal value, it is clear that, whatever rank we assign to one of them, we must assign the same to all.

I am unwilling to extend this communication, or I should make some comment on the objections which Mr. Newman has brought forward (VI. 485.) against the expressions which I adopted in my former article. [VI. 385.] I shall simply observe, that, when I talk of principles of classification, I do not mean principles of my own setting up, as that gentleman seems to think, but such as have been laid down by those who have studied most deeply the philosophy of the science, and such as are generally acknowledged by all professed naturalists. Of this nature is the only principle to which I had occasion to allude; viz., *that all groups bearing the same title should be groups of the same value.*

I conceive that every systematist would assent to this principle, at the same time that no one would ever think of asserting that it was now, for the first time, brought forward and offered to his notice.

L. Jenyns.

Swaffham Bulbeck, Cambridgeshire,
Jan. 14. 1834.

* The arrangement adopted, not merely in Mr. Stephens's continuation of Shaw's *Zoology*, to which reference was before given [VI. 388.], but in the latest ornithological work which has appeared in this country. See Selby's *Illust. of Brit. Orn.*, vol. ii. (Water Birds) p. 8. &c.

ART. II. *Observations on the Habits of the Rook.*
By CHARLES WATERTON, Esq.

LAST year I partly promised [V. 241.] that, on some dismal winter's evening, I would sit me down, and write the history of the rook. The period has now arrived. Nothing can be more gloomy and tempestuous than the present aspect of the heavens. The wind is roaring through the naked branches of the sycamores, the rain beats fiercely on the eastern windows, and the dashing of the waves against the walls of the island warns us that one of November's dark and stormy nights is close at hand; such a night, probably, as that in which Tam O'Shanter unfortunately peeped into Kirk Alloway. Foreigners tell us that on these nights Englishmen are prone to use the knife, or a piece of twisted hemp, to calm their agitated spirits. For my own part, I must say that I have an insuperable repugnance to such anodynes; and, were a host of blue devils, conjured up by November's fogs, just now to assail me, I would prefer combating the phantoms with the weapons of ornithology, rather than run any risk of disturbing the economy of my jugular vein, by a process productive of very unpleasant sensations, before it lulls one to rest.

According to my promise, I will now pen down a few remarks on the habits of the rook, which bird, in good old sensible times, was styled frugílegus. It is now pronounced to be *prædatòrius*. Who knows but that our great ones in ornithology may ultimately determine to call it up to the house of hawks?

If this useful bird were not so closely allied to the carrion crow in colour and in shape, we should see it sent up to the tables of the rich, as often as we see the pigeon. But prejudice forbids the appearance of broiled rook in the lordly mansion. If we wish to partake of it, we must repair to the cottage of the lowly swain, or, here and there, to the hall of the homely country squire, whose kitchen has never been blessed by the presence of a first-rate cook, and whose yearnings for a good and wholesome dish are not stifled by the fear of what a too highly polished world will say.

There is no wild bird in England so completely gregarious as the rook; or so regular in its daily movements. The ring-doves will assemble in countless multitudes, the finches will unite in vast assemblies, and waterfowl will flock in thousands to the protected lake, during the dreary months of winter: but, when the returning sun spreads joy and consolation over the face of nature, their congregated numbers are dissolved,

and the individuals retire in pairs to propagate their respective species. The rook, however, remains in society the year throughout. In flocks it builds its nest, in flocks it seeks for food, and in flocks it retires to roost.

About two miles to the eastward of this place are the woods of Nostell Priory, where, from time immemorial, the rooks have retired to pass the night. I suspect, by the observations which I have been able to make on the morning and evening transit of these birds, that there is not another roosting-place for, at least, thirty miles to the westward of Nostell Priory. Every morning, from within a few days of the autumnal to about a week before the vernal equinox, the rooks, in congregated thousands upon thousands, fly over this valley in a westerly direction, and return in undiminished numbers to the east an hour or so before the night sets in. In their morning passage, some stop here; others, in other favourite places farther and farther on; now repairing to the trees for pastime, now resorting to the fields for food, till the declining sun warns those which have gone farthest to the westward that it is time they should return. They rise in a mass, receiving additions to their numbers from every intervening place, till they reach this neighbourhood in an amazing flock. Sometimes they pass on without stopping, and are joined by those which have spent the day here. At other times they make my park their place of rendezvous, and cover the ground in vast profusion, or perch upon the surrounding trees. After tarrying here for a certain time, every rook takes wing. They linger in the air for a while, in slow revolving circles, and then they all proceed to Nostell Priory, which is their last resting-place for the night. In their morning and evening passage, the loftiness or lowliness of their flight seems to be regulated by the state of the weather. When it blows a hard gale of wind, they descend the valley with astonishing rapidity, and just skim over the tops of the intervening hills, a few feet above the trees: but, when the sky is calm and clear, they pass through the heavens at a great height, in regular and easy flight.

Sometimes these birds perform an evolution, which is, in this part of the country, usually called the shooting of the rooks. [V. 239.] Farmers tell you that this shooting portends a coming wind. He who pays attention to the flight of birds has, no doubt, often observed this downward movement. When rooks have risen to an immense height in the air, so that, in appearance, they are scarcely larger than the lark, they suddenly descend to the ground, or to the tops of trees exactly under them. To effect this, they come headlong

down, on pinion a little raised, but not expanded, in a zig-zag direction (presenting, alternately, their back and breast to you), through the resisting air, which causes a noise similar to that of a rushing wind. This is a magnificent and beautiful sight to the eye of an ornithologist. It is idle to suppose for a moment that it portends wind. It is merely the ordinary descent of the birds to an inviting spot beneath them, where, in general, some of their associates are already assembled, or where there is food to be procured. When we consider the prodigious height of the rooks at the time they begin to descend, we conclude that they cannot effect their arrival at a spot perpendicular under them, by any other process so short and rapid.

Rooks remain with us the year throughout. If there were a deficiency of food, this would not be the case; for, when birds can no longer support themselves in the place which they have chosen for their residence, they leave it, and go in quest of nutriment elsewhere. Thus, for want of food, myriads of wildfowl leave the frozen north, and repair to milder climates; and in this immediate district, when there is but a scanty sprinkling of seeds on the whitethorn bush, our flocks of fieldfares and of redwings bear no proportion to those in times of a plentiful supply of their favourite food. But the number of rooks never visibly diminishes; and on this account we may safely conclude that, one way or other, they always find a sufficiency of food. Now, if we bring, as a charge against them, their feeding upon the industry of man, as, for example, during the time of a hard frost, or at seedtime, or at harvest, at which periods they will commit depredations, if not narrowly watched, we ought, in justice, to put down in their favour the rest of the year, when they feed entirely upon insects. Should we wish to know the amount of noxious insects destroyed by rooks, we have only to refer to a most valuable and interesting paper on the services of the rook, signed T. G. Clitheroe, Lancashire, which is given in Vol. VI. p. 142. of this Magazine. I wish every farmer in England would read it. They would then be convinced how much the rook befriends them.

Some author (I think, Goldsmith) informs us that the North American colonists got the notion into their heads that the purple grakle was a great consumer of their maize [I. 47.]; and these wise men of the west actually offered a reward of threepence for the killed dozen of the plunderers. This tempting boon soon caused the country to be thinned of grakles, and then myriads of insects appeared, to put the good people in mind of the former plagues of Egypt. They

damaged the grass to such a fearful extent, that, in 1749, the rash colonists were obliged to procure hay from Pennsylvania, and even from England. Buffon mentions that grakles were brought from India to Bourbon, in order to exterminate the grasshoppers. The colonists, seeing these birds busy in the new-sown fields, fancied that they were searching for grain, and instantly gave the alarm. The poor grakles were proscribed by government, and in two hours after the sentence was passed, not a grakle remained in the island. The grasshoppers again got the ascendency, and then the deluded islanders began to mourn for the loss of their grakles. The governor procured four of these birds from India, about eight years after their proscription, and the state took charge of their preservation. Laws were immediately framed for their protection; and, lest the people should have a hankering for grakle pie, the physicians were instructed to proclaim the flesh of the grakle very unwholesome food. Whenever I see a flock of rooks at work in a turnip field, which, in dry weather, is often the case, I know that they have not assembled there to eat either the turnips or the tops, but that they are employed in picking out a grub, which has already made a lodgement in the turnip.

Last spring, I paid a visit, once a day, to a carrion crow's nest on the top of a fir tree. In the course of the morning in which she had laid her fifth egg, I took all the eggs out of the nest, and in their place I put two rooks' eggs, which were within six days of being hatched. The carrion crow attended on the stranger eggs, just as though they had been her own, and she raised the young of them with parental care. When they had become sufficiently large, I took them out of the nest, and carried them home. One of them was sent up to the gamekeeper's house, with proper instructions; the other remained with me. Just at this time an old woman had made me a present of a barn-door hen. "Take it, Sir," said she, "and welcome; for, if it stays here any longer, we shall be obliged to kill it. When we get up to wash in the morning, it crows like a cock. All its feathers are getting like those of a cock; it is high time that it was put out of the way, for when hens turn cocks people say that they are known to be very unlucky; and, if this thing is allowed to live, we don't know what may happen. It has great spurs on its legs, and last summer it laid four eggs. If I had had my own way, it would have been killed when it first began to crow." I received the hen with abundant thanks; and, in return, I sent the old woman a full-bred Malay fowl. On examining the hen, I found her comb very

large; the feathers on the neck and rump much elongated; the spurs curved, and about $1\frac{1}{4}$ in. long; the two largest feathers in her tail arched, and four or five smaller arched ones, of a beautiful and glossy colour, hanging down on each side of the tail. In a word, this hen had so masculine an appearance, that, when strangers looked at her, they all took her to be a cock, and it was with difficulty I persuaded them that she was a hen. We allowed her the range of a sheltered grass-plot, flanked on one side by holly trees, and open to the lake on the other. Here, also, was placed in a cage the young rook which I had taken from the nest of the carrion crow. The hen showed such an antipathy to it, that, whenever I held it to her, she would immediately fly at it. When visiters came to inspect her, I had only to take the rook out of the cage, and pit it against her, when she would stand upright, raise the long feathers on her neck, and begin to cackle, cluck, and crow. One morning the rook had managed to push aside a bar in front of its cage. A servant, in passing by, looked into it, and missed the bird. The hen had also disappeared. On search being made, they were both found floating side by side, dead, in the lake below. We conjectured that the hen had pursued the rook after its escape from the cage, and that the wind, which blew very strong that morning, had forced them both into a watery grave. I had still one rook left at the gamekeeper's. It was kept in a cage, which was placed on a little stand in his garden; and I had given orders that upon no account was it to be allowed to go at large. The feathers remained firm at the base of the bill till the 15th of August; on which day the keeper perceived that a few feathers had dropped from the lower mandible, and were lying at the bottom of the cage. In a couple of weeks more, the lower mandible had begun to put on a white scurfy appearance, while here and there a few feathers had fallen from the upper one. This is the purport of the keeper's information to me, on my return home from Bavaria. On the 31st of the same month, a terrible storm set in. By what the keeper told me, the night must have been as dark and dismal as that in which poor King Lear stood in lamentation, and exposed his hoary locks to the four rude winds of heaven. A standard white-heart cherry tree, perhaps the finest in Yorkshire, and which, for many generations, had been the pride and ornament of this place, lost two large branches during the gale; and in the morning, when the keeper rose, he found the cage shattered and upset, and driven to the farthest corner of his garden. The rook was quite dead. It had lost its life, either through the inclemency of that stormy

night, or through bruises received in the fall of the cage. Thus both the rooks were unlucky. The old woman, no doubt, could clearly trace their misfortunes to her crowing hen. However, the experiment with the two young rooks, though not perfect, has nevertheless been of some use. It has shown us that the carrion crow makes no distinction betwixt its own eggs and those of the rook; that it can know nothing of the actual time required to sit upon eggs in order to produce the young; that the young of the rook will thrive under the care of the carrion crow, just as well as under that of its own parents; and finally, that the feathers fall off from the root of the rook's bill, by the order of nature, as was surmised by the intelligent Bewick, and not by the process of the bird's thrusting its bill into the earth, in search of food, as is the opinion of some naturalists. [III. 402., V. 241.]

The rook advances through the heavens with a very regular and a somewhat tardy beat of wing; but it is capable of proceeding with great velocity when it chooses: witness its pursuit and attack on the sparrowhawk and kestrel. It is apt to injure, in the course of time, the elm trees on which it builds its nest, by nipping off the uppermost twigs. But this, after all, is mere conjecture. The damage may be caused by an accumulation of nests, or by the constant resort of such a number of birds to one tree. Certain, however, it is, that, when rooks have taken possession of an elm tree for the purpose of incubation, the uppermost branches of that tree are often subject to premature decay.

Though the flocks of rooks appear to have no objection to keep company, from time to time, with the carrion crows, in a winter's evening, before they retire to roost, still I can never see a carrion crow build its nest in a rookery. There was always a carrion crow's nest here, in a clump of high Scotch pines, near the stables, till the rooks got possession of the trees; the carrion couple then forsook the place: the rooks were dislodged from this clump of trees; and then a pair of carrion crows (the same, for aught I know to the contrary) came and built their nest in it.

The rook lays from three to five eggs, varying much, like those of the carrion crow, in colour, shape, and size. After the rooks have built, and even lined their nests, they leave them on the approach of night, to repair to the general rendezvous at Nostell Priory; but, as soon as they begin to lay, they then no longer quit the trees at night, until they have reared their young. When this has been effected, we see large flocks of them resorting to the different woods of the neighbourhood to pass the night. This they continue to do, till a few days before the autumnal equinox, when, for reasons

which baffle all conjecture, they begin to pass over this valley every morning in a westerly direction, and return in the evening to their eastern roosting-place in the woods of Nostell Priory.

Rooks are observed to keep up a very close and friendly intercourse with starlings [VII. 183.] and jackdaws [VI. 394. 516.]; but, on looking at them in the fields, the observer will perceive, that, while the jackdaws mix promiscuously with the rooks, both in their flight and in searching for food, the starlings always keep in their own flock. This circumstance has long engaged my attention; but I am no farther advanced in the investigation than I was on the first day on which I set out. It is one of the many secrets in the habits of birds, which will, perhaps, be for ever concealed from our view.

Walton Hall, Nov. 27. 1833. CHARLES WATERTON.

[FOR remarks, by Mr. Waterton, "on the nudity on the forehead and at the base of the bill of the rook," see V. 241—245.; and for observations, also by Mr. Waterton, "on the supposed pouch under the bill of the rook," see V. 512—515. In Captain Brown's edition of White's *Natural History of Selborne*, which is noticed in VI. 133., there is a figure of "a domestic hen in male plumage;" and in p. 93, 94., in a long note, Captain Brown has adduced some instances of this phenomenon which he had read of, or seen.]

ART. III. *An Introduction to the Natural History of Molluscous Animals.* In a Series of Letters. By G. J.

Letter 12. *On their Respiration.*

THE respiration of the Mollúsca is so slow, so little obvious, and so easily suspended for a time, that it is possible you may never have observed the process even in those species which daily cross your path. You will, therefore, in your next walk, please to examine the snail or the slug while they are in progression, and you will see them at intervals open wide a circular hole on the side of the neck and near the margin of the shield or collar, and, after dilating it to the utmost, they will close it again until its place becomes imperceptible; this they do about four times in a minute, expelling at each time the effete air, and inhaling a fresh supply. In like manner, the aquatic tribes, while crawling along the surface, raise from time to time the pulmonary aperture, in order to emit the vitiated air, sometimes even with a crackling noise, and to receive an equal quantity

unadulterated before the aperture is shut. This process is not so obvious in the branchial Mollúsca, and in many of them, from the position of the gills, such a function is not necessary to renew the water around them. Where, however, the gills are strictly internal, it seems probable that the water is regularly changed when the creatures are in their natural habitats and undisturbed: we know that such is the case with the Cephalópoda, in which inspiration and exspiration are well marked. "The first is effected by a gradual dilatation of the sac in every direction, but particularly at the sides, accompanied by a subsidence of the lateral valves, collapse of the walls of the funnel, and a rush of water through the lateral openings into the sac. Inspiration being completed, the lateral valves are closed, the sac is gradually contracted, the funnel erected and dilated, and the water expelled through it with great force, and in a continued stream." Dr. Coldstream, from whose letter I quote the preceding sentence, has seen the stream emitted by an individual of the Octòpus ventricòsus, "whose sac measured about four inches in length, carry light bodies to the distance of eleven inches from the orifice of the funnel. Respiration is performed more frequently in young than in adult individuals. One, whose sac measured 1½ in. in length, I saw respire 18 times per minute; and the larger one, mentioned above, respired 10 times per minute. The time seemed to be pretty equally divided between inspiration and exspiration." In the bivalves, whose cloak forms a shut sac, the water is sucked in through the siphonal tube, when the capacity of the sac is increased by its own expansion, or by the opening of the shells; and by its muscular contraction, aided sometimes by the closure of the shells, it is again expelled in a stream from the anal siphon: but there is no regularity in the process in such species as I have observed in confinement. It is the same with the Mollúsca tunicàta. The branchial sac is muscular, and just as its capacity is enlarged, apparently by the contraction of its longitudinal fibres, the water flows in to fill the space in a slow and uniform current, through the branchial aperture only, for none can be detected entering by the anal orifice. It is, after a space, expelled again by a contraction of the annular fibres of the sac, but the voluntary contractions for this purpose, as stated above, take place at irregular intervals of time, and, for the most part, not oftener than once in a minute. (Cuvier, *Mollus. Mem.* xx. p. 17.; Coldstream, in *Edin. New Phil. Journ.* for July, 1830, p. 240.)

I have told you that the respiration of the Mollúsca is at all times slow, and easily suspended for a long period; but, to obviate the inconveniences which might result from this, and

to supply the place of that regularly alternate and ceaseless play of the respiratory muscles of the vertebrates, Dr. Sharpey has discovered that, in "the Mollúsca, and other inferior tribes of aquatic animals, the external covering of the body generally, but especially of the respiratory organs, possesses the power of impelling the water contiguous to it in a determinate direction along the surface, by which means a constant current is kept up, and the blood exposed to the influence of successive portions of the surrounding element: this peculiar provision effecting, in those creatures, the same purpose as the respiratory muscles in the more perfect animals." These currents, in the Mollúsca at least, and probably in all the animals in which they have been detected, are produced by the action of minute cilia, visible only with a glass, which are in constant motion, and clothe all the surfaces along which the currents are excited. Similar cilia had been observed on the eggs and organs of many zoophytes by previous naturalists, and in a few naked Mollúsca, by Dr. Fleming; but the merit of proving their existence in all the great families of the Mollúsca, with the exception of the Cephalópoda and the Tunicàta, and of pointing out their use, is due to Dr. Sharpey. Carus came near the discovery; for he observed the currents in question, but left uninvestigated their cause; or, rather, he attributed the phenomena to one which has probably little efficiency. His words are: — "In a living bivalve, it is easy to observe that the water gains access to the branchial laminæ by the fissure in the cloak, and escapes by the anal tube, which serves also to evacuate excrement and ova. It has not, however, been hitherto noticed, that this current is uninterrupted, and that thus these animals, when not too deeply immersed, form an eddy on the surface of the water. But as, in almost all other animals, the influx of air or water to the respiratory organs is intermittent, the simultaneous and continuous current into the fissure of the cloak and out of its tube, of which I have satisfied myself by numerous observations, must depend on a very peculiar mechanism, which consists chiefly in the muscularity of the cloak, but partly also in the mobility of the gills themselves, and may be compared to the mechanism of certain bellows, which produce an uninterrupted current of air by means of double bags." (*Comp. Anat.*, transl. vol. ii. p. 148.)

As this discovery appears to me the most important which has been made of late years in the physiology of these animals, you will permit me to transcribe, for your perusal, a paragraph of considerable length from Dr. Sharpey's Essay, with a view of giving some farther illustration of the process.

"When a live muscle (*Mytilus edùlis*) is attentively examined in a vessel of sea water, it is soon observed to open its shell in a slight degree, and about the same time a commotion may be perceived in the water in its vicinity. This is occasioned by the water entering at the posterior or large extremity of the animal, into the cavity in which the gills are lodged, and coming out, near the same place, by a separate orifice, in a continued stream. This current is obviously intended for the purpose of renewing the water required for the respiration and nutrition of the animal; but, though it is now a well-established fact in the history of the muscle, the mechanism by which it is produced has not, so far as I know, been satisfactorily explained. Some have contented themselves with ascribing it to an alternate opening and shutting of the shell; but, as no such motion takes place in the shell, except at distant and irregular intervals, it is evident that the constant passage of the water cannot be explained in this way. Others, who saw the insufficiency of this explanation, have endeavoured to account for it by assuming peculiar contractions and dilatations of the mantle in virtue of its muscular power, or, like M. de Blainville, have supposed that the triangular labial appendages placed round the mouth excited the current by their constant motion. After meeting with the currents in the tadpole, it struck me that the entrance and exit of the water in the bivalve Mollúsca might not improbably be owing to a similar cause; and that the surface of the respiratory organs, and other parts over which the water passed, might have the power of exciting currents in it, the combined effect of which would give rise to the entering and returning stream.

"This conjecture proved, on actual examination, to be right. Having cut off a portion of the gill, I found that a current was excited along its surface in a determinate direction, and that it moved itself through the water in an opposite one, exactly as in the case of the tadpole. The whole surface of the gills and labial appendages or accessory gills, the inner surface of the cloak, and some other parts, produced this effect. The currents on the gills are of two kinds. When finely powdered charcoal is put on any part of their surface, a great portion of it soon disappears, having penetrated through the interstices of the vessels into the space between the two layers of the gill. On arriving here, a part is forced out again at the base of the gill from under the border of the unattached layer, but most of it is conveyed rapidly backwards in the interior of the gill between the two layers, and almost immediately escapes at the ex-

cretory orifice, or that from which the general current already mentioned is observed to come out. That portion of the powder which remains outside the gill is carried along its surface in straight lines from the base to the margin, along which it then advances onwards towards the fore part of the animal. As the spaces between the layers of all the gills terminate directly or indirectly at the excretory orifice, it is easily conceivable that the water, penetrating by the entire surface of these organs, may, by their concentrated effect, give rise to the powerful current which is observed to come out from the animal.

"On examining a portion of the gills with a powerful lens, I perceived that it was beset with minute cilia, which are evidently instrumental in producing the different currents. Most of them are ranged along the anterior and posterior margin of each of the vessels composing the gills, in two sets: one nearer the surface, consisting of longer and more opaque cilia; the other close to the first, but a little deeper, in which they are shorter and nearly transparent. Both sets are in constant motion, but of this it is difficult to convey a correct idea by description. The more opaque cilia, or those of the exterior range, appear and disappear by turns, as if they either were alternately pushed out and retracted, or were continually changing from a horizontal to a vertical direction. The motion of the other set appears to consist in a succession of undulations, which proceed in a uniform manner along the margin of the vessel from one end to the other. It resembles a good deal the apparent progression of the turns of a spiral when it revolves on its axis, and might very easily be mistaken for the circulation of a fluid in the interior of a canal, more particularly as the course of the undulations is different on the two edges of the vessel, being directed on the one towards the margin of the gill, and on the other towards the base. But, besides that the undulations continue to go on for some time in small pieces cut off from the gill, which is inconsistent with the progression of a fluid in a canal, the cilia are easily distinguished when the undulatory motion has become languid. When it has entirely stopped, they remain in contact with each other, so as to present the appearance of a membrane attached to the edge of the vessel.

"It is very remarkable, that, when the gill is immersed in fresh water, both the currents and the motion of the cilia are almost instantaneously stopped." *

* On a peculiar Motion excited in Fluids by the Surfaces of certain Animals; by William Sharpey, M.D. *Edin. Med. and Surg. Journal*, vol. xxxiv. p. 118, &c.

The purpose of the respiratory organs, and of the currents just described, is, to expose the blood freely to the purificative action of the atmospherical air, that it may be purged of some noxious qualities which it has acquired during its circulation through the venous system, and fitted again for the continuance of the life of the individual. In the vertebrate animals the blood is altered, even in its outward appearance, by this process; from a dark it becomes a bright red fluid: but no perceptible change is operated on the white serous blood of the Mollúsca, yet that it has experienced a similar purification is not to be doubted; for the air breathed by these creatures is similarly deteriorated, as it would have been had it been breathed by the quadruped or bird; the oxygen has disappeared, and its place become occupied by an *equal* bulk of carbonic acid gas. This had been proved by the well known experiments of Spallanzani and other physiologists; and though, in general, the proportion holds good, yet it appears, from the recent experiments of Treviranus, that the absorption of oxygen is not *always* proportional to the excretion of carbonic acid, the proportion of the one to the other depending on the strength of the respiration, the time of its continuance while the respirability of the air is diminishing, and the volume of the air in which the respiration is performed. "The more carbonic acid," says Treviranus, "there is developed while breathing in the open air, and the less the power of continuing in a medium deficient in oxygen, the less is the proportion of the consumption of oxygen to the production of carbonic acid gas, whence a small quantity of atmospheric air is respired for a moderate period. But when the respiration is continued for a longer period in the same air, and the strength of the individual begins to sink, the excretion of the latter diminishes more rapidly than the absorption of the former. We know that the higher classes of animals, when enclosed in a certain quantity of air, die long before all its oxygen has been exhausted. The case is very different with many of the Mollúsca under the same circumstances; for they not only consume all the oxygen, but actually continue afterwards to exspire carbonic acid gas: consequently, after the respiration has been continued for some time, there has been more of the latter excreted than there has been consumed of the former; nay, sometimes this occurs even before all the oxygen has been consumed." (*Edin. New Phil. Journ.*, April, 1833, p. 383.*) These observations may serve to

* The Rev. Mr. Guilding has conjectured that some Mollúsca may even purify water: — "*Neritinæ* are destroyed with great difficulty: some,

explain, in some degree, the apparent apathy of the Mollúsca generally to a temporary deprivation of their respiratory media: for snails may be immersed in water for many hours without injury; and the purely aquatic species will survive as long a time exposed to the atmosphere. Oysters and muscles, as every one knows, and probably all the Conchífera, will live for three or four days without any more water to breathe in than what may lie in the concavity of their shells; and Mr. Boyle has some experiments which illustrate, in a remarkable manner, their tenacity of life even in vacuum. He found that two oysters, put "into a very small receiver," exhausted of air, were alive at the end of twenty-four hours; "but how long afterwards they continued so, I did not observe." (*Phil. Trans.*, 1670, p. 2023.) Another oyster was put into a vial full of water before being enclosed in the receiver, "that, through the liquor, the motion of the (air) bubbles, expected from the fish, might be more pleasantly seen and considered. This oyster proved so strong, as to keep itself close shut, and repressed the eruption of the bubbles, that in the other did force open the shells from time to time; and kept in its own air as long as we had occasion to continue the trials." (*Ibid.*, p. 2024.) Shelled snails (Hélices) appeared to be not more disordered in vacuity; and even the slugs (*Limax*) endured the privation for many hours. The same illustrious philosopher included two of the latter "in a small portable receiver," carefully exhausted; "but, though they did not lose their motion near so soon as other animals were in our vacuum wont to do, yet, coming to look on them after some hours, they appeared moveless and very tumid; and, at the end of twelve hours, the inward parts of their bodies seemed to be almost vanished, and they seemed to be but a couple of small full-blown bladders; and, on the letting in of the air, they immediately so shrunk, as if the bladders had been pricked: the receding air had left behind it nothing but skins; nor did either of the snails afterwards, though kept many hours, give any signs of life." (*Ibid.*, p. 2050.) In this experiment, it is obvious that the snails were killed from the mechanical effects of the expansion of the air within them, and not from its ingress to the pulmonary cavity being prevented.

---

which were even kept close in salt water, seemed to have the power of purifying it, and rendering it fit for respiration; while many large air-bubbles were generated in the glass. Some power of this kind would be very valuable to those species which inhabit maritime ponds, the waters of which, nearly dried up at certain seasons, must be stagnant and unwholesome." (*Zoological Journal*, vol. v. p. 33.)

But there are on record some extraordinary facts, which seem to prove that, under certain conditions, all of which are not yet known, the respiration of many Mollúsca, more especially the terrestrial, may be suspended for an indefinite period, and again renewed by the application of heat and moisture; life, as it were, keeping watch, and holding at bay every destructive agent, but without giving any outward sign of her presence and constant wakefulness, until the return of those influences in which she joys. "All the land Testàcea," to use the words of Dr. Fleming, "appear to have the power of becoming torpid at pleasure, and independent of any alterations of temperature. Thus, even in midsummer, if we place in a box specimens of the Hèlix horténsis, nemoràlis, or arbustòrum, without food, in a day or two they form for themselves a thin operculum, attach themselves to the side of the box, and remain in this dormant state. They may be kept in this condition for several years. No ordinary change of temperature produces any effect upon them, but they speedily revive if plunged in water. Even in their natural haunts, they are often found in this state during the summer season, when there is a continued drought. With the first shower, however, they recover, and move about; and at this time the conchologist ought to be on the alert." (*Phil. Zool.*, vol. ii. p. 77.) I may illustrate these remarks, which are perfectly correct, by some additional examples; one or two of which you may find to require an exercise of faith for which you may not be altogether prepared. Mr. Lyell tells us that "four individuals of a large species of Bùlimus, from Valparaiso, were brought to England by Lieutenant Graves, who accompanied Captain King in his late expedition to the Straits of Magellan. They had been packed up in a box, and enveloped in cotton, two for a space of thirteen, one for seventeen, and a fourth for upwards of twenty months; but, on being exposed, by Mr. Broderip, to the warmth of a fire in London, and provided with tepid water and leaves, they revived, and are now living in Mr. Loddiges's palm-house." (*Princ. Geol.*, vol. ii. p. 109.) Dr. Elliotson put a garden snail "into a dry closet, without food, a year and a half ago: it became torpid, and has remained so ever since, except whenever I have chosen to moisten it. A few drops of water revive it at any time." (Blumenbach's *Physiology*, p. 182.) Similar instances may be found in some of the periodical journals; but they are as nothing when compared with the snails of Mr. Stuckey Simon, a merchant of Dublin, which, on being immersed in water, recovered and crept about after an uninter-

rupted torpidity of *at least fifteen* years *; and I agree with Mr. Bingley in thinking that this is a well-authenticated fact. Whether what follows is so, I leave to your own decision; but I will not say you are unreasonably sceptical if you deem it too tramontane. "Professor Eaton of New York stated," says my authority, "that the diluvial deposits through which the Erie Canal was made contained ridges of hard compact gravel. On cutting through one of these, near Rome village,

* "Mr. Stuckey Simon, a merchant of Dublin, whose father, a fellow of the Royal Society, and a lover of natural history, left to him a small collection of fossils and other curiosities, had among them the shells of some snails. About fifteen years after his father's death (in whose possession they continued many years), he by chance gave to his son, a child about ten years old, some of these snail shells to play with. The boy put them into a flower-pot, which he filled with water, and the next day into a basin. Having occasion to use this, Mr. Simon observed that the animals had come out of their shells. He examined the child, who assured him that they were the same he had given him, and said he had also a few more, which he brought. Mr. Simon put one of these into water, and in an hour and a half after observed that it had put out its horns and body, which it moved but slowly, probably from weakness. Major Vallancey and Dr. Span were afterwards present, and saw one of the snails crawl out, the others being dead, most probably from their having remained some days in the water. Dr. Quin and Dr. Rutty also examined the living snail several different times, and were greatly pleased to see him come out of his solitary habitation after so many years' confinement. Dr. Macbride, and a party of gentlemen at his house, were also witnesses of this surprising phenomenon. Dr. Macbride has thus mentioned the circumstance: —'After the shell had lain about ten minutes in a glass of water that had the cold barely taken off, the snail began to appear, and in five minutes more we perceived half the body pushed out from the cavity of the shell. We then removed it into a basin, that the snail might have more scope than it had in the glass; and here, in a very short time, we saw it get above the surface of the water, and crawl up towards the edge of the basin. While it was thus moving about, with its horns erect, a fly chanced to be hovering near, and, perceiving the snail, darted down upon it. The little animal instantly withdrew itself into the shell, but as quickly came forth again when it found the enemy was gone off. We allowed it to wander about the basin for upwards of an hour, when we returned it into a wide-mouthed phial, wherein Mr. Simon had lately been used to keep it. He was so obliging as to present me with this remarkable shell; and I observed, at twelve o'clock, as I was going to bed, that the snail was still in motion; but next morning I found it in a torpid state, sticking to the side of the glass.'

"A few weeks afterwards the shell was sent to Sir John Pringle, who showed it at a meeting of the Royal Society; but some of the members imagining that Mr. Simon must have been imposed upon by his son having substituted fresh shells for those that had been given to him, the boy was reexamined by Dr. Macbride on the subject, who declared that he could find no reason to believe that the child either did or could impose upon his father. Mr. Simon's living in the heart of the city rendered it almost impossible for the boy (if he had been so disposed) to collect fresh shells, being at that time confined to the house with a cold. Mr. Simon has also declared that he is positive those were the shells he gave to him, having in his cabinet many more of the same sort, and nearly of the same size." (Bingley's *Animal Biography*, vol. iii. p. 574.)

16 miles west of Utica, the workmen found several hundred of *live* molluscous animals. They were chiefly of the *Mya* cariòsa and *Mya* purpùrea. The workmen took the animals, fried, and ate them. He adds, 'I was assured that they were taken *alive* 42*ft. deep in the deposit.* Several of the shells are now before me. The deposit is diluvial. These animals must have been there from the time of the deluge, for the earth in which they were is too compact for them to have been produced by a succession of generations. These freshwater clams of 3000 years old precisely resemble the same species which now inhabit the fresh waters of that district; therefore, the lives of these animals have been greatly prolonged by their exclusion from air and light for more than 3000 years." (Silliman's *Amer. Journal*, No. xv. p. 249., as quoted in Turner's *Sacred History*, p. 473.)

With the exception of the last example, the others refer to land Testàcea; but some pulmoniferous aquatic species are equally capable of assuming this state of torpidity, when under circumstances which deprive them of their respiratory medium. In early spring, I have more than once observed the Limnèus fossàrius to abound in small pools of water, which were dried up as the season advanced; and when, after a careful search, the little snails were found, in a torpid condition, concealed in the cracks made by the drought, or under small clods of earth, where they awaited a happier season to refill their pools, and permit them to resume the functions of active life. Perhaps, in this country, their torpidity can rarely be continued beyond a few weeks; but, in tropical climes, similar species can pass the dry season of five long months in this state. Thus, Adanson informs us that the minute freshwater shell, which he calls Bùlimus, is to be seen only from the month of September to January, in the marshes of Senegal, formed by the rains which fall in June, July, August, and September. When these marshes are dried up, and, as it were, roasted by the sun, the shellfish disappear; a few empty shells alone being left, to show where they had been; but they never fail to return with the rainy season; and Adanson remarked that, the hotter the preceding summer, the more abundant was the issue of the succeeding hordes. How, asks the author, shall we explain this marvellous reproduction? Can the eggs of the animal, necessarily very delicate and minute; can they remain in a soil so burned up, without being entirely dried; or can the animals themselves, if it is true that they conceal themselves in the bosom of the earth, can they resist, during five or six months, the heat of a burning sun? (*Hist. Nat.*

du Sénégal, p. 7.) The latter supposition is the only one which can, I think, solve the question.

When in this torpid state, the condition of the snail itself has not been ascertained. Some authors speak of it as being dormant; and the language would seem to imply that they consider it in a state of sleep, in which the circulation and respiration go on uninterruptedly and as strongly as when awake; but I suspect that the authors alluded to never intended that such an inference should be drawn from their analogical language. The fact is, it is not known precisely whether the circulation goes on or is stopped, or whether the contact of air is essential or otherwise. It is difficult to believe that all the functions as well as the signs of life cease entirely; and yet it is scarcely less so to suppose that, for the space of fifteen years or more, those functions could exist without some supply of food to keep up the waste and secretions, however trivial, which necessarily flow from a circulation, or without some air to purify the circulating fluid.*

If I deem it necessary to distinguish torpidity from sleep, it is, perhaps, not less so to distinguish it from the state of hybernation, although the phenomena of both are more strictly analogous. Snails become torpid when the atmosphere is hot and dry; and, as often as they are unbound by the application of a warm moisture, they come forth from the shell strong and vigorous; but, "intelligent of seasons," they begin instinctively to seek hybernating quarters at a moist season of the year, and before the cold has benumbed their powers; and, if roused ultimately, their languid movements evidence their weakness, and bespeak our sympathy to leave them to repose. Whether the vital functions in these creatures are similarly affected during torpor and hybernation remains to be determined. It is probable that they are.

In this country, and in others with similar climates, probably all the terrestrial shelled snails, and all the pulmoniferous freshwater Mollúsca, pass the winter in a state of hybernation. I believe that the naked slugs do not hybernate; for, although they retire under stones, clods of earth, or moss, to protect

* "This living principle has the singular property of remaining dormant and inert for years or ages; without, therefore, ceasing to exist. We all know that seeds may be kept a long while unsown, and yet grow whenever planted in a suitable soil. This, again, is like animals which have been found enclosed in trees, and yet have revived. When plants are buried in the ground to a greater depth than is natural to them for their proper growth, they do not vegetate; but they do not therefore die: they retain their power of vegetation to an unlimited period; and when, by any accident, brought so near the surface as to suit their evolution, they begin immediately to grow." (Turner's *Sacred History*, p. 195.)

themselves from the cold and storms of the season, yet I have always found them immediately to resume their activity when taken from their concealments, and they are in motion all the winter in mild weather. It is not certainly known, although the contrary has been asserted *, that any marine Mollúscum hybernates. There would seem to be no necessity that the snails of tropical countries should be endowed with this remarkable property; but the observations of Adanson prove the contrary. He tells us that the Bùlimus *Kámbeul* apparently passes *the winter, or dry season, in a deep slumber, like the snails of Europe;* for he found several of them which were half-buried, in the month of September, at the roots of trees and in the thickest brushwoods; and of these some had already closed the aperture of their shell very exactly with a lid of a whitish and plaster-like matter, to protect themselves against the long droughts which continue for eight or nine months uninterruptedly. (*Hist. Nat. du Sénégal*, p. 18.)

None of the hybernating Mollúsca exhibit any remarkable cunning in the selection of their hybernacula or winter quarters. On the approach of the cold weather, the terrestrial tribes seek out a convenient station in crevices of old walls, at the roots of coarse grass, or in tufts of moss, and, retiring within the shell, they close up its aperture by a membranous or calcareous epiphragm, which serves, at the same time, to fix or cement the shell to the wall or body against which it rests. At the same period, the aquatic tribes descend to the bottom of their ponds and ditches, sink a little in the soft mud, and cover over the mouth of the shell with a transparent gelatine. In general, when the temperature of the air sinks below the 50th degree of Fahrenheit, cold-blooded animals begin their winter slumber, and, previously prepared by that instinct which operates as wisely as if right reason had foreseen the coming evil, they gradually, with the increasing cold, sink into a state which resembles more the stillness of death than the quietness of sleep; a state without motion, or feeling, or sense, or heat, and in which the heart and lungs, the vital organs, perform their functions more and more feebly, until they also rest still in the general quiescence; and in this deathlike condition these animals continue "for five, six, seven, or even eight or nine months, according to the climate and season," until the genial warmth and dews of spring recall them anew to life and action.

M. Gaspard has given a minute and a very interesting

* "The marine Mollúsca probably migrate in part from the shallower to the deeper waters in cold winters: many, however, hybernate." (*Duncan on the Analogies of Organised Beings*, p. 97.)

account of the hybernation of Hèlix pomàtia, in the first volume of the *Zoological Journal*; to which I must refer you for the particulars. This species forms, by aid of its foot and a very glutinous secretion, an excavation or nest, in which it buries the shell, and it then closes the aperture with a thick calcareous epiphragm, and with several interior membranous partitions, which are more numerous at the end than at the beginning of winter, and in the snails inhabiting the mountains than in those found on low ground. Thus buried and enclosed, it passes six months in a state of total torpidity; for the only indication of irritability perceptible during this period is a slight contraction of the collar of the mantle when touched, on removing the epiphragm. He found that there was no digestion; the heart at first beat feebly, and with a very slow pulsation; but at a later period it was found to have stopped, and the circulation was entirely suspended; respiration ceased; no animal heat, which even in the summer, when respiration and circulation are most lively, does not exceed one degree above the surrounding atmosphere, was evolved; no secretions nor wasting function went on, neither any growth or reproduction of new parts. "In our climate, it is about the beginning of April, soon after the song of the cuckoo begins and the swallows appear, that the snails leave their torpid state; varying a little, however, according to the season. The mode by which their escape from confinement is effected is simple and easily comprehended. The air which is contained in the different cells, and which had been expired on the animal withdrawing itself farther and farther into the shell after the formation of the operculum, is again inspired, and each separate membranous partition broken by the pressure of the hinder part of the foot projected through the mantle. When it arrives at the calcareous operculum, the animal, making a last effort, bursts and detaches its most obtuse angle. Then insinuating by little and little the edge of the foot between the shell and the operculum, it forces the latter off, or breaks it away. The animal then comes forth, walks, and immediately begins feeding, with an appetite excited, doubtless, by an abstinence of six or seven months." (p. 99.)

Such is M. Gaspard's account of the reviviscency of Hèlix pomàtia, and the process must be still simpler in the other species; for they have merely to rupture a single horny or semigelatinous membrane. But there has been a difference of opinion relative to the source of the air which is first respired. Gaspard, you will observe, says that that portion which is confined between the layers of the epiphragms is

the first inhaled; and, in coincidence with this opinion, we must infer that the species with a single membrane respire in the first instance the air behind it, and then, by their own efforts, burst their prison wall. A very different explanation of the process has been advanced by Sir Everard Home. He says: — "When warmth and moisture are applied, the membranous film (of the garden snail) falls off; a globule of air that remained in the cavity of the lungs becomes rarefied, and forces its way out, and admits of fresh air being applied to these organs." * (*Comp. Anat.*, vol. iii. p. 156.) I suspect that more of fancy than of observation enters into the baronet's theory; for were the rarefaction of the contained air, and its egress through the pulmonary aperture, all that was necessary to shake off the winter slumber, this would be done on several days in winter and in early spring, when the sun shines brightly and the atmospherical temperature is high enough to produce the effect, often higher, indeed, than it is when they begin, in the appointed time, to leave their hybernating retreats. If, says M. Gaspard, individuals of Hèlix pomàtia "were exposed during the winter to a dry heat of from 60° to 100° for several days, or even weeks, not one made its appearance; whilst, on the contrary, those which were placed in a deep recess, the regular temperature of which was 50°, came forth in April, or at the beginning of May, without any increase of temperature."

Dr. Turton, on the other hand, maintains that the doctrine of Gaspard is equally untenable; for that the direct communication between the external air and the animal within its shell is never interrupted, but on the contrary preserved, by means of a small aperture in the epiphragm. His words are: — "But, upon examination, it will appear, that in the

* In the following extract Sir E. Home repeats his hypothesis in a more detailed manner: — "It is curious that, although respiration is necessary for carrying on the functions of life, it is by no means so for the continuance of its existence. The garden snail illustrates this fact in the most satisfactory manner. When the temperature of the atmosphere sinks below a certain degree, this animal places itself upon a solid body, that it may not be liable to fall off: it then forms an operculum of mucus, by which respiration is stopped, and the animal remains hermetically sealed up till warmth and moisture dissolve the mucus by which the animal was fixed to its place; and a globule of air retained in the lungs, which consist only of one cell or bag, being rarefied, escapes externally, restoring the communication with the air of the atmosphere which rushes in, and the action of the heart is renewed. If it is admitted that the application of oxygen to the muscles of the heart is capable of stimulating that organ, nothing can be more simple than the mode in which this is effected: the oxygen of the atmosphere is absorbed by the blood in the lungs, and the closeness of the ventricle of the heart to the lungs permits the oxygen to penetrate to the heart." (*Comp. Anat.*, vol. v. p. 129.)

centre of this epiphragm (of Hèlix pomàtia) is an exceedingly minute orifice, communicating with an umbilical cord, which is connected with a fine placenta-like tissue of vessels, penetrating into the pulmonary cavity itself; and this minute orifice, although not large enough to admit a drop of water, is of sufficient capacity for the passage of that quantity of oxygenated air necessary for the purposes of extremely slow, but not totally extinct, respiration. If this orifice be covered over with a coat of wax or varnish, so that all possible connection with external air be excluded, animal life becomes altogether extinguished, never to be again restored. We have observed this minute puncture in the winter covering of the H. ericetòrum and some others; and it is probable that all whose aperture is closed during the cold season only, are furnished with this beautiful apparatus for the preservation of life." (*Manual of Land and Freshwater Shells*, p. 46.) I recommend you to examine into those very interesting statements; and, if your own observations confirm them, they will materially alter some inferences which have been drawn from Gaspard's experiments, and adopted by us, in reference to the *total cessation* of the action of the lungs and heart. That snail does not reach this northern latitude; but I have examined, too carelessly however, the epiphragm of Hèlix aspérsa during its hybernation, and always find a small aperture in it; and also, in the aquatic tribes, I find a larger hole in their thin winter operculum, intended, assuredly, to keep up the communication between the pulmonary cavity and circumambient medium in their season of repose.

There is something admirable in this curious adaptation of the economy of the hybernating creatures to their situations; for otherwise they could not live beyond a single summer in the countries which they now inhabit with impunity to themselves. If, during their active state of existence, you were to keep a Limnèus, or any other aquatic pulmoniferous species, immersed in water for only one short day, it would die irrecoverably; but it remains under water, perhaps with the surface frozen over, for three or four months uninjured, when the system has been prepared, in autumn, for the change. And so of the land kinds: they perish if deprived of air for a few hours only in summer, or if exposed to an artificial cold not lower than the cold of winter; but in a state of hybernation they respire, if any, such a small quantity of air as is not to be appreciated, and brave our longest and severest frosts without peril and without pain. "O Lord, how glorious are thy works! thy thoughts are very deep!"

Sept. 26. 1833. G. J.

ART. IV. *On Structure, and its adaptedness to Economy in the Annulate Animals.* By Ω.

THE most advantageous occupation for man is the study of the works of his Creator; this study is also the most natural, and consequently the most gratifying. Man delights to enquire into the means employed to accomplish appointed ends; he possesses an innate desire to discover the causes of those obvious phenomena which are continually attracting his attention. It is but too frequently the aim of those who instruct youth to repress this desire, this thirst for natural knowledge, supposing it likely, if encouraged, to interfere, in after-life, with the pursuit of power and riches, which are generally the only desiderata held up to our youthful hopes. It should be far otherwise; the expanding mind, like the growing body, should be copiously supplied with wholesome nutriment, else its tastes become vitiated and its power weakened. There is nothing which enables an ardent and aspiring mind to form so just an estimate of itself, as does an idea, however imperfect, of something greatly superior. Now, that mind must be lost to the power of thinking, that cannot trace in the circulation of the blood, in the conversion of an egg to a chicken, or in the reproduction of a spider's leg or a lobster's claw, the design and superintendence of an intelligence infinitely above its own. Let man enquire into these things. As he imbibes great and important truths in natural history, he becomes deeply imbued with a sense of his own insignificance. His first safe step in knowledge is the assured feeling of his own utter ignorance.

I have long desired the opportunity now afforded me, of addressing readers among whom many will be willing to consider themselves learners. For the learned I have no novelties in store. I address myself more particularly to those yet in the morning of life, whose enthusiasm of enquiry has received no chill from the unsatisfactory sophisms and pedantry of some of the self-elected dictators in natural history. I am no dictator, but a fellow enquirer: my solicitation is, "Come with me, a lowly and unworthy son of science; come with me, and let us together meditate on the wonderful works of our Creator. Let us examine together the structure of one branch of the animal kingdom. Let us trace the peculiarities which distinguish it from the other branches. Let us see how beautifully these very peculiarities are adapted to the parts in the creation which these creatures are designed to perform."

In this research, Professor Grant, in his admirable lectures at the London University, and Mr. Newman, in his letters on the Osteology of Insects, in the *Entomological Magazine*, have both preceded me; but, by restricting myself to much narrower limits than the former, and avoiding altogether the technicalities of the latter, I trust it will not be difficult to steer a middle course, without the least interference with either of them.

Animals are termed annulate, from having the exterior of their bodies divided into rings. The name may be considered as applicable to every creature commonly known as an insect; flies, bees, wasps, beetles, grasshoppers, dragon-flies, moths, butterflies, fleas, mites, spiders, centipedes, scorpions, lobsters, crabs, shrimps, &c., &c.

In these creatures we find the seven principal systems of organs observable in larger animals and in man: the organs of sensation, or nervous system; the organs of support, osseous or bony system; the organs of motion, or muscular system; and these three we shall find, throughout their varied developement, peculiarly connected and dependent on each other: the organs of circulation, or vascular system; the organs of respiration, or respiratory system; these two, also, being dependent on each other: the organs of nutrition, or digestive system; and the organs of reproduction, or generative system.

We frequently find, in the writings of men entitled to the greatest respect, a kind of triple division made of the organs of sensation — the brain, the nerves, and the organs of the senses. Let us examine whether this division really exists. Vegetable physiologists have shown that the delicate flowers of a plant are but the perfected continuation and completion of the same rind which originates in the root and clothes the stem. Now, it appears to me, that the nerves originate in the brain, which is their root, branch through the body, and blossom in the organs of the senses; and that, therefore, each peculiar character they assume is but the modification of the same system. Taste, smell, hearing, and sight must, in this case, be considered as nothing more than variously perfected attenuations of the same nerves which are distributed throughout the body; in other words, varied developements of the power of feeling, wonderfully contrived to arrest, ascertain, and apply the properties of substances, effluvia, sounds, and rays of light. The nerves, when terminating simply in organs of sensation, appear to be endowed with a double capacity: they convey the impression of the presence and form of inert

matter, and of pain from the quality or motion of matter. One impression is not the excess of the other; the scald of hot water, or the entrance of a bullet, conveys no impression of form. We find that, the more concentrated the brain, as in vertebrates, the more perfect are the organs of the senses. Let us select, for example, a mouse: mark the bright eyes, the attentive ears, the inquisitive nose, all taking instant cognizance of danger, or enquiring for means of support. Exquisitely slender, infinitely ramified, and tremblingly alive to pain, are the nerves which serve for the sense of touch. Of vertebrated animals, moreover, it is a distinguishing character that the separation of the brain from its branches, the nerves, causes death.

In annulates, the nerves are nowhere concentrated into a mass analogous to the brain of man, but are gathered up into knotted strings, two principal series of which pass longitudinally throughout the body, extending their branches into all the limbs. The head, in such a formation, is therefore no longer the seat of life, or essential to life, but every segment and every limb is possessed of, and retains, vitality in equal proportion. This diffused brain, like the concentrated human brain, appears to be the organ governing sensation, and, like that, also, seems, in its principal masses, without sensation in its own self; and its radiations do not, except as organs of the senses, generally, as in vertebrates, find their way to the surface. From these circumstances it may be conjectured, that, had we the means of ascertaining, we should find that annulates are altogether without that acute sense of pain which we possess. The organs of the senses, also, are less perfectly developed. If we select the lobster as an example of a large and tolerably perfect annulate, and examine its dull eyes, its simple vestibules of ears, we shall instantly be struck with its inferiority in these respects. Another result of this difference in organisation is, that creatures having the concentrated brain enjoy, in a greater or less degree, that wonderful reflecting meditating power possessed in so glorious a degree by man; whilst the whole of the annulates are directed in all their actions by a blind unreasoning instinct. The annulates, then, may be said to be unprotected by reflection, and for the most part unguarded by the senses. The lobster is driven by the waves and dashed among the roughest rocks; the heedless beetle flies in our very faces; myriads of insects are forcibly impelled by the winds against the hardest substances; myriads are beaten to the earth by rain; myriads are cast, unresisting, into rivers and lakes. Yet they escape

from all this unharmed, and, by a simple and beautiful contrivance, are enabled to abide their time, to exist till their destiny is complete. They are provided with an exterior skeleton, a covering which wraps them as a mantle and shields them from harm.

The covering of annulates is completely bony; it is, in every respect, a substitute for the internal skeleton of vertebrates: like that, it serves for the attachment of the muscles and support of the whole frame. It bears uninjured the contact of the roughest and hardest substances. It enables its possessor to endure that rough usage which the more perfect developement of the organs of the senses in vertebrates enables them to avoid. When we consider the destiny of annulates, principally food for each other, or for larger animals, we cannot wonder that the same nicety of reasoning power and of sensation, which vertebrates enjoy, has not been given them. To what good purpose would it have tended, had nature furnished creatures so obviously the sport of wind and wave, so obviously liable to continual loss of limb, so obviously designed the living food of others, with that constant apprehension of danger, and that acute sensation of injury, which we ourselves possess? Certainly to none. Their brain does not reason, their covering does not feel. This bony covering or skeleton of annulates gives them shape, and, like the skeleton of vertebrates, affords the naturalist some of the best characters for distributing them into groups. It is transversely divided into thirteen segments, or rings; whence the term *annulate*. To each of these rings names have been lately given by Mr. Newman, in the work before alluded to, the *Entomological Magazine*. Attached to these rings are the organs of locomotion; and the number, position, and developement of these are very various; and a knowledge of these variations is, consequently, not only highly interesting, but absolutely essential to the right understanding of the economy and classification of these wonderful creatures.

The muscles, in annulates, are very various in their proportions; we shall, however, always find them beautifully adapted to the labour they have to perform; and their degree of developement operates immediately on that part of the skeleton which covers them, by a visible increase or decrease in size of the bony plates of which each segment is composed. It not unfrequently happens in glowworms, moths, &c., that, in the same species, one sex is provided with wings and the other sex wants them entirely: in these cases we find that, in the females, there is a tendency to equal developement of all

the segments; whilst, in the males, the wing-bearing segments are both increased in magnitude and altered in form. By dissection we find that those muscles which, in the males, are essential to move and guide, with great power and rapidity, the organs of flight, are become obsolete, or rather repose in a quiescent and undeveloped state, in the inactive females, which are doomed never to traverse the realms of air. Observe, again, the common ant. Compare, in a winged ant, the wing-bearing segments with the same parts in a worker which is constantly without wings, and you cannot fail to be struck with the difference in their size. In autumn, large wingless ants are not uncommonly seen with the wing-bearing segments precisely similar to that of the winged ants: these are females which have once possessed wings, but which have, on settling down to form a new colony, stripped off these organs as useless in the subterranean life they are about to lead.

We must, however, in making a law for the appropriation of muscular developement to the extent, strength, or activity of the organs it has to govern, be ever on the watch for the operation of yet more positive and unvarying laws, which may supersede the operation of the one we may assume. Specific gravity is one of these. The lobster, which is so nearly equal in weight to its own bulk of salt water that it floats in it with perfect ease, can, in that medium, move its ponderous claws with the greatest activity; but in the air, unless the governing muscles, and consequently that portion of the body which they occupy, were increased at least tenfold in magnitude, these claws would be unwieldy and useless. If we hold a lobster up by the back, we find that these claws are too heavy to be employed: the forceps will pinch, and that severely, but the object must be placed purposely in their way, the animal possessing no muscles which will raise them sufficiently to seize an object on a level with its head. Still we must not conclude that the annulates inhabiting water are invariably thus unfitted for exertion in another medium; for this is by no means the case; many possess a form and organs equally adapted for living in the water or on the land.

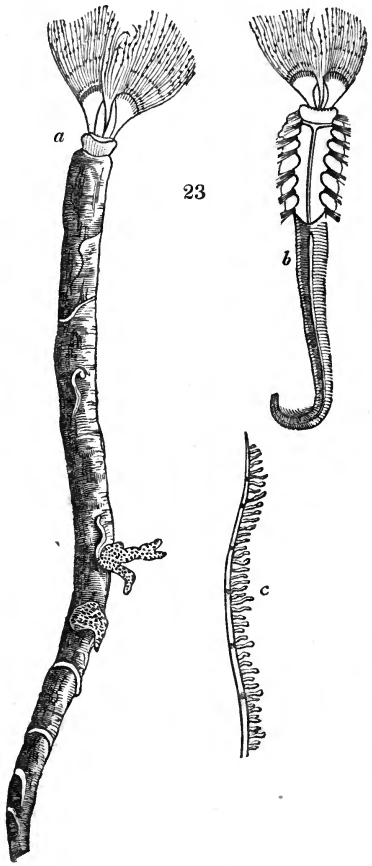
Ω.

January 16. 1834.

(*To be continued.*)

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

18. SE'RPULA TUBULA'RIA. (*fig.* 23.)



Synonymes. — Sérpula tubulària, Mont. Test. Brit. p. 513. (1803), Turt. Brit. Faun. p. 202. (1807), Fleming in Edin. Encyclop. vol. vii. p. 67. t. 204. f. 9., Penn. Br. Zool. vol. iv. p. 362. (1812), Dillw. Cat. Rec. Sh. p. 1083. (1817), Fleming in Edin. Phil. Journ. vol. xii. p. 243. (1825). Sérpula arúndo, Turt. Conch. Dict. p. 155. (1819), Berkeley in Zool. Journ. vol. iii. p. 229. (1828). The figure there referred to I have not seen.

? variety. — The tubes clustered. Sérp. tubulària, Mont. Supp. p. 171. (1808), Turt. Conch. Dict. p. 154. t. 24. f. 84.

Habitat. — The sea; affixed to old shells, particularly bivalves. Coast of Devonshire, *Montagu;* Weymouth, *Berkeley;* Zetland, *Fleming;* Berwick Bay, *G. J.* The variety has been found on the coasts of Devon and Essex; and, of a smaller size, in Dublin Bay, *Turton.*

a, The animal in the shell, natural size. *b*, The animal removed from the shell, natural size. *c*, A single filament of a branchial tuft, magnified.

THIS splendid worm was first discovered by Colonel Montagu; and although it has been since noticed by several conchologists, yet as none of them, except Mr. Berkeley, has taken any notice of the animal, it may not be deemed an uninteresting subject for these illustrations, particularly as the figure alluded to is contained in an expensive work, in the hands, perhaps, of few readers of this Magazine; and the figure itself I was never able to procure.

Sérpula tubulària is the largest species of its genus found

on our coasts, and has been usually considered among the rarest. The shell is from four to five inches long, and sometimes more, but the animal tenant does not exceed three. The body of this is vermiform, flattish, distinctly annulated, of a reddish-orange colour, stained with irregular blotches, from the opacity of the viscera and their contents. The anterior extremity is obtusely truncate, and on it are placed two large fan-shaped bundles of filaments of a yellowish colour, beautifully marked with scarlet spots. The filaments in each bundle are numerous, and are united at the base into a fleshy stalk, which again is directly connected with the head, on which also some scarlet spots are distributed. Each filament is simple, but pectinated along the internal edge with a close series of short blunt processes, which are not visible without the aid of the magnifier. The anterior third of the body is covered with a thin brown membrane, divided on the ventral aspect, where the margins are free and somewhat undulated; they are also furnished on each side with seven little brushes of bristles, which appear to be partly retractile. These brushes are placed at equal distances; the anterior, perhaps, a little closer; and at the side of each there is a scarlet bar or spot; the bristles in each are very slender, numerous, yellowish, smooth, and acutely pointed. The remaining portion of the body is divided into very numerous short rings, on the sides of each of which there is a thickened puckered spot, something like a beginning tubercle; it is grooved along the back, and tapers to a rather obtuse end, where it is sparingly clothed with some delicate hairs. The ventral surface is convex, smooth, and flesh-coloured; and the anus is terminal, there lying underneath it a long white spot, produced, perhaps, by some dilatation of the intestine.

The shell, as we have said, is from four to five inches long, and as thick as a goose-quill. It is cylindrical, gradually tapered at the posterior end, where it becomes more or less flexuose, and where it is affixed to the foreign body whence it takes its origin. The attachment in our specimen was broken off. The colour is opaque white, and the smooth surface is partially covered with corallines and smaller Sérpulæ. The margin of the aperture is circular, smooth, and even; the other extremity is closed.

I kept the individual here figured for several days by me, to observe its motions. The worm would sometimes remain for hours concealed in the shell: and, when it ventured to peep out, the branchial tufts were sometimes slowly and cautiously protruded, and sometimes forced out at once to their full extent. After their extrusion they were separated and expanded, as in the figure, and lay at perfect rest on the bottom

of the plate, in unrivalled beauty, and an object of never failing admiration. The worm, however, seemed never either to slumber or sleep; for, on any slight agitation of the water, occasioned, for example, by walking across the room or leaning on the table, it would at once take alarm, and hurriedly retreat within the shelter of its tube. It was never off its guard, and would often, when lying apparently in calm indulgence, suddenly withdraw, in evident alarm, without a cause but what was gendered by its own natural timidity; for the phantoms of dreams are not, it may be, the visitants only of higher intelligences, but come as they like, in a fearful or cheerful mood, even to these lower things. It never protruded itself farther than is shown in *fig.* 23. *a*; and, after becoming weak and sickly, it first threw off one half of its pride, a branchial tuft; and after several hours the other was likewise cast away, when the poor mutilated creature buried itself, still living and to live for a day or so longer, in its own house and cemetery.

The anus is at the posterior extremity, as in other worms; but the remains of its food are ejected from the mouth of the shell, in small egg-shaped pellets. By what contrivance this is done, I do not know: are the pellets forced along the dorsal furrow? The fan-shaped fascicles are its breathing organs; and the brushes of bristles in the sides of the mantle are the organs which enable it to move up and down the tube, assisted, undoubtedly, by the rough spots on the margins of the body. This is traversed down the centre of the back with a vessel filled with red blood, and which sends off minute branches to almost every ring.

Mr. Berkeley has attempted to draw a distinction between Sérpula arúndo and tubulària. The former, he says, may be known "by its more slender form and delicate substance; neither is the aperture expanded, as in S. tubulària. The animal differs from S. tubulària in its oblong dorsal area; while that of the latter is much attenuated behind; and in the absence of the operculum." Now, if we turn to Montagu, the original describer of S. tubulària, and whose name therefore ought to be retained, we shall find him telling us that the animal has no operculum; and his description of it agrees exactly, so far as I am able to judge, with Mr. Berkeley's. Indeed, it seems to me, that this very acute and excellent naturalist has confounded the S. tubulària of Montagu with the S. *vermiculàris* of authors: for, on this supposition, his remarks on their distinctive characters will be found perfectly correct and decisive.

Berwick upon Tweed, Feb. 19. 1833.

ART. VI. *Illustrations of some Species of British Animals which are not generally known, or have not hitherto been described.* By C. M.

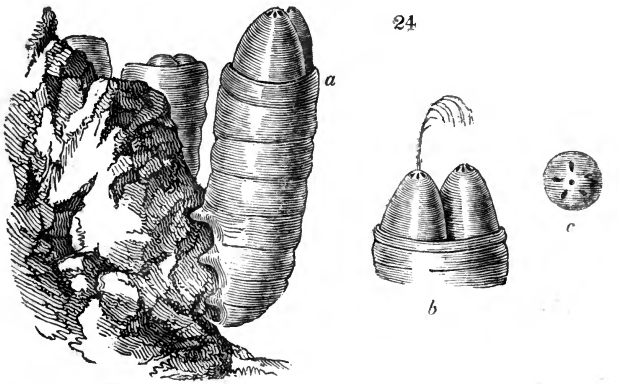
[" Segnius irritant animos, demissa per aures,
Quam quæ sunt oculis subjecta fidelibus." HOR.

——— " What we hear,
With weaker passion will affect the heart,
Than when the faithful eye beholds the part."
FRANCIS's *Translation.*]

Sir,

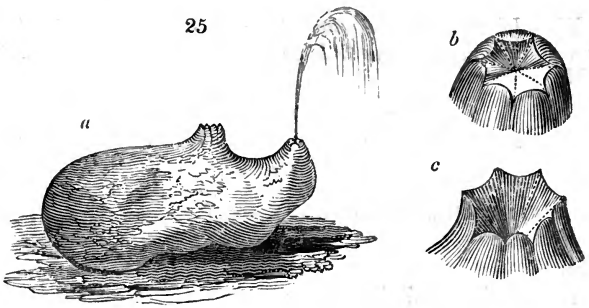
I SHALL feel gratified if the accompanying contributions to the British Fauna, " a very short paper and very long drawings," should meet with your approval, and obtain a place in your journal. Believing that natural history will, in this country, be much more advanced by presenting accurate sketches of its objects, than by the most voluminous descriptions unaided by them, I shall, confident in the attention I pay to the delineation of those I forward, continue to supply you, from time to time, with such of the animals I meet with as appear to me totally new. I am, Sir, yours, &c.

C. M.



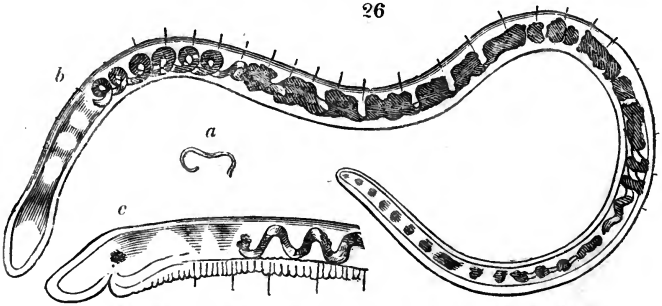
ASCI'DIA? GE'MINA. (*fig.* 24. *a*) — Body coriaceous, elongate, cylindric, adhering to the rocks by 5 or 6 roots, of a greenish brown colour, surmounted superiorly by two mammiform processes (*b*), each with a terminal orifice (*c*) surrounded by 5 oval orange marks. These processes are retractile, but easily made to protrude by pressing the body; and, on continuing it, water is projected in jets from both orifices. It adheres very strongly to the rocks, a number of them being generally found within the limit of a few inches.

25



Asci'dia? *Holothu'ria?* a'nceps. (*fig.* 25. *a*) — Sessile, elongate, irregular in form, obscure greenish yellow, one of the apertures lateral, erect, subterminal. Mouths crateriform, with 8 or 9 segments, from each point of union a row of bright yellow oval dots leading directly to the orifice, which, on pressing the body, emits a jet of water. The interior structure was not examined, so that no opportunity occurs of referring it to its proper position. It appears to approach in form to Ascídia prùnum. Dredged up off Carrickfergus, Belfast Lough, August, 1811. (*b*, *c*, Views of the mouth, magnified.)

26



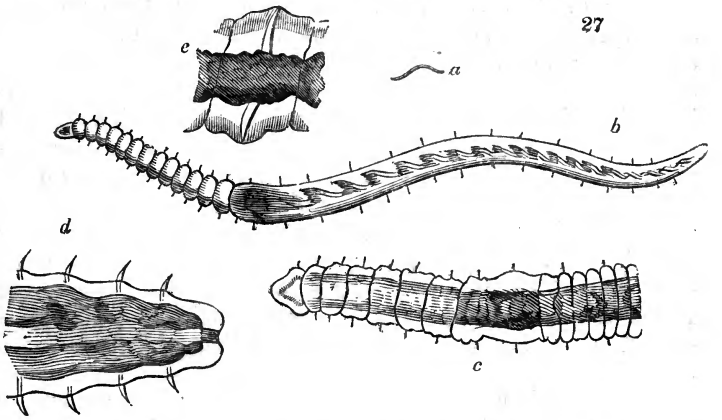
a, The animal of the natural size. *b*, The same magnified.
c, A profile of the anterior portion magnified.

——— "An atom is an ample field." Cowper.

Na'is Lin. *serpenti'na Gmel.* (*fig.* 26. *a*) — Hyaline; the convolutions of the intestinal canal obvious. Two dark spots mark the position of the eyes, which seem made up of numerous irregular black points. Mouth immediately beneath the eyes. The snout rounded. A single row of simple spines is protruded from the belly at the will of the animal; a sheath, easily distinguishable, receives them when retracted. The intestinal canal continues in constant action.

If this be Nàis *s*erpentìna, and I am disposed to believe it is, it agrees indifferently with the generic character of Lamarck, and the specific of Müller. The former describes the

mouth as terminal, while in mine it recedes considerably from it; the setæ lateral, instead of a single ventral row, and the body flattened, instead of cylindric. Müller's description, and his figure does not agree with it, is "setis lateralibus nullis, collari triplici nigro." Mine is totally deficient in the latter quality, but agrees with the former, though possibly in a different sense from that intended by Müller. It was found entwined round the bracteas of *C*hàra fléxilis.



*L*umbrì'cus? Clite'llio *Savigny?* pellu'cida. (*fig.* 27. *a*) —Minute, hyaline, with porrectile setæ, one series on each side of the body, retractible at the will of the animal, within a sheath, which can be distinguished, exterior to the intestinal convolutions. Neither eyes nor mouth is apparent. The rings are strongly marked anterior to the position of the sexual organs, and from each of them proceed 2 lateral setæ, which are, at *e*, exhibited retracted: they were exserted at each violent movement of the animal, or about once every 20 seconds. *a* Represents the animal of the natural size; *b*, magnified; *c*, the anteal extremity; *d*, the anal, with the setæ shot out. It was found among moss. The *L*umbrìcus minùtus of Fabricius and Müller is marine, else the description answers tolerably.

Art. VII. *A Description of a Mode, practised by M. Klotzsch, of drying Specimens of Fúngi for Preservation in Herbariums.* By William Christy, Jun. Esq., F.L.S., &c. &c.

Sir,

If the following brief notice of an easy and successful mode of preserving *F*úngi should be deemed worthy of a place in

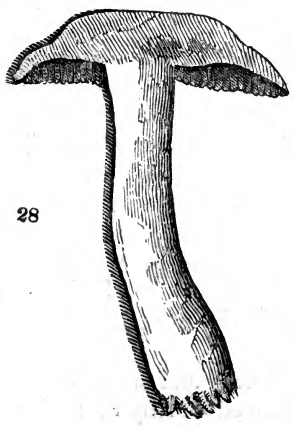
your pages, I shall be gratified. I enclose, for your inspection, some specimens, which have now been prepared between three and four years, and which, you will, I think, allow, give a very fair idea of the *Fúngi* in their growing state.

I am, Sir, yours, &c.

Clapham Road, Feb. 1834. W. Christy, Jun.

The extreme difficulty of preserving *Fúngi*, so as to give any idea of their colours or forms, except by the cumbrous and expensive plan of putting them in spirits, must have struck every one who has paid any attention to this beautiful branch of botany. When on a visit, several years since, to my excellent friend Dr. Hooker of Glasgow, I became much interested with a mode which M. Klotzsch (who had then the care of the doctor's herbarium) adopted to preserve various *Fúngi*. M. Klotzsch was good enough to give me some lessons on his plan, by which, I am sorry to say, I have as yet profited little; but I have done at least enough to satisfy myself that it is not only practicable, but easy and very successful. Preserving *Fúngi* in spirits, besides the expense for spirit and glasses, is of little use as regards their colours; whereas the plan alluded to preserves the colours, in *most* instances, in their native brilliancy. M. Klotzsch published, I believe, an account of his plan in that valuable work the *Botanical Miscellany*; but as that work, from its comparatively high price, has a much less extensive circulation than your Magazine, I think I may be rendering a service to some of the lovers of *Fúngi* by communicating, through your pages, a sketch of the mode as known to myself.

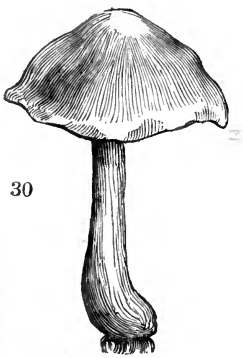
The plan which, in pursuance of M. Klotzsch's instructions, I have adopted, is as follows:— With a sharp knife I divide the fungus through the pileus and stipes into two parts, one rather larger than the other. From the inside of the larger portion I take, in the same manner, a thin slice (*fig.* 28.), which thus affords a complete vertical section of the fungus, showing the peculiarities in the structure of the stipes, pileus, and gills. The remaining portions are then to be treated as follows: — Carefully separate the pileus (*fig.* 29. *a*) from the



28

29

stipes (*b*); scrape out the gills, and, where the fungus is very fleshy, remove also a portion of the solid part of the pileus. The vertical section, and the respective portions of pileus and stipes, are then to be placed in blotting-paper, and submitted to pressure, as is usual in drying plants. It is, however, advisable to expose them to the air for a short time, in order to wither them, and also to apply the pressure at first gently, as they are otherwise liable to split and crack. If the fungus is of a succulent nature, M. Klotzsch recommends drying them within the influence of the fire, and changing the papers several times a day. When dry, the vertical section, with the pieces of stipes on which are to be placed the respective portions of pileus, may be glued upon paper, and the whole will give a very good idea of the general appearance of the fungus. (*fig.* 30.)



30

Where a sufficiency of plants of a species occur, sections may be made of them in their different stages of growth, showing the various degrees of developement. (*fig.* 31.)

The very vivid colours of some *Fúngi* (*Agáricus* eméticus and others), are, in specimens dried in this manner, beautifully preserved, as well as the forms of some of the most fragile and delicate species.

The advantage which this mode of preservation possesses over all others, by enabling us to place the specimens in almost as little space as other plants in our herbaria, renders it worth the notice of all botanists.

31

I trust I have made myself intelligible; but any one desirous of farther information would doubtless find it in M. Klotzsch's paper. Not having the *Botanical Miscellany* at hand, I can only speak from memory; but I think the paper will be found in the fifth or sixth number of that work [Vol. ii. p. 159. t. lxxxiii.]

The dried specimens of funguses sent by Mr. Christy are affixed to four tablets of paper, and are thereon named *Agáricus squarròsus Müller*, *A.* peronàtus *Bolt.*, *A.* eméticus *Schaeff*, *A.* praténsis *Pers.* The place and time in which they were obtained are added: the time, as to the year, is 1830. Their appearance on the paper is very pleasing, and their characteristics seem most satisfactorily exhibited. *A.* squarròsus is illustrated by one specimen, very young; a vertical section of another, a little older; a profile of one full grown; and a vertical section of another full grown: this last shows the relative thickness of the pileus, the depth of the gills, and the structure of the stipes. *A.* peronàtus is shown in two profiles and two vertical sections: *A.* eméticus by a profile and two vertical sections; the external colour of the pileus is a fine fulvous red: *A.* praténsis by two profiles, and four vertical sections of as many plants in progressive stages of growth. The condition of all the specimens proves the excellence of this mode of preparing them, and this must render a knowledge of it very useful to every student of *F*ungi. We hope to see a descriptive notice of it given in the volume on the funguses of Britain, now in preparation by Dr. Hooker: it will then be under the eye of every one who may endeavour, by the help of that work, to attain an acquaintance with these plants.—*J. D.*

Art. VIII. *Short Communications.*

Mammiferous Animals.—*Fox at Deptford.*—Sir, I scarcely know whether you will think it worth noticing among your Short Communications, that a fox should have established an "at home" within four miles of London Bridge. My garden is one that is rather remarkable for having its own way. Some years ago, I took a great deal of pains to introduce into it all kinds of wild flowers, shrubs, and trees, and these have grown uninterruptedly and formed large masses of underwood, which, being principally composed of bramble and dog-rose, have established a seat of empire not easily to be shaken. What is termed, vulgarly, a tide-ditch, elegantly, a canal, which the river Thames fills at high water, surrounds more than two thirds of the garden. In this spot a fox established his abode, and made himself very happy for more than six weeks. The neighbours lost their fowls, ducks, pigeons, and rabbits. Many a long face have I seen pulled about their losses; many a complaint of the "howdaciousness" of the rats, the cats, the thieves, and the new police; in all which I

took very great and sympathising interest. In the mean time, I used to sit in my summer-house of an evening, and watch master Reynard come out of his retreat; and a great amusement it was to me. He would come slowly trotting along, to a round gravelled place, where four paths met; then he would raise himself on the sitting part, look about, and listen, to ascertain that all was safe, and, being satisfied of this, he would commence washing his face with the soft part of the leg, just above the pad. After this operation was well performed, he used to lie flat down on his belly and walk deliberately along with his fore legs, dragging the rest of his person along the gravel, as though it were quite dead, or, at least, deprived of motion; then he would run round and round after his brush; which I could see he sometimes bit pretty severely, and on such occasions he would turn serious all at once, and whisk his brush about in a very angry manner. Poor fellow! a neighbour happened to see him cross the ditch by moonlight into my garden with an old hen in his mouth. The outcry was raised; a search was demanded. Next day there came guns, dogs, pitchforks, and — neighbours; the upshot of all which was, that poor Reynard's brush is dangling in my little wainscotted room between an Annibal Caracci and a Batista. — *E. N. D. Dec.* 14. 1833. [Facts on the fox will be found in II. 457., IV. 11. 24., VI. 207., VII. 181.]

Instances of depraved Appetite in Mammiferous Animals. (V. 714., VI. 364.) — Sir, The case of a dog's eating heath mould, related in p. 714. of Vol. V., is, as you observe, more strange than the case I have, in Vol. III. p. 364., described, of a dog's eating oats, as oats are, as you have observed, of the nature of part of a dog's food; such as, "bran, pollard, barley-meal," &c.: but I think that the dog's eating mould was occasioned by a depraved appetite, similar to that in human creatures who eat coals, mould, &c., of which many cases are on record. I lately met with a case of this disease, mentioned in a recent work on the West Indies. The writer states that he saw a slave who was in the habit of eating earth in large quantities. He seemingly considered it a luxury. Yours, — *J. M. Haughton le Skerne, County of Durham, August* 20. 1833.

A somewhat large, and a very interesting, collection of instances of depraved appetite in the human species will be found in Good's *Study of Medicine*. Humboldt, in his *Tableaux de la Nature*, informs us that the Otomacs sometimes appease their hunger by distending their stomachs with prodigious quantities of slightly baked clay.

In farther illustration of this subject we present

Some Instances of depraved Appetite in the domestic Rabbit, taken from a communication on the habits of this animal, contributed by our correspondent, Wm. G. Barker. After he has described the usual articles of food with domestic rabbits, he thus proceeds: —

They will drink ale with avidity, but in this matter, I must own, they show much greater sense than pigs, two or three spoonfuls sufficing them. But the appetite of the rabbit appears to have no bounds: vegetables are their natural food; but I unhesitatingly assert that they feed upon animal substances both dead and living. Some few of your readers will undoubtedly feel surprised at this declaration: I have, however, seen it myself. Depravity of appetite is far from being peculiar to the rabbit. If time and space allowed me, I could refer to a kestrel (Fálco *T*innúnculus *L.*), now in my possession; and to some remarkable anecdotes of hyænas, by Professor Buckland, in his valuable *Reliquiæ Diluvianæ*. Of these in their season. Many, I may say the whole, of your readers have, in all probability, kept rabbits in their younger days, and they must, therefore, be well aware that the male has so great a propensity to devour the young ones, that breeders of rabbits always remove him from the doe, at the time of kindling. As soon, however, as the young ones can see, there remains not the slightest danger to them, from him *; on the contrary, he will sometimes display great ferocity in defending them from their enemies. Far otherwise the doe: if the young are born dead, as they not unfrequently are, they are, in most cases, immediately devoured by the mother; and some have this unnatural propensity in so strong a degree, that the offspring, though born alive, share the same fate. I have known one remarkable and solitary instance of a doe who killed her whole brood, when two months old. They were tolerably fine young rabbits, lively, and appeared healthy, but there was something in them which exasperated their mother, for she seemed wholly bent upon destroying them. It was not done at once, nor in a few hours, but occupied her about ten

* I have known an instance of a male inducing the death of a young rabbit, between a third and half grown. The latter, and all those of the same litter, were moving about on the floor of the apartment, out of their hutch, when the male forced open the door of his own hutch and sprang among them, and bit through the skin of one of them behind the shoulders. In the struggling of the young rabbit to get away, and the detention of it by the male, the skin, in an instant, was torn off a considerable portion of its back, although not wholly detached from the portion of skin left remaining; insomuch that it was judged proper to kill the little rabbit instantly, and this was done. — *J. D.*

days. I do not, however, mean that she was employed the whole of that time in the operation of slaughtering, as two or three days intervened between the death of each. It was painful to see her chase the little unoffending creature round the hutch, in frenzied passion, and literally thirsting for its blood; but there was no alternative: to remove it from her was certain death, to allow it to remain was to leave it in the jaws of destruction: one after another, they all were slain. One of those which perished in this manner had received a wound from her teeth and claws in the side, through which the bowels protruded. As soon as it was dead, nay, even before the breath had left the mangled body, the unnatural brute, and the surviving young ones, eagerly devoured the whole of the carcass, and even the bones, leaving nothing of their horrid banquet but a portion of the skin, the legs, and, if I mistake not, the head. Until then, I had thought maternal love inviolate in the brute creation. I have since found, from other sources, that they share the depravity of man. If any person presumed to touch one of the young rabbits above mentioned, its death was sure to follow almost immediately. What renders the above account more remarkable is, that the animals had just received their morning's allowance of food; but the deaths generally happened after feeding time. May I here be allowed to ask some of your medical readers, might not this extraordinary and unnatural depravity arise from some disease in the organs of smell, and, perhaps, in the stomach also? The mother invariably examined them, which rabbits always do, by smelling, previous to commencing her attack. — *Wm. G. Barker. East Witton, March* 22. 1833.

Gooseberry-eating Dogs. (VI. 364.) — Grammarians tell us of three degrees of comparison: J. M.'s dog is positive; J. D.'s is comparative; mine is superlative. The book people, and the technical people, and the anti-Natural History Magazine people may laugh at all three, dubbing us, by way of epithet, *stultus, stultior, stultissimus:* but no matter; I cannot let my poor old favourite Crib, and his favourite appetites, be forgotten like a common dog or a common propensity, when the oat-cracking, gooseberry-crushing candidates for immortality are eternised by Mr. Loudon.

My friend Crib was a dog of talent and discerning; he was bred at Ely, and educated at Cambridge; having graduated with his master, as Bachelor of Arts, in the year 1821. Like Ulysses *, he was one of the ugliest and most eloquent of animals, and his very exuberance of black

* " Non *formosus* erat, sed erat *facundus*, Ulysses." OVID.

whisker and eyebrow, and his unceasing bark, made him noticeable by day and night. I never was given to such pastimes, but I am told he would dive after a waterfowl, and draw a badger; accomplishments some years since in high odour with puppies at the Universities; now, I hope, in these reforming days, abandoned for more philosophical and classical pursuits. Crib, therefore, did not want courage. He was Cerberus from that time till his death, in 1831, at my residence in Suffolk, and during those ten years became celebrated as a guardian by night, a companion by day, an enemy of poachers, the friend of cats, and, like J. D.'s Toby, a mighty connoisseur in gooseberries. I have no time here to tell all his adventures with a monkey and a snake, which I kept with him as playmates; but I may add that Toby, with all his "taste" and "well-bred" enjoyment, does not appear to have arrived at Mr. Crib's state of renown. I found him, one day, in the garden, performing Toby's feat of gooseberry-crushing; thereby discovering the depredator, whom we had long unjustly considered a two-legged dog. In his heedlessness, he swallowed a berry, in which was a wasp. The wasp stung his throat; and the agony, to judge by his grimaces, must have been intense. From that hour he became the mortal enemy of the whole race of wasps, and his skill in destroying them was remarkable. Baring his teeth by the withdrawal of his lips (V. 386.), he would wait under his favourite bushes till the wasps appeared, and then, snapping at them, he contrived to kill them without injury to himself. I have seen dozens of those marauders mingled with the gooseberry husks under the bushes, but I never recollect an instance of their doing their destroyer an injury after the first insult. The dog never forgot the circumstance; a wasp ever after became an object of pursuit with him. This, however, was not all: amongst other things, Crib, like his namesake of the ring, was a tippler as well as boxer; and nothing delighted him so much as a saucerful of warm elderberry wine, which he regularly partook at Christmas with the family. I have seen him, more than once, "pretty considerably decent tipsy," as they say in America; but justice compels me to say that this was his only failing: a more moral dog, in every other respect, never lived, and one more regretted never died. The day I left my native place, he laid himself down at the foot of my chair, burst a blood-vessel, and expired. He sleeps in his quiet grave, under the shadow of one of the most splendid oaks in all Suffolk; and his epitaph might put to the blush many, perhaps, who may call its writer, for this

mention of it, simpleton. — *W. B. Clarke. Stanley-Green Cottage, near Poole, July* 2. 1833.

Acts, possibly analogous, in the Lion and the Young of the Domestic Cat. — In playing with a cat, young enough not to refuse to play, it is observable that, when the cat has enclosed your hand in its (all four) paws, and has also applied its mouth to your flesh, ready to both lacerate and bite you at the very next tickle, should you adventure one more, yet, if you do not adventure one more, and hold your hand perfectly still, you may usually save yourself the laceration and biting threatened you, and, at the cat's own good pleasure, be entirely released from its grasp. I have fancied there is a similarity in this conduct of the cat of our hearth, and that of the lion to Major Woodhouse, as described by Mr. Waterton. (p. 5.) *J. D.*

A few Words on Cats.—J. W. L. (V. 275.) tells of a cat at Dorking, which never ate the mice he caught, but laid them at the feet of the first person he met. My father had a white male cat, about the year 1815 (when we resided at East Bergholt, in Suffolk), which was even more sportsman-like than his Dorking compatriot. In a meadow bank, behind the house, were abundance of rabbits; the cat would go thither, and bring away his game, even rabbits more than half-grown, and, without injuring them in any way, would take them into the house, lay them at the feet of any one he met, and retire to the door, to prevent the escape of his prey. This I remember to have occurred frequently, till, in one of his poaching expeditions, poor Tom was taken in a snare laid for his game, and delivered over to the executioner, to be done with according to game law.

J. D. (V. 276. and 674.), X. (V. 674.), and Mancuniensis (V. 717.), speak of cats without tails. The last observes that they are plentiful in the part of the Isle of Man called "the Calf of Man." This can hardly be, as the Calf of Man is a smaller island at the southern extremity of Man, and is not peopled or inhabited, save by the family of the person who has charge of the splendid lighthouse erected there. I do not exactly agree in the description given by Mancuniensis, though the tailless cats of Man are tall. When I was in the island, with some college friends, in the long vacation of 1820, we had much amusement with these curious creatures. I saw several in the huts of the peasantry, amongst the mountains, between Ramsay and Peel Town; but as the honest people did not speak English, and we spoke no Manx, I learned nothing of their history there. But mentioning the subject to a person at Balla Salla, near Castle

Rushen, and not very far from the Calf, I was informed that a vessel from Prussia, or some port in the Baltic, was wrecked many years ago on the rocky shore between Castle Rushen and the Calf, and that, on her driving close in to the land, two or three cats without tails made their escape from the bowsprit, and were taken by the wreckers; and that these were the first of the kind ever seen in the island. I do not say that this is the truth, but I was told so; and, if it be the truth, the original breed is not of Manx extraction, but must be sought out in the north of Europe. I do not agree, though, in the emendation of Mancuniensis, who recommends (V. 717.) reading "Isle of Man" for "Isle of Wight;" for Dr. Leach's cat might have been wrecked there, or imported thither, as well as its contemporaries to the Isle of Man.

Whilst on the subject, I will allude to a tale which was told me when a boy, of an extraordinary instance of the powers of abstinence of the cat. I forget the minutiæ of the story, but it ran thus:—A cat, which belonged to a vessel from the port of Mistley, in Essex (a place about four miles from East Bergholt), was missing when the vessel sailed from some harbour in America, and no one could tell what had become of it. But on arriving in a part of the Channel where it was necessary to unfurl a sail that had not been employed till then during the voyage, the cat was discovered, in a sadly emaciated condition, in the folds of the sail, and, notwithstanding her long imprisonment, still alive. My informant was the late Mr. Dunthorne of London Street (a young self-taught artist, of rising and deserved celebrity, whose industry, taste, and acquirements, in spite of difficulties and want of "appliances and means to boot," made him an extraordinary instance of the power of genius and talent, and would have wrought out for him a distinguished place in English biography, had not a too early death taken him away from us*); but I cannot now, in consequence of his having recently paid the debt of nature, appeal to him for further information. If, however, there be any feline Sadducees amongst your readers, I would venture to assert that this story may have been true, judging from an instance which I can fully attest by the evidence of self-experience, and the testimony (if required) of two or three friends. The Dutch commenced the siege of Brussels, in the revolution of 1830, in the month of September. On the 24th of that month, they took possession of the house of my friend, Dr. Verstraeten, rue de Namur; and, after

* He deserved this paragraph, and many more less parenthetical. He was born at East Bergholt, April, 1798, and buried in November, 1832.

barbarously destroying his furniture and drinking all his wine, shut up his cat, with the empty bottles, in a closet in the kitchen. As the family were driven out of the house at the point of the bayonet, to seek shelter where they could, no thought was taken of any thing but their preservation. On the 15th October (just 21 days afterwards), I accompanied Dr. Verstraeten and some friends to his house, to see the ruins, and, on descending to the kitchen, the door of the above-named closet was opened, and immediately the cat, which had remained there a prisoner since the battle, came bounding out with a look and a cry of hunger and joy. Dr. Verstraeten remarked himself, that the cat was supposed to have been lost or killed, and expressed his surprise at her existence so long without food. The poor animal could not have had any food (unless a mouse or two) during her imprisonment, as the house contained nothing which had escaped the piratical hands of the besiegers, save a solitary bottle of preserved gooseberries, the only entire article in the house. The poor thing looked as wretched as possible; but she devoured most voraciously some food we procured from a house opposite, and lived to do justice to her deliverer from "durance vile."

Since I wrote the above, I have been informed, by Captain T. Festing, R.N., of this place, that a favourite cat belonging to his family, which was transported from Andover hither, suddenly decamped, and, after being on his travels nine days, arrived, "hungry and sore bested," at his old quarters, having discovered his way across the country without a guide. So much, for the present, on cats, English, Manx, and Belgian. — *W. B. Clarke. Parkstone, near Poole, Dec.* 18. 1832.

Additional note to my short paper entitled "A few Words on Cats." — *W. B. C. August*, 1833.

"In the Sappho, lately arrived from Nova Scotia, at Bideford, was found the cat belonging to the vessel, about the middle of the cargo. She had been a prisoner 29 days, and, of course, had nothing to subsist on during that time; she was still alive, but almost a skeleton. The captain gave her some milk, of which she drank greedily, and is now slowly recovering." (*Western Luminary*, Aug. 6. 1833.)

The Baltic trader, Mary, Capt. Ritchie, arrived a few days ago at Leith, with a cargo of flax from St. Petersburgh. On unpacking one of the bundles of flax, a cat was found bound up and much compressed within it, but still alive. The vessel had been 28 days on its passage. The cat revived. (*Berrow's Worcester Journal*, Oct. 24. 1833.) — *J. D.*

Some of the Inhabitants of the Isle of Man ascribe the Origin

of their tailless Cats to a Sport of Nature.—Mancuniensis (V. 717.) remarks that the cats without tails, in the Isle of Man, are more like the hare or the rabbit; and this circumstance may account for such an impossibility being stated as the following, which appeared in the *British Traveller* (May, 1823): "There is in the possession of Mr. Henley, at Chatham, a cat, which has littered a kitten and four rabbits!!" A writer in the Manx paper, in allusion to the above, remarks:—"We are inclined to believe the four rabbits to be nothing more than kittens of the same description as some cats in this island, viz., without tails, and which must originally have been a freak of dame Nature's here, which she is now showing at Chatham."—*James Fennell. Laytonstone, June*, 1833.

P. S. In the possession of the friend in whose house I am at present writing is a female cat, which, I am informed, on one occasion bit off the tips of the ears of her kittens just after they were born. Is not this a modified instance of that perversion of the natural affection (*storgē*) which sometimes induces animals to devour their own young?—*Id.*

Unusual Lengthening in the Cutting Teeth of the Rodent Animals.—In II. 134., III. 27., VI. 21. 24., instances of this effect, produced in the rabbit, and, in VI. 390. 393., in the rat, are given. I add a notice of an instance which I have known to obtain in the flying squirrel. Some time after the appearance of the number of this Magazine for May, 1829, in which was given the first of the above notices, I was requested by a lady in this neighbourhood to examine a flying squirrel, a general favourite with her family. I found the upper incisors very much elongated, and inclined under the lower jaw; rendering it out of the little animal's power to take his usual food, as there was no possibility of the opposition of the extremities of the upper and lower incisors. I considered that the disease might be remedied, by removing such a portion of the upper incisors as would allow them to come properly in contact with those of the lower jaw. This I easily effected, by means of a pair of forceps. I have frequently seen the little animal since, and have had the satisfaction of observing him busily at work on his nuts, and of learning from his mistress that he has since that time taken his food as before the disease had occurred.—*John Reynolds Rowe. Wimborne, Dorset, Jan.* 1. 1834.

Among the numerous individuals of the common squirrel (*Sciùrus vulgàris L.*) which occur in British woods, is one with a discoloured coat often seen? On January 10. 1834, I learned that one with a party-coloured coat had, at some time

previous, been several times seen upon the lawn at (Mrs. Southwell's) Wroxham Hall, near Norwich. — *J. D.*

A Common Dormouse (*Myóxus avellanàrius* L.), with me, eats, of its own choosing, the A`phis lanígera *Ill.* and the caterpillars of the *Sphínx* ocellàta *L.* It is particularly fond of the grubs of the Balanìnus nùcum *Germar*, preferring, for the sake of them, the maggoty nuts to the sound ones; and I have known it eat the small caterpillars which are found in blackberries and pears. Are these appetites morbid ones, from the animal's domesticated condition? Cannot the animal be employed to avail us in gardening objects, as the caterpillars, &c., it might destroy would fully compensate the little damage it could do the fruit?—*John Perry, jun. Godalming, Surrey, February*, 1834.

A Mole, of a beautiful silvery ash-grey Colour, with an orange Mark under the lower Jaw, and a Line of the same Colour down the Belly, taken in this Neighbourhood, was lately brought to me. — It is probably the same variety as that mentioned in Griffiths's translation of Cuvier's *Règne Animal* as occurring in Germany; and does not appear to owe this peculiar colour of its fur to the effect of age. Other individuals of the same variety, and some also white, have been occasionally taken by mole-catchers with whom I have conversed. — *W. C. Trevelyan. Wallington, Jan.* 28. 1833.

The Singing of Birds at early Dawn in Summer-time. —

> The wonders and beauties which Nature displays
> Excite to devotion the soul;
> Her wonders teach wisdom, her beauties prompt praise,
> Pure bliss is the fruit of the whole.

When I lived in the cottage at the end of the garden that now adjoins the house I reside in, and my business called me sometimes earlier than I am now willing to leave my bed, I have been delighted in a summer's morning to hear the pleasing note of the goldfinch busy amongst the dew-bespangled foliage of the apple trees; the blackbird, perched on the highest branches of the highest trees, cheering its mate with its song; the lark caroling over my head; joined by the deep bass of a contiguous colony of rooks. In moments like these, I have found myself elevated and inspired with pity for those to whom, according to their own declaration, "this goodly frame, the earth, seems a sterile promontory," to whom "this most excellent canopy the air, this brave o'erhang'd firmament, this majestical roof fretted with golden fire, appears nothing but a foul and pestilent congregation of vapours." At times like these, I have made resolutions to rise earlier, that I might the more fully enjoy the beauties and the harmony of nature:

but my propensity to indulge myself in the arms of Morpheus has too often gotten the better of my resolution.

Larks always in fine weather hail the earliest dawn of day with their song, and sometimes sing before the dawn, as I have recently learned in a journey by the night coach (the Red Rover) from Cambridge to London. I and my fellow travellers were surprised to hear the singing of the lark as early as two o'clock on a frosty morning, on the 7th of May (1833). The subject furnished us with agreeable chat, and roused us from our inclination to sleep: before it was exhausted, we were greeted with the song of the nightingale and cuckoo. The house sparrow, as we approached near London, was chirping. The sun was rising. The metropolis of England was in view. We arrived at the Flower-pot (a sign suggested from nature), in Bishopsgate Street, almost forgetting that we had lost a night's rest.

Birds, at least Singing Birds, are Lovers of Music. [VI. 523.] — A goldfinch of neighbour ——'s, in whose room the Primitive Methodists hold their meetings, always sang with the congregation, whether by day or night. I have observed the robin, when I have whistled to him, appear pleased, and listen with attention. My nephew ——, who plays on the violin, had a linnet that always appeared delighted when the violin was played. The early singing of the lark, of which I have spoken, was possibly owing to the bird's being aroused by the sound of the guard's bugle; it was immediately after the guard's playing a tune that we observed the singing of the lark, in a field near Buntingford, the London side of Royston. *Rustici.*

At " vernal dawn" the larks pour forth a concert of music as they sit on the clods. I witnessed this on April 16. 1833, in passing some lands sown with barley, three miles north of Cambridge: the barley was just visibly up. — *J. D.*

The small dark brown Thrush of the Western Islands of Scotland, which W. L. deems of an undescribed Species. (III. 238., note †, VI. 218. 516., VII. 75.) — Mr. Blyth states, in VI. 516., that I have mistaken the redwing (*Túrdus iliacus*) for the brown thrush of the western islands. Now, I beg to say that the redwing, even at a considerable distance, is very easily distinguished from every other species of *Túrdus*, by size, attitude, and general colour combined together; for, although its watchful and listening air, and its colour, resemble much those of the fieldfare (*T.* pilàris), when this species is observed at a distance, yet it is so much less (being, indeed, the least of the genus), that there can be no mistake between the two. Besides, I have several times noticed it at a dis-

tance, by its own peculiar and distinguishing mark; namely, the large ash-coloured streak near the eye, so like that of the stonechat.

The dark brown thrush that I first saw in the Lewis, and have so often observed passing north in spring, is a very sober and plain-looking bird as to colour; and has nothing of the airiness and elegance of the redwing, being shorter and thicker; and is very sparingly mottled on the breast. In fact, both as to shape and colour, it might pass for a large edition of the hedge sparrow (*M*otacílla familiàris). I have, I am sure, seen hundreds of them, and not a redwing among the number. Moreover, I would refer to a footnote [note †] affixed to a communication of mine, in III. 237, 238., where it is mentioned that Mr. Macgillivray saw this same brown thrush breaking whelks on the shore. It must be allowed that this enthusiastic and now skilful naturalist (from nought else that I can suppose but innate modesty) took it for granted that these thrushes were of the common species (*T.* mùsicus). With not one tenth of his knowledge, I, with all the rashness of a little learning, when I heard them singing on these desolate shores, *guessed* that they must belong to a different species; and I hope I may be allowed to refer to and cite the above note. "I was greatly surprised to hear the song of the thrush resounding on all sides from the heathy and rocky banks of the sea ('wasting her sweet notes on the desert air'); but I have always suspected it to be another species, darker and less." And so I am, with all due deference to Mr. E. Blyth, still convinced it really is; and I beg that Mr. Blyth will not take it as anything like want of respect, when I use the freedom to suggest that there may be more things to be seen, among the moors and rocks and bosky glens of Scotland, than "he has yet dreamt of in his philosophy." What if there may be not only plants and birds, but two or three quadrupeds, that he has never seen? But, I would like to know, who has seen the nests of the redwing there?

I request to add that the migratory birds, in their journeys, alternately, to their native homes and their winter abodes, seem to keep generally along the "back-bone of the country." The redwing, after all, I take to be comparatively a rare bird; for, although I have seen redwings both in spring and November, I have seen but few. It is in the upland glens of Selkirkshire, Tweeddale, and Dumfriesshire, and not on the plains of Lothian, the Merse, or "the Laigh of Teviotdale," that the flocks of female chaffinches, grey linnets, thrushes, starlings, and snowflecks are seen. I well remember the

flock of grey linnets that used to congregate on the leafless branches of an old ash in my father's stack-yard, singing in lively and cheering concert, for eight or ten days, as they passed in November. * — *W. L. Selkirkshire, December* 20. 1833. [See also in p. 175. of the present Number.]

Owls capture Fishes for Food. — In addition to the instances of this fact already registered in I. 179., II. 288., V. 13., the following one, told me by a friend, may be cited. In the neighbourhood of Harrowgate there is a large building called the Observatory, which affords from its summit an extensive view. A pair of owlets, taken from a nest in an adjoining wood, were placed in a cage on the summit of the tower, and for nearly six weeks the old birds came every evening to feed them there. They brought them, in addition to mice and pieces of flesh, frequently fishes. The river Nidd is three miles from the spot. Could they have procured the fishes thence? — *A. Bloxam. Rugby, Warwickshire, Jan.* 1834.

An Instance of the Barn Owl's seeking its Food at Mid-day in sunny Weather. — I have once seen a barn owl on wing at between the hours of twelve and one o'clock in the middle of the day. The sun was shining brightly at the time. The owl, as the sequel proved, was seeking food. After I had watched it for some minutes, I saw it descend, and light upon the side of a bank of an old watercourse, and remain there for the space of a minute. It appeared to me to be working hard with its talons during that time, as if removing something that impeded its immediate attack on its prey. At the expiration of that period its labour was crowned with reward, for it then took wing, bearing away in its talons a fine mouse. — *A. D. April*, 1833.

The Food (*Contents of the Pellets*) *of Owls.* (V. 13. 727.)

* I am aware that there are often exceptions to these (as I suppose) general habits; for I have often seen hawks of different species skimming with great swiftness southwards over the downs and fields of these districts, generally during a fall of snow. On July 24. 1830, I met a small flight of water swallows (*Hirúndo ripària*), and, about ten minutes after, another, flying south over Bowden Muir, about seven o'clock in the afternoon. They were evidently on a journey; besides, it was nearly two miles from the Tweed, which they were apparently leaving. Again: a friend has told me that while himself and a companion were returning home early from a party in Edinburgh, on a foggy morning, they heard a flock of wild geese passing close over the city. They were aware of this from the repeated calls of the geese to one another, which calls were probably necessary to prevent separation: but they likewise distinctly heard the sound of their wings, which the stillness of the streets of Edinburgh at such an hour made easily distinguishable. The winged travellers were passing northward, as their course was indicated by their calls dying away in the increasing distance.

— A pellet, which I, about February, 1833, found in Bayswater meadows, on the flat top of a tree's truncated stem, left in a hedgerow as a huge post, contained the fur and bones of two field campagnols (Arvícola agréstis *Flem.*), as I have learned by submitting the skull bones to the inspection of an excellent comparative anatomist. — *J. D.*

The Carrion Crow. — Mr. Waterton's admirable history of the habits of this bird, and his able advocacy of its merits, in VI. 208. to 214., have given me, and must all who have read them, extreme pleasure. One vice, however, is chargeable on the crow, to which Mr. Waterton has not adverted. This bird has a strong predilection for the eyes of sheep. I speak from my own knowledge; for I have really caught this bird in the very act and deed of plucking out the eyes of a lamb ere it had scarcely drawn the vital air; hence, in "lambing-time," particularly where sheep are kept upon wastes and commons, which is much the case in Yorkshire, you will be almost sure to see a carrion crow or two lurking among them. The bird, with much cunning, watches the movements of the sheep, and, if the shepherd should not be constantly on the alert, the flock will most likely suffer some loss. The ewe, when about to bring forth, is very restless, lying down and getting up, &c., almost at every minute. The cause of this uneasiness the crow appears to know full well; for, sometimes before the parturient process is half over, the luckless offspring is bereft of one or perhaps of both its eyes. The crow is a most expert operator in this business: the villanous deed is finished by his murderous bill in the twinkling of an eye. I have also known these ravenous birds to deprive sheep of their visual organs, when, from sickness or the infirmities of old age, or from being entangled with thorns and briars, they were incapable of resistance. The carrion crow does not, on leaving its nest, cover its eggs: Professor Rennie was therefore in error when he stated that it did. — *Thomas Weatherill, M. D. Liverpool, Dec.* 7. 1833.

[*The Titmice* (*Pàrus màjor and cærùleus, and àter and palústris may be added*) *will sometimes feed on Walnuts while these are yet on the Tree;* a fact on their habits additional to those already registered in III. 476., IV. 166., V. 489. 655. to 663.] They eat the walnuts, attacking and devouring them as they grow on the tree, and before they are ripe enough to quit the green outside husk. A walnut tree on the premises here affords peculiar facilities to the operations of these little depredators: it bears nuts which are frequently more or less imperfect in their shells; that is, the shells, instead of being composed throughout of a

hard woody substance, are partially defective towards the apex on each side, or consist of a soft texture easily pervious to the bills of the titmice. Here, at the soft or imperfect apex of the shell, these birds commence their attack, and peck out the kernel to the utmost depth that their bills will reach. I have frequently known the entire kernel completely scooped out by the titmice, before the nut was ripe enough to fall from the tree. On one large tree, with a good crop, scarcely a walnut remained that had not been attacked by these birds, and more or less eaten. I mention this circumstance merely as a fact in natural history; not by any means with a view to blacken the character of the birds in question, a race which, I cannot help thinking, is already more persecuted than it deserves to be.*

[*The Rook*, VI. 142. VII. 100.] — For a similar reason, and with no unfriendly feeling towards the rooks, I may state that they also have a relish for walnuts. I have seen them settle on the trees, several in a party, and, plucking off the nuts, fly away with them to a distance. Whether they swallow the walnuts whole, or, as I rather suspect, stock through the shell and extract the kernel, I cannot positively say. One autumn I was rather at a loss how to account for the number of walnuts, some in their green husks, and some without, which were to be seen strewed on the walks under the elm trees which the rooks occupy as their breeding-place in the spring. Recollecting that the rooks occasionally plundered the walnut trees, and also that a day seldom passed without their reconnoitring their spring quarters, I was led to

* Mr. Blyth has contributed a paper "On the British Tits" to the *Field Naturalist's Magazine:* it is published in the number for June, 1833, and occupies more than seven pages, vol. i. 262—269. Have the names "cole tit" and "cole mouse," which are ascribed to the Pàrus àter, been so applied in expression of the blackness of the head, throat, and under side of the neck of this species? The synonymes, Pàrus atricapíllus *Brisson*, La petite charbonnière *Buffon*, and Mesange petite charbonnière *Temminck*, seem to prove that they have; and if they have, the prefix "cole" should of course be spelled "coal," analogously with "coaly hood," one of the provincial names of the bullfinch (*Pyrrhùla vulgàris*), —

> "The honours of whose *ebon poll*
> Are brighter than the sleekest mole;
> (His bosom of the hue
> With which Aurora decks the skies,
> When piping winds shall soon arise
> To sweep up all the dew.") COWPER.

"Cole goose," one of the provincial names of the "great *black* cormorant," is likewise, it is presumed, an erroneous spelling for coal goose.— *J. D.*

conclude that the stray walnuts were such as had been accidentally dropped by the birds in their attempt to extract the kernels from the shells. Whatever may be urged in prejudice of the rooks, and, besides eating a few walnuts, they certainly do peck up and devour a portion of the newly sown corn, they ought to be regarded as useful and beneficial creatures to man, and by intelligent persons are generally allowed to be so, for the reasons so ably shown by T. G. in VI. 142. — *W. T. Bree. Allesley Rectory, June* 12. 1833.

The partiality of rooks for walnuts is such as to render it not unprofitable, in an orchard of walnut trees, to keep a boy as a scarecrow, or rather scarerook, to prevent their helping themselves to the walnuts too extensively. A rook, having plucked a walnut, will, in its wariness, usually fly off to a common, or any open place which may be not very distant, to eat it unmolested. Occasionally a rook is induced to abandon uninjured a walnut or other nut which it had borne off from the tree that had yielded it, and such nut may, and in some instances doubtless does, vegetate and produce a tree; and hence, and from similar accidents with other birds, it is that birds form one of the classes enumerated by naturalists in their catalogue of Nature's agents in disseminating plants. (See V. 527. note *.) The springing of an oak tree from an acorn buried by "a raven" has been likened to Melancholy burying Hope, "which Providence still keeps alive," in eight lines of poetry published in Dr. Hodson's selection of poems called *The Bouquet*, 2 vols. 8vo. 1792. The lines were copied off "a pane of glass at Kingsgate;" and, although entitled "a fable," describe an incident very likely to have happened: the poet, perchance, mistaking a rook for a raven. — *J. D.*

Companies of Rooks delight to assemble and build near human Residences. — Mr. Jennings and others entertain this idea; and the following fact tends to establish it. In the grounds of Mr. Hope, at Deepdene, there are some trees on which rooks used to build invariably before the mansion was destroyed. This house stood close by the trees. Mr. Hope added Chart Park to his own at Deepdene; and, as he did not wish to keep both mansions, the old Chart House was pulled down. No rooks have built on the trees since, though the trees remain in precisely the same state. — *W. Fowler. Dec.* 17. 1834.

Instances of Enmity evinced by the Rook and the Magpie to the Kestrel Hawk. (p. 105.) — I was much amused, the other day, in witnessing an engagement that took place, over a small grove, between a kestrel hawk, five magpies, and four rooks. My attention was called, when at some distance, by the loud cries

of war. The rooks attacked the kestrel in the air, hovering over and around him, and were sometimes in close contact with him; and when he, as if to gain breath, alighted on any tree, up came the magpies with their loud clang of war, and fiercely carried on the combat. Again the kestrel mounted into the air, which the rooks no sooner beheld than at him they went, apparently as fierce as ever, and so they and the magpies continued alternately attacking him for about a quarter of an hour; when he drove the rooks off, and, after having another round or two with the magpies, he left them, and soared off into quieter regions. The sight was the more interesting to myself, from my having but just left a friend who had related to me a description of a similar engagement, which he had witnessed between a kestrel and three rooks; and about a week since another friend told me of an engagement which he had seen, but with only one magpie. Both occurred within a mile from the place at which I saw the action. — *T. Aylesbury, Oct.* 14. 1833.

[In the *Field Naturalist*, ii. 74., a correspondent tells of a kestrel and a magpie, which a countryman had seen fighting on the ground. "He approached them; the hawk endeavoured to escape, but the magpie held her so firmly by the leg, which he had grasped in his claw, that she could not escape, and both were taken with the hand."]

Habits of the Jackdaw (VI. 394. 396. 516.), *Anecdotes on a domesticated One.* — Being informed that with the cleanliness and management of the parish workhouse at Kidderminster I should be much pleased, I accompanied a clerical friend to visit it; and was gratified on finding the information true. Noticing a jackdaw at large in the governess's parlour, manifesting as much self-consequence as if the whole establishment were under its control, I was told that the bird had become domesticated there when young, and had ever since been quite a free agent about the premises and neighbouring fields, and that it was a privileged pet and favourite, notwithstanding its many peccadilloes of pilfering and stealing. I learned farther as follows: — After it had been some time an inmate, it having observed that "the copper-drawer," in which pence and halfpence for household disbursements are kept, engaged a particular portion of the governess's care, one day, no sooner was this drawer unlocked and left open, than the bird began to carry into it whatever rags and loose things it could find. At first they were thrown out; when, fast as possible, the bird, apparently in displeasure, carried them in again. The governess, thinking it strange, submitted to the bird's humour, by leaving the drawer open, after securing

the coin by locking the room door. It was then the spring season of the year. In the course of a few days, she was surprised to find that "Jack" had laid two or three eggs, and went on laying until it had laid the usual number. The bird was thus, for the first time, discovered to be a female. Though, in her rambles abroad, she had met with a sweetheart, her old quarters of peace and plenty were preferred to all the privileges of precarious freedom. From whatever excursions she might choose to take during the day, she always returned home in proper roosting time at night.

A caged Fieldfare. — In the same apartment, and, like Miss Jack, perfectly contented, was a caged fieldfare, singing sweetly, *it being summer time.* I was not a little pleased to see a winter bird so happy in a strange land; but more surprised was I to know that it is a bird of song. In its wild state, during its hybernal visit, we have only one or two notes, and those somewhat discordant, uttered as a call to its companions; but the notes of this feathered stranger resembled the woodlark's, subdued and warbling. It was originally brought to the kind-hearted governess, as a pensioner, with a gunshot wound. She doctored and recovered it; and the bird, like its jetty friend Jenny Daw, is quite satisfied with its "settlement."—*L. Booker, LL.D. Dudley, Jan.* 7. 1834.

A Ferruginous Duck or Ruddy Goose (*Anas rutila*, Fauna Suecica) was shot, a few days since, at Iken, near Orford [on the coast of Suffolk]. It is in the possession of Mr. Manning, chemist, Woodbridge. (*Ipswich Journal*, Jan. 11. 1834.) — *W. B. C.* [See VI. 141.]

The Account of the Oyster-catcher (VI. 151–2.) reminded me of a circumstance relating to that bird which was entered in my notes during a visit at Ramsgate in 1830, and which is an additional proof of its capability of swimming and diving.

On November 12., in that year, being out shooting with a friend, we beat round Pegwell Bay, crossed the Sandwich Haven in a ferry-boat, and proceeded along the shore till opposite the blockade station-house beyond Shellness, when an oyster-catcher flew past, which I shot at, and winged. It fell in the water, and swam boldly. The shore was flat and sandy, the sea calm and shallow, and the tide gently ebbing. Having no dog with us, my friend, anxious to secure the bird, actually undressed, and took the water after it, as it was making out to sea; on coming up, he stooped to catch it, but it eluded his grasp by diving, and was lost to view till it emerged at a distance of several yards from him. He repeated the attempt two or three times, but with no better

success. He then returned to the water's edge, shivering with cold. Nothing daunted, however, he took my double gun, and proceeded to the charge a second time. He fired, but with little effect; as, on trying to take the bird up, it dived again, though it did not remain so long under water as before, owing, no doubt, to its wounds. When it rose again, he killed it. These birds I noticed in pairs, and in little parties of four or six, all the autumn; but as winter approached, their numbers greatly increased. I have a specimen, killed by myself on September 10., which possesses the white mark under the chin. — *T. G. Chipping Norton, Oxfordshire, March* 6. 1833.

The Peafowl (*Pàvo cristàtus* L.) *is the natural Enemy of the Serpent Tribe.* (VI. 515.) — An opinion to this amount prevails, as I have stated in VI. 515., in this part of England. I have now to communicate two facts which seem to fully justify it. The first has been related to me by an eye-witness of it; the second is included in an extract from a letter sent to me by my esteemed friend, the Hon. and Rev. Charles Bathurst. — *M. Chalmers, M. D. Hull, Dec.* 12. 1833.

A peacock was observed to remain for several days near to a hotbed frame in the garden at Raynell, and to make frequent attempts to break the glass of the frame with his beak, and, although he was repeatedly driven away from it, he as constantly returned to it again as soon as the gardener had left the spot. This circumstance at length attracted the attention of the late Mr. Sykes (M. P. for Hull), who caused the frame to be removed, when the peacock instantly leaped into the bed, scratched away some part of the manure, under which he found a nest containing several young serpents, all of which he, with a little assistance, instantly killed and devoured.

Extract from the Hon. and Rev. C. Bathurst's Letter to Dr. Chalmers; dated Siddington, near Cirencester, Nov. 5. 1833. — "Lord Bathurst's park, &c., is two miles from this place, and in his woods, near the keeper's house, peacocks are kept as ornaments to the wild scenery, but not, as far as I have ever heard, or, even since reading your paper, been able to learn, for the purpose of destroying serpents. I do not make out that they are esteemed 'in *this* part of the country, the natural enemy of the serpent tribe;' neither do I see, in any of the works of natural history which I have consulted since reading your article, that this peculiarity has been noticed. Among ancient naturalists, Aristotle and Pliny say not a word on that subject; Buffon and Bewick, you say, do not mention this peculiarity, so I have not consulted them; but I have looked into Goldsmith and Blumenbach, but find it not there

either. However, it may not be uninteresting to you, as in a great measure connected with your subject, to mention a circumstance which recently came to my knowledge. My friend, Sir John Ogilvy, who has lately been staying with us, told me that, last year, when riding at Halnaker Park, in Sussex, he saw a pheasant with a long thin substance in its beak, and, upon his making towards the bird, he flew off and dropped his prey, which turned out to be a slowworm or blindworm (*Anguis frágilis*). The pheasant has, by this anecdote, been proved to prey on serpents; and, if it be true of the pheasant, why should it not be true of the peacock, for they are both species of the same order, Gallinæ?"

Some of the Habits and Anatomical Conditions of a Pair of hybrid Birds, obtained from the Union of a Male Pheasant with Hens of the Bantam Fowl; and an incidental Notice of a hybrid Dove. — Sir, I send you a few particulars relating to the habits of a handsome pair of hybrid birds lately presented to the Cambridge Philosophical Society by my father, J. P. Henslow, Esq., who furnished me with these details from his personal observations. I shall also subjoin a few anatomical remarks upon them, which were forwarded to me by Mr. Leadbeater; who stuffed the specimens for us, and who had sent the bodies, divested of their skins, to an anatomical friend for examination. I am, Sir, yours, &c. — *J. S. Henslow. Cambridge, April* 8. 1833.

J. P. Henslow's Account of their Habits. — After having been several years disappointed in obtaining hybrids from the pheasant and common fowl [adults], I procured a brace of young pheasants, a cock and hen. These were brought up with four young smooth-legged hen bantams of the same age, in an enclosure of about 30 ft. by 10 ft. I purposely confined them in this small space, to create familiarity, which was effected; and the hen pheasant, the succeeding summer, laid many eggs, about one dozen of which proved good; the bantams also laid, and about eighteen of their eggs proved good. The hybrids produced from these eggs were thriving, when a thunder-storm destroyed one half, and a cat killed all the remainder, except the two now sent to the Society. These were reared, and they proved to be a cock and a hen. In the succeeding summer (1829), the hen showed inclination to sit; but as the cock did so likewise, which seemed to disturb her, I removed her to a separate shed; and she took to a nest of eleven eggs, which I put for her in a corner; but, from what cause I know not, none of these eggs were hatched. Previously to the next summer (1830), I provided them a small enclosure; and, when I perceived the same inclination to sit,

I supplied them with straw and eleven bantam's eggs. The hen sat closely; as also did the cock at times, which, I suspect, disturbed her. One chicken, however, was hatched, which they reared with most sedulous attention; particularly the cock, who called and accompanied it for some time after the hen had apparently neglected it. I again put eggs to them in 1831, and they both sat; but none were hatched. The hen moulted badly, and drooped till January, 1832, when she died; and I then had the cock killed. It is worthy of remark that these birds evinced at least as strong attachment to the chicken which they reared as the real parent would have done; though they never showed any regard for each other, as most of the hybrids, however, that I have kept have done. When the chicken was about a month old, I entered their place; when they both flew at me violently, the cock, especially, attempting to attack my face.

Hybrid Dove. — In the same case with these hybrids is a hybrid dove, from between a cock turtle dove and a hen ringneck (the common West Indian cream-coloured species). This hybrid, which is a male, has associated for three years with a hen ringneck, which has laid many eggs, and regularly sat on them, and been duly relieved in this office by her hybrid mate, but without effect.

Extract from the Anatomical Remarks forwarded through Mr. Leadbeater. — "In the examination of the two hybrid birds which you were so kind as to send me, the following appearances were observed: — One of them, which proved to be a male, had the muscles of the body in a healthy, plump, full condition, with very little fat in the intervening cellular membrane. The muscles of the other, which was a female, were extremely emaciated, of an unhealthy character, and the cellular membrane loaded with fat. In the latter bird, two small bodies of a dark colour were observed on each side of the spine, in the situation of the ovarium: they were smooth, and of a uniform appearance externally, possessing very few of the characters of the healthy ovarium. The two oviducts reached nearly the whole length of the lateral parts of the abdomen, that of the left side being the longest. On making a small opening into the right oviduct, and inflating it, this was found to terminate in a *cul de sac* by the side of the rectum; the loose abdominal extremity being curved upon itself, having an aperture at the end, of the size of a bristle, which allowed mercury to pass through it. The abdominal extremity of the other oviduct was similar; and the anal also had most probably terminated, like them, in a blind pouch, but an opening had been accidentally

made into it: it was very clear that it did not open into the gut or cloaca. A small pyramidal cavity existed at the back part of the rectum, into which neither of the oviducts opened, although they passed close to the sides of the gut. The lower part of the rectum was not at all enlarged, i. e. into the form of a cloaca; nor were there any openings into it except those of the ureters. The testes of the male bird were small, white, and of a healthy appearance: a *vas deferens* was clearly to be seen running from them over the surface of each kidney. Into one *vas deferens* a mercurial tube was placed, and it allowed the quicksilver to pass readily. The margin of the anus, with some of the rectum, having been removed, the quicksilver escaped at the cut extremity of the duct, so that it was impossible to ascertain in what manner it terminated. Osseous fibres existed in the muscles and tendons of the legs of both birds."

Habits of the Hoopoe (U`*pupa* E`*pops* L.), *as observed near Bordeaux.* — On the Bordeaux side of the Garonne, and near the city, are large spaces of marshy ground, intersected by broad ditches and creeks terminating in the river; where, from the advantage derived from the water, many poplars and willows are planted for the sake of the twigs, which are much used for tying vines. These trees being topped at about 10 ft. or 12 ft. from the ground, so as to induce them to sprout much, become very thick, and, in the course of a few years, gradually decaying at the centre, are attacked by numerous tribes of insects, particularly the jet ant (*Formica fuliginosa*). In these retired places, which are frequented only by a few cowherds and country people, the hoopoe, which is a very shy bird, may be frequently observed examining the rotten wood, and feeding on the insects with which it abounds. The hoopoe flies low and seldom, unless when disturbed, its food being so abundant as to require little search; it remains the whole year; and breeds in a hollow willow, about the end of May, laying two eggs of a cinereous or ash colour. The young come out in June; but I could not ascertain the exact time required for hatching. This bird is occasionally, though rarely, met with in England, generally late in the autumn; and, I believe, has never been known to breed in England, though it probably does with some of our northern neighbours: and its occasional visits to us may be in the way of its autumnal migrations thence. — *E. H. Greenhow. Bordeaux, Oct.* 23. 1833.

[Instances of the occurrence of the hoopoe in Britain are registered in II. 395., IV. 163., V. 569., VI. 150. Sir Wm. Jardine, in his notes to White's *Selborne*, states that the figure of the hoopoe, published in Selby's *Illust. of Orn.*, is

from an individual "taken on the coast, near Bamborough Castle, Northumberland;" and adds that "Col. Montagu mentions that a pair of hoopoes began a nest in Hampshire; and Dr. Latham records that a young hoopoe was shot in the month of June. The species is abundantly met with in the south of Europe; it also occurs in Holland, Germany, Denmark, and Sweden. In the winter it retires to Asia and Africa, where it is also a permanent resident." Mr. Blyth has recorded, in the *Field Naturalist* for January, ii. 53., that in the summer of 1833 a pair of hoopoes frequented a garden in the neighbourhood of Tooting, Surrey. — *J. D.*]

The Fern Owl, its time of Migration. (V. 674.) — The following is an extract from a letter from my brother (H. T. Clarke, VI. 94.) to a relative, dated Kronstadt, 27th June, 1833, English style: — "Tell W—— that whilst we were in the North Sea" (the date must have been 9th or 10th June), "two fern owls settled on the main-topmast-stay, the only instance I have ever heard of these birds settling on a vessel. I shot one; its crop was empty, and it appeared quite exhausted: the other got away. If I were at home, I would tell Mr. Loudon about it: he can do as he likes. They were most likely on their way from Norway to Lincolnshire, as we were then about 120 miles abreast of that county." I have followed my directions in communicating the above, as it will satisfy a correspondent in V. 674.; but I regret that the traveller should have so cruelly divorced the poor birds. — *W. B. Clarke. Stanley Green, near Poole, Aug.* 24. 1833.

One of the Habitats of the Fern Owl, or Night Jar, is a plantation at Paradise, in Broad Clist, Devonshire, ten miles from Exeter, the property of Sir Thomas Acland. The clutter made by these birds during the night is occasionally heard at an almost incredible distance. I have this on the authority of a friend, the Rev. C. R. Roper, M.A., of Mount Radford, Exeter. — *W. B. Clarke. Sept.* 12. 1833.

[In Waterton's *Wanderings in South America* will be found a delectable description of the night cries of the various species of goatsucker, or fern owl, which inhabit the wilds of Demerara.]

The Hawfinch, and its Nest and Eggs, in Britain. — In addition to the instances indicated in VI. 520, 521., VII. 53., T. F. R.'s detailed description, in II. 404., of the unusual nest and eggs which had been taken in a hedge of elms, in July, by a boy in Essex, proves clearly that they were the nest and eggs of the hawfinch. T. F.'s description, in I. 374, 375., of the nest and eggs of the hawfinch is very accurate: they, with the old female bird, had been taken in Kent. — *J. D. Salmon. Stoke Ferry, Norfolk, Dec.* 28. 1833.

A Pair of Redbreasts built a Nest late in November, 1833, in a rather exposed hole in the northern side of a garden wall in this town. By early in December, five eggs were laid; but some boys, who had discovered the nest, caused the birds to forsake it. The nest and eggs were removed on Dec. 20., when, of the eggs, two that were accidentally broken, showed a state of progress towards the formation of young. I have the three unbroken eggs. A nest of young redbreasts in winter would be rare indeed, but the past season has been extraordinarily mild. — *T. G. Chipping Norton, Oxfordshire, December* 26. 1833.

Reptiles. — *A Tortoise foreknows the relative Coldness of a coming Winter, and foreshows the Degree by the Depth to which it buries itself in the Earth.* — I have a tortoise; I was going to say an old tortoise, but I know nothing about his age. I have had him about nine years. He was given to me by an old gentleman, who had possessed him at least twenty years, and who had received him from another old gentleman who had possessed him for many years previously, but who gave him away because he used to eat young lettuces. Neither this person nor the gentleman who gave him me knew any thing about his age; so it is not probable that I should. Every winter, this tortoise buries himself in the earth; and, knowing better than Mr. Squire or Moore's *Almanack* what sort of a winter we are going to have, the colder the winter is going to be, the deeper he goes. Well, Sir, last winter [1832] the top of his shell was only covered two inches. There were, if you recollect, only two nights that could be really called frosty; and now his shell is only just level with the earth, the very top of it being visible through the turf. Argal, we shall have no frost at all. — *E. N. D. Dec.* 14. 1833.

This foretelling arrived too late for publication in the Number for January, 1834. E. N. D. has, on February 2., informed us that "the tortoise, on January 17. 1834, emerged from his hiding-place, and walked about as in summer."

A Tortoise inhabits the Aquarium of the Botanic Garden at Cambridge; and as this (*it is possible*) may eventually become as venerable as the tortoise above, and, like it, the hero of a tale, a timely registration of some facts in the history of its younger days may avail its future biographer. This tortoise was once my father's, who has, at my request, supplied most of the following facts respecting it. — *J. D.*

The tortoise was given me in the end of May, 1828, by your aunt, L. Cross, to whom it had been given by her son, E. Cross, who had brought it, with five other tortoises, from

the coast of Malaga in Spain, where he picked them up off the sands. Your aunt must have received it in the autumn of 1826 or 1827, because she says that during the winter it used to get under the grate. She used to put water or milk, with soaked bread, in a plate for it; but it is not certain that she ever saw it take any thing. When I had received it, I, not knowing better, treated it as a land tortoise. I put it, in the day time, into the front garden (which is, from its aspect, the warmer one), but, contrary to my expectation, I could not perceive it take any vegetable food. I afterwards put it in the back yard, whence it several times made its escape; and one day we considered we had lost it, until our dog traced it to the pond in the yard, and assisted in the capture of it. We then bored a hole in its shell, tied thereto a string, and to the same string, at about a yard from the shell, fastened a float, that we might capture the creature at any time. We regularly, in an evening, brought it in-doors and put it in a basket. When liberated, in the morning, it directly sought the pond: so that, after we had half-starved it, it had found its element. It was in the water that we first saw him feed on some small pieces of lights which your mother threw into the pond for it. Afterwards it became so familiar as to eat out of your mother's and sister's hands (it seemed to show an aversion from men), and by its more healthy appearance, the quickness of its motions [and it would, when obstructed in front, travel backwards almost as fast as forwards], and by its getting frequently out of the water upon a stone at the pond's edge, to bask there in the heat of the sun, showed that it enjoyed its existence. When winter approached, it was less anxious to leave its basket. We then wrapped it up, and placed it in its basket, in a warm situation, until the spring. After keeping it through a part of the summer [of 1829], I made a present of it to Mr. Arthur Biggs, the curator of the Cambridge Botanic Garden, and took off its float, and put it into the sheet of water [supplied by a slow stream that passes through it], in which the aquatic plants are cultivated. Here it gets its own living, and has remained, to the best of Mr. Biggs's, and Mr. Scott the foreman's, knowledge, during four winters. [The length of time which it remains wholly unapparent (wherever it may hide) is not many weeks. Its first appearance, in 1833, was on April 2.] In warm weather, in the heat of the day, it either enjoys itself by sunning itself on a stone step at one end of the water, or on the grass at the edge of the water, or, when the water is low, on the narrow beach which intervenes the water and the grass. From this place it, on the approach of any one, hastens into

the water, and has convenient hiding-places amongst the aquatic plants, and especially amongst and under the ample leaves of the water lilies (*N*ymphæ*a* álba *L.* and *N*ùphar ádvena *H. K.*), and occasionally it floats stationary on the surface of the water, as it were in the manner in which fishes, in slow streams, are, in hot sunny weather, said to sleep. It has increased in size considerably, and appears very healthy. Mr. Scott has told me, that once [in April or May, 1832] it travelled to near the Free School Lane entrance to the garden; a distance of, perhaps, 150 yards from the water, — possibly in search of a mate.

These facts prove that this species of tortoise will live in any reservoir of water, like that in the Cambridge Botanic Garden; and they may, especially if the amount of them is not already well known, promote endeavours to naturalise many individuals of this and other species of aquatic tortoises in similar situations, where they could not fail to be interesting objects to lovers of nature. — *J. D. sen.*

A young Land Tortoise, once kept in a cool green-house in a private garden at Bury St. Edmunds, lost its life by attempting to ascend a tall stone step placed at the threshold inside the entrance door. It fell backwards; and the convexity of its shell was such, or the animal's weakness (for I suspect that it had been but very negligently fed) was such, that it could not apply its feet to the floor to lever itself into its natural position. It was found lying on its back, dead, and with froth at its mouth. — *J. D.*

Fishes. — *The Goldfish, with a double Tail-fin.* (VI. 529.)— Another instance of this variation is now living at Mr. Hope's, of Deepdene. — *W. Fowler. Dec.* 17. 1833.

Molluscous Animals. — *A List of the more rare Species of Shells, which were collected in August,* 1833, *at Aberdovey, in Merionethshire.* — This part of the coast has, I believe, been but little explored by the conchologist. The following species of shells were all found on the sand at Aberdovey, or between that place and Borth. *v. r.* mean very rare; *r.* rare; *f.* frequent; *c.* common.

*N*aútilus crícspus *c.*, umbilicátulus *r.*; Rotàlia Beccàri*i c.* Beccàri*i* pervérsa *c.*; Lobátula vulgàris *f.*; Vermículum intórtum *c*, oblóngum *f.*, subrotúndum *f.*; Arethùs*a* láctea *v. r.*; Orthócera (?) tràchea *c.*; Patélla virgínea *r.*; Búlla umbilicàta *r.*, cylindràcea *f.*, truncàta *r.*, obtùsa *r.*, apérta *r.*; Turritélla Térebra *c.*, elegantíssima *f.*, ùnica, *v. r.*; Cíngula subcarinàta *r.*, costàta *r.*, reticulàta *r.*, striàta *r.*, labiòsa *f.*, ventròsa *r.*, púlla *f.*, cingílla *v. r.*; Odostòmia unidentàta *r.*, plicàta, *r.* spiràlis *v. r.*; Scalària clàthrus *f.*, Túrton*i r.*; Skène*a* depréssa *r.*; Nática pallídula *v. r.*, lacùna *v. r.*; Tròchus tùmidus *r.*; Ián-

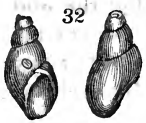
thina commùnis *v. r.*; Tornatélla tornátilis *r.*; *B*úccinum anglicànum *v. r.*; Térebra reticulàta *c.*, pervérsa *r.*; Fùsus costàtus *r.*, nébula *f.*, lineàris *r.*; Pleurótoma grácilis *v. r.*; Rostellària pès-*p*elecàni; Cápulus hungáricus *v. r.*; Fissurélla græ`ca *v. r.*; *P*écten operculàris *r.*, vàrius *r.*; Pectúnculus pilòsus *r.*; Nùcula nùclea *r.*; Modìola díscrepans *r.*; *C*árdium tuberculàtum *c.*; Córbula striàta *f.*; Máctra sólida *c.*, subtruncàta *r.*, stultòrum *c.*; Kéllia rùbra *r.*; Amphidésma convéxum *r.*, compréssum *c.*, Bóysii *f.*; Tellìna fábula *f.*, crássa *r.*; Cýprina islándica *f.*; Cytherèa Chiòne *f.*, exolèta *r.*; Vènus verrucòsa *r.*, gallìna *c*, undàta *r.*; Sòlen vagìna *f.*, énsis *f.*, legùmen *c.*; Lutrària vulgàris *c.*; Montacùta bidentàta *f.*, ferruginòsa *f.* The three following are common on the rocks at Aberystwith: — Túrbo petræ`us, Tròchus umbilicàtus and crássus. Besides the above, I also found at Aberdovey six or eight species, which I have not yet ascertained, and some of which I believe have not been described. — *H. E. Strickland. November* 22. 1833.

The following Species of British Land and Freshwater Shells have been collected in the Neighbourhood of Rugby, Warwickshire: — In the Oxford and Coventry Canal, Cyclas rivícola. In the canal and river Avon, Cyclas córnea, pusílla; A'nodon *c*ýgneus; *M*ýsca pictòrum, ovàta. In gardens and hedges, Hèlix nemoràlis, horténsis, aspérsa. In Newbold lime pits, Hèlix ericetòrum, híspida. The following were found in a mass of silt and dead leaves, left after a flood, upon the banks of the Clifton Brook, near Brownsover Mill: — Hèlix nìtens, lùcida, crystállina, pulchélla; Bùlimus lùbricus; Succínea amphíbia; Carýchium mínimum; Vertìgo pygmæ`a; Planórbis carinàtus, marginàtus, vórtex, fontànus, contórtus, álbus; Limnèus auriculàrius, péreger, scaturíginum, stagnàlis, frágilis, palústris, fossàrius; Phỳsa fontinàlis, Valvàta obtùsa, Paludìna impùra, víridis. In the Oxford Canal, Paludìna achátina, vivípara. In the Bilton Brook, A'ncylus fluviátilis, and a small species of Cyclas, unnamed in Turton's *Manual of the British Land and Freshwater Shells.* — *A. Bloxam. Rugby, Warwickshire, January*, 1834.

A Portion of Pearly Matter found within a Shell of the Freshwater Muscle (*A'nodon cýgneus*); *and the Reason why it was formed there.* — In the hollow of one of the valves of a freshwater muscle (A'nodon *c*ýgneus), which I lately picked up by the side of one of the ponds in this neighbourhood, I found a large irregular-shaped apparently solid mass of pearly matter, rather more than 1 in. long, $\frac{3}{4}$ in. broad, and full $\frac{1}{4}$ in. high. It struck me as being an awkward encumbrance for the animal, and I was puzzled, as neither dint nor

fracture was observable on the exterior of the shell, to ascertain the cause; but, on breaking a small portion of the irregular mass, discovered it. The animal had, by some accident, got a large mass of mud between itself and the shell, and not having the power of dislodging the mud, and probably finding the roughness of it disagreeable to the smooth surface of its own body, had formed a coating of pearly matter entirely over it, and had thus sagaciously rendered it, though it must have been a great encumbrance, as little inconvenient to itself as possible. — *Id.*

The Limnèus elongàtus Turton, *Hèlix octanfrácti* Montagu, *and H. octòna* Pennant. — Would that some correspondent would clear up the difficulty which appears to hang over these! The figure in Pennant's *British Zoology* is quite correct, according to many dozens of specimens which I have found on plants in a pool near Southampton, where even the youngest shells have the fractured apex. Will Mr. Kenyon, who (in his list of land and freshwater shells in II. 273.) mentions it under the name of Lymnæ`a leucóstoma, oblige me by stating in what degree my drawing (*fig.* 32.) is like or unlike his shell? — *W. W. Southampton, Jan.* 17. 1834.


32

Spider-like Animals. — [*Of Trachean Arachnìdes, the Genus Achlysia, constituted and named by M. Audouin, consists, probably, but of Species, in an immature State, of Hydráchnadæ, of the Genus Limnócharis* Latr. *Individuals of a Species of Limnócharis* Latr. *have been found subsisting, in one of their States, as Parasites, upon the Body of* Dytiscus *marginàlis* L.] — In turning over the leaves of vol. i. of the *Zoological Journal*, my attention was attracted by some figures in the 4th plate, and, on referring to the descriptions I found, in page 122., "A Memoir on Achlysia, a new Genus of Trachean Arachnides, by M. J. V. Audouin."

Some years back, I carefully examined a specimen of *D*ytiscus marginàlis *L.*, under the wings of which, and attached to its back, were above a dozen bags, each rather smaller than a grain of wheat, curved and narrowed at the end by which they were attached. On opening these sacs, I found, to my astonishment, that each contained a perfect animal, which I believe may be a Hydráchna, or rather Limnócharis *Latr.* As there is nothing new under the sun, I did not at the time regard this discovery, and lost my descriptions and drawings, which I now very much regret, as it renders my present communication very imperfect; but, I hope, even this notice may be the means of calling the attention of some one to the subject better acquainted with the Tracheària than I am.

From the learned observations of M. Audouin on this class, it must have happened that the animals in the sacs which he examined, and has called Achlýsia, were in an early stage of growth; so that he had no opportunity of ascertaining what I, under more favourable circumstances, discovered.

Whether the metamorphoses of the Hydráchnadæ be known, I am not aware; but it will be very remarkable should they be parasitic in their different states; and it struck me, at first, as an extraordinary fact, that these animals should remain in their sacs attached to the *Dytíscus* by their rostrum, when they are matured, and have eight perfect legs for use. I believe the Limnóchares are not uncommon in ponds and ditches, and are supposed to feed upon animalcula, &c. De Geer mentions, I believe, that the eggs of a Hydráchna are attached to, and receive nourishment from, one of the water fleas (*Gyrìnus Lin.*). — *J. Curtis.* 57. *Upper Charlotte Street, Fitzroy Square, Nov.* 16. 1833. [To Achlýsia *Dytísci Aud.* the text and figures in *Zool. Journ.* ascribe only six legs.]

Chélifer cancröìdes. (V. 754.) — I have often taken this odd little creature, and other species of Chélifer, attached to the legs of *Músca* doméstica, *M.* meteórica, and *M.* larvàrum. I have observed them attached to flies, most frequently in hot weather; but they are to be found, at almost any time, under the bark of trees, under stones, and amongst moss in dryish banks. The C. *c*ancröìdes is known to live in old drawers and closets, and amongst old books. It is undoubtedly, at times, a parasitical creature; but not generally. They attach to the legs of flies by one of their curious pincers; but I have never seen them so attached as to lead me to believe that they derived nourishment from the flies. They feed, no doubt, in their usual habitats, on minute insects. — *W. B. B. W. Nov.* 14. 1832.

Chélifer cancröìdes. (V. 754.) — A fly (*Músca* doméstica) was yesterday produced to me, to one of whose legs were affixed four specimens of Chélifer *c*ancröìdes. If this new instance can be called accidental, I am at a loss to conceive how so many enemies (as they doubtless are to its tribe) had attached themselves to one limb? If the fly had accidentally placed the limb in a nest of these insects, it seems natural to believe that it would have had sufficient sensibility to withdraw it ere the whole family had time to attach themselves. At present, the most probable reason which can be advanced is, that the fly was asleep at the time. I have to regret that a tender-hearted and fearful boy in the room should have stopped all further investigation on this interesting instance,

by crushing the little tyrants before I had time to complete my experiments on them. — *F. C. Lukis. Guernsey, Aug.* 7. 1832.

Geology. — *Additional Information on the Fucöìdes alleghaniénsis.* (p. 27.) — Nov. 11, 12. 1833. Two days' examination along the slope of the Shade Mountain, in Juniata Valley, has materially enlarged my knowledge of the geological position of this fossil. On the banks of the Pennsylvania canal, near Lewistown*, the strata consist of numerous seams from 1 in. to 1½ ft. thick, of argillaceous sandstone, more or less ferruginous, and varying in colour from dark brown to greenish blue. These are quarried in large slabs for the purposes of paving and building. The surfaces of these slabs are covered with *Fùci* in relief, whose forms are ill defined, and are smaller than the Fucöìdes alleghaniénsis; they are also separated by courses of soft argillaceous rock, from ½ in. to 1 in. in thickness, consisting almost entirely of similar *Fùci*. An opening, made into another part of the series, at a lower position, and at the distance of half a mile, exhibited no fewer than a hundred successive courses of these vegetable deposits upon similar rock, within a section of only 20 ft. perpendicular. All these fossil beds comprise the same undefined Fucöìdes, occasionally traversed by the larger species. I traced a succession of these beds to upwards of 200 ft. elevation. At the height of full 350 ft., the Fucöìdes alleghaniénsis prevailed in abundance upon slabs of brown red sandstone, and probably extended 50 ft. higher. The whole series, therefore, which contains fossil *Fùci* occupies a thickness of from 250 ft. to 400 ft.

Nov. 21. 1833. In traversing the parallel ridges called the Seven Mountains, at the distance of 15 miles west of the Shade Mountain just noticed, the Fucöìdes alleghaniénsis appears on the surface of white sandstone strata, occupying a mile in breadth, and rising to the height of 1000 ft.

Dec. 6. 1833. In Murney Ridge, 50 miles north of the Shade Mountain, and running parallel with, and at the distance of 15 miles east of, the Alleghany Mountains, I again observed splendid specimens of F. alleghaniénsis.

I notice these localities, the detail of which is only interesting to show that this remarkable fossil is repeated at various and distant parts of the transition series in this country. — *R. C. Taylor. Lewistown, Pennsylvania, Jan.* 1. 1834.

* Upon this spot I observed growing that magnificent tree the *Catálpa syringæfòlia*, and groups of the medicinal shrub, *Acàcia* marilándica. At 400 ft. higher, the mountain was covered with the common acacia, or prickly locust tree (Robínia Pseud-*Acàcia L.*), amongst scrubby chestnuts and rock oaks and sumachs.

MISCELLANEOUS INTELLIGENCE.

ART. I. *Retrospective Criticism.*

REMARKS in Defence of [*Mr. Audubon*] *the Author of the* "[*Biography of the*] *Birds of America*" [VII. 66.], *by the Rev. John Bachman, Charleston, South Carolina.* — Although, from my profession and habits, I feel no disposition to enter into controversy, yet, having had opportunities which few others possess of becoming acquainted with the occupations and literary acquirements of Mr. Audubon, and being prompted, not alone by feelings of private friendship, but by a desire that full justice should be awarded him for those expenses, sacrifices, and privations which he has undergone, I take the liberty of stating what I know on this subject; and I have reason to believe, from the characters of the writers who have doubted his veracity and the authenticity of his works, that, with the generosity of feeling so distinctive of those who are engaged in liberal and kindred pursuits, they will be gratified to assign him the meed of praise which he so undoubtedly merits.

It appears that exception has been taken to two publications of Audubon's; one on the habits of the rattlesnake, and the other on the habits of the turkey buzzard (Cathártes Aúra). The latter publication is now lying before me; the former I have not had an opportunity of seeing; but, from what I gather from some communications in [this] Journal, it appears that he ascribed to the rattlesnake some of the habits of the common black snake (*Cóluber constrictor Lin.*), as ascending trees in search of game, feeding on squirrels, &c. He also mentioned the remarkable fact, of their living a considerable length of time in confinement without food.

[Here follows, in the manuscript, an extract of some length from Featherstonehaugh's *Monthly American Journal of Geology and the Natural Sciences*, Nov. 1831, p. 221. (the communication to that work to which Mr. Audubon, jun., has, in our VI. 551., referred), and a variety of evidence from Dr. Cooper, Dr. Leitner, Dr. Randolph, and Mr. Hockley; the amount of which is, that "at least five well-defined species of rattlesnake are now found in this extensive country;" that rattlesnakes, of one or other species, climb and have been seen on fences, and on trees, and on bushes, and that one has been

seen coiled up and at rest, in the fork of a tree, at about 8 ft. from the ground; that "the rattlesnake sometimes takes to the water, and is found a considerable distance from the shore in salt water;" that the rattlesnake, in its native woods, feeds on squirrels; even, occasionally, on the largest American squirrel (*Sciùrus vulpìnus*), rabbits (*Lèpus americànus*), and also rats (Arvícola floridàna *Ord*, and, from the wording of the manuscript, probably other species of rat); and that, with regard to the means by which rattlesnakes capture these animals, it is possible that "rattlesnakes may yet be discovered to be nocturnal in their habits; possessing a degree of activity at night which is not exhibited by day, unless hard pressed by hunger." As this communication is professedly in reply to Mr. Waterton, who has, in VII. 67., line 8. and 7. from the bottom, observed that "nobody doubts that rattlesnakes swallow squirrels," it is needless to occupy space to confirm an assertion which Mr. Waterton has not disputed. The Rev. J. Bachman states that he had not seen a later number of this Magazine than the one for Sept. 1833. The MS. will be returned to the party through which it reached us, to be published elsewhere, entire, if our elision dissatisfies.]

With regard to the experiments of Audubon on the powers of smelling, usually ascribed to the turkey buzzard (C. Aúra) [VI. 84. 163.], I acknowledge that he has adopted views opposed to the long established opinions of naturalists. But no one who will read his paper on the subject, containing a full detail of a number of experiments on the habits of this vulture, can deny that, if he intended to deceive the world, he certainly chose a subject where detection was easy and certain. In our southern cities, these birds, with their kindred species Cathártes atràtus, are so abundant in our streets and on our house-tops, as to have become a nuisance. It is but due to Mr. Audubon to state, that, in his frequent visits to this city, he has fearlessly invited investigation on this subject. During his absence, he has written to me on several occasions, urging me to make farther experiments. A number of engagements prevented me from devoting as much time to the subject as was necessary to investigate it in such a manner as to prove satisfactory to my mind, and I postponed it to a more leisure period. On the recent visit, however, of Mr. Audubon to this city, I consented to institute these enquiries; in the prosecution of which I was aided by the intelligence and experience of such disinterested naturalists and men of science as could be obtained.

On the 16th of December, I commenced a series of experiments on the habits of the vultures (C. Aúra and C. atràtus);

particularly as regards their powers of smell and sight, which were continued, with little intermission, till the 31st. Written invitations were sent to all the professors of the two medical colleges in this city, to the officers and some of the members of the Philosophical Society, and such other individuals as we believed might take an interest in the subject. Although Mr. Audubon was present during most of this time, and was willing to render any assistance required of him, yet he desired that we might make the experiments ourselves, that we might adopt any mode that the ingenuity or experience of others could suggest in arriving at the most correct conclusions. The manner in which these experiments were made, together with the result, I now proceed to detail.

There were three points on which the veracity of Mr. Audubon had been assailed: first, whether the vulture is gregarious; secondly, whether he feeds on fresh as well as putrid flesh; thirdly, whether he is attracted to his food by the eye or the scent? To these queries, not only in justice to the American ornithologist, but to aid the cause of natural science, our enquiries were directed. First, whether the vultures of this country are gregarious? — That vultures, during the breeding season, and occasionally at other times, fly singly, is well known; but such is also the case with all our birds that usually keep in flocks; witness the wild pigeon (*Colúmba migratòria*) and the robin (*Túrdus migratòrius*), and many of our water birds. But that our vultures are gregarious, in the true sense of the word, is a fact well established. In most cases, in the interior of our state, as well as in the environs of this city, considerable numbers are found in company, from three or four to forty or fifty. They hunt for their prey in company; they feed together on the same carrion; they perform their gyrations in great numbers together, and they roost together. I have visited their roosting-places; a sight well worth travelling many miles to observe. In some deep swamp, or occasionally in high ground, surrounded by a thicket of vines and thorny shrubs, usually composed of *Zízyphus volùbilis*, and several species of *Smilax* and *Rùbus*, the buzzards resort for years together to spend their nights. Here, on some dead tree, and frequently on several that may be standing near each other, they are crowded so close together that one or two hundred may be counted on a tree, and frequently thirty or forty on a single branch. The ground and bushes, within a certain extent, are covered with the excrements; which, by their acridity, have destroyed the whole undergrowth of shrubs and plants and every blade of grass; so that the surface presents an appearance of having received several thick coatings of whitewash.

Secondly, whether our vultures subsist on fresh as well as putrid food?—On this head it was unnecessary to make experiments; it being a subject with which even the most casual observer amongst us is well acquainted. It is well known that the roof of our market-house is covered with these birds early every morning, waiting for any little scrap of fresh meat that may be thrown to them by the butchers. At our slaughter-houses, the offal is quickly devoured by our vultures, whilst it is yet warm from the recent death of the slaughtered animal. I have seen the *V*últur Aúra a hundred miles in the interior of this country, where he may be said to be altogether in a state of nature, regaling himself on the entrails of a deer, which had been killed not an hour before. Two years ago, Mr. H. Ward, who is now in London, and who was in the employ of the Philosophical Society of this city, was in the habit of depositing, at the foot of my garden (in the suburbs of Charleston) the fresh carcasses of the birds he had skinned, and in the course of half an hour both species of vulture, particularly the Cathártes Aúra, came and devoured the whole. Nay, we discovered that vultures fed on the bodies of those of their own species that had been thus exposed. A few days ago, a vulture that had been killed by some boys in the neighbourhood, and had fallen near the place where we were performing our experiments, attracted, on the following morning, the sight of a Cathártes Aúra, which commenced pulling off its feathers and feeding upon it. This brought down two of the black vultures, who joined in the repast. In this instance, the former chased away the two latter to some distance; an unusual occurrence, as the black vulture is the stronger bird, and generally keeps off the other species. We had the dead bird covered with some rice chaff, where it still remains undiscovered by the vultures.

Thirdly, whether is the vulture attracted to its food by the sense of smell or of sight?—A number of experiments were tried, to satisfy us on this head, and all led to the same result. A few of these I shall detail.

1. A dead hare (*L*èpus tímidus), a pheasant (*P*hasiànus cólchicus), a kestrel (Fálco *T*innúnculus *L.*), from a recent importation, together with a wheelbarrowful of offal from the slaughter-pens, were deposited on the ground, in a retired situation at the foot of my garden. A frame was raised above it, at the distance of twelve inches from the earth. This was covered with brushwood, allowing the air to pass freely beneath it, so as to convey the effluvia far and wide; and although fifteen days have now gone by, and the flesh has become offensive, not a single vulture appears to have per-

ceived it, though hundreds have passed over it, and some very near it, in search of their daily food. Although the vultures did not discover this dainty mess, the dogs in the vicinity, who appeared to have better olfactory nerves, frequently visited the place, and gave us much trouble in the prosecution of our experiments.

2. I now suggested an experiment which would enable us to test the enquiry, whether the vulture could be attracted to an object by the sight alone. A coarse painting on canvass was made, representing a sheep skinned and cut open. This proved very amusing. No sooner was this picture placed on the ground, than the vultures observed it, alighted near, walked over it, and some of them commenced tugging at the painting. They seemed much disappointed and surprised; and, after having satisfied their curiosity, flew away. This experiment was repeated more than fifty times, with the same result. The painting was then placed within 10 ft. of the spot where our offal was deposited. They came, as before; walked around it, but in no instance evinced the slightest symptom of their having scented the offal which was so near them.

3. The most offensive portions of the offal were now placed on the earth; these were covered over by a thin canvass cloth; on this was strewed several small pieces of fresh beef. The vultures came, ate the flesh that was in sight, and, although they were standing upon a quantity beneath them, and though their bills were frequently within the one eighth of an inch of this putrid matter, they did not discover it. We made a small rent in the canvass, and they at once perceived the flesh, and began to devour it. We drove them away, replaced the canvass with an entire piece, and again they commenced eating the fresh pieces of flesh exhibited to their view, without discovering the hidden food they were treading upon.

4. The medical gentlemen who were present, now made a number of experiments, to attest the absurdity of a story, widely circulated in the United States through the newspapers, that the eye of a vulture, when perforated, and the sight extinguished, would, in a few moments, be restored, in consequence of his placing his head under his wing; the down of which was said to restore the sight. The eyes were perforated: I need not add, that the bird became blind, and that it was beyond the power of the healing art to restore his lost sight. His life was, however, preserved by occasionally putting food in his mouth. In this situation, they placed him in a small out-house; hung the flesh of the hare, that had now become offensive, within his reach; nay, they frequently placed it within an inch of his nostrils; but the bird gave no

evidence of any knowledge that his favourite food was so near him. This was repeated for several days in succession, with the same results.

I did not consider this last experiment as conclusive as others did who witnessed it. The bird might not have been wholly free from the pain inflicted by the operation, nor might he have been so soon reconciled to the new situation into which he had been thrown by the loss of sight; but, in connection with other experiments, it strengthened us in the opinions we had formed.

After having resorted to the means detailed above, to satisfy myself of the accuracy of the statements of Audubon as regards the habits of the turkey buzzard, detailed in Jameson's *Journal* [for October and December, 1826], I once more carefully read over his remarks on the subject; and I now feel bound to declare that every statement contained in that communication is in accordance with my own experience, after a residence of twenty years in a country where the vultures are more abundant than any other birds.

We were not aware that any other experiments could be made to enable us to arrive at more satisfactory results, and, as we feared, if continued, they might become offensive to the neighbours, we abandoned them.

As my humble name can scarcely be known in Europe, I have thought proper to obtain the signatures of some of the gentlemen who aided me in, or witnessed, these experiments; and I must also add that there was not an individual, among the crowd of persons who came to judge for themselves, who did not coincide with those who have given their names to this certificate.

"We, the subscribers, having witnessed several of the experiments made on the habits of the vultures of Carolina (Cathártes Aúra and Cathártes atràtus), commonly called the turkey buzzard and carrion crow, feel assured that these species respectively are gregarious; the individuals of each species associating and feeding together; that they devour fresh as well as putrid food of any kind, and that they are guided to their food altogether through their sense of sight, and not that of smell.

"E. F. Leitner, Lecturer on Botany and Nat Hist.
B. B. Strobel, M.D. Martin Strobel.
Robert Henry, A.M., Pres. Coll. of S. Carolina.
John Wagner, M.D., Professor of Surgery, Med. Coll. of the State of South Carolina.
Henry R. Frost, M.D., Professor of Materia Medica, Coll. of the State of South Carolina."

It now remains for naturalists to account for the errors which have, for so many ages, existed with regard to the power of scent ascribed to our vultures. Indeed, it is highly probable that facts elicited from the experiments of Audubon on our two species of vulture, strengthened by those instituted on this occasion, may apply to all the rest of the genus. Without having had many opportunities of observation, I am inclined to doubt the extraordinary powers of smell ascribed to the condor of the Andes (C. *Gryphus*), and it would be advisable to make farther experiments on the vultures of southern Europe and Africa. Perhaps it may yet be discovered that all the birds belonging to this genus are altogether indebted to the eye in their search after food. Indeed, I am of opinion, that, while to quadrupeds (particularly carnivorous ones) the faculty of scent is their peculiar province, this organ is but imperfectly developed in birds. As it does, however, exist, although in an inferior degree, I am not disposed to deny to birds the power of smell altogether; nor would I wish to advance the opinion that the vulture does not possess the faculty of smelling in the slightest degree, although it has not been discovered by our experiments. All that I contend for is, that he is not assisted by this faculty in procuring his food: that he cannot smell better, for instance, than hawks or owls, which, it is known, are indebted to their sight altogether in discovering their prey. If our vultures had to depend on their olfactory powers alone in procuring food, what would become of them in cold winters; in Kentucky, for instance, where they remain all the year, and where the earth is bound up with frost for months at a time, and where, consequently, during that period, putrefaction does not take place: and, if they had to depend alone on tainted meat for food, how soon would the whole race (at least, in our temperate climates) die of hunger?

How easily error may be perpetuated, from age to age, we may learn from a thousand other visionary notions, which the more careful observations of recent travellers and naturalists have exploded. At this day, the belief is very general in this country, that, immediately after a deer (*Cérvus virginiànus*) has been killed, the vultures, at the distance of many miles, are seen coming in a direct line against the wind, scenting the slaughtered animal. This may be accounted for, with a little observation, upon rational principles. When a deer is killed, the entrails are immediately taken out: these, or perhaps the blood which covers the earth to some distance, are seen by some passing bird. He directly commences sailing around the neighbourhood; he is observed by those at a dis-

tance; the peculiar motions of his wings, well known to those of his own species, communicate to them the intelligence that something good for them is perceived. These, hastening to the place, give information to those who are still farther off; and, in the course of an hour, a very great number are guided to the spot. But it will scarcely be argued that this great concourse of vultures has been attracted by the effluvia of putrid flesh, since the animal has been killed but an hour before.

I come now to notice the most important enquiry, and one which has been my principal inducement in taxing the pages of [this] Journal, and the patience of [its] readers, with this communication, Whether Audubon is the real author of the book called *Ornithological Biography.* Probably this question is already settled in Europe; as his original manuscripts are there, to which many of his friends have had access. The September Number of this Magazine is the latest that has been received in this part of America: perhaps [the] subsequent Numbers may have shown that this voice from his native land was unnecessary to establish a fact already placed beyond the reach of suspicion. [The additional communications on the matter occur in VI. 550., VII. 66.] Be this as it may, I am unwilling that the lukewarmness or the confidence of his friends should deprive this enterprising ornithologist of the reputation which he has so laboriously acquired. No naturalist in this country has ever bestowed so much of his time, industry, and wealth, or made so many sacrifices to a favourite pursuit, as he has done. To this he has devoted the most active portion of his life; to accomplish this, he has traversed the whole of this wide-extended country, from the Atlantic to the very foot of the Rocky Mountains; from the swamps of Florida and Louisiana to the snows of Michigan and the rugged rocks of Labrador.

For the last two years and a half, I have been intimately acquainted with Audubon: he has resided in my family for months in succession. From a similarity of disposition and pursuits, he was my companion in my rambles through the woods and fields, and the enlivener of my evening hours. During his absence, we were constant correspondents; and his letters, amounting to nearly a hundred, are now lying before me. His journals have been regularly submitted to my inspection; his notes and observations were made in my presence; and a considerable portion of the second volume of his *Ornithological Biography* was written under my roof. I have carefully compared his first volume with the forthcoming one; and, from all these opportunities which I have

enjoyed of making a decision, I do not hesitate to state that Audubon is the author of the book to which his name is attached; and that the second volume will not fall short of the first in purity, vigour, and originality of style; and that it will contain the additional experience and observation of three of the most active years of his life.

Some details of the habits and pursuits of this gentleman may not be uninteresting to your readers, and will account for the manner in which he has been enabled successfully to carry on so large, expensive, and laborious a work as that which is now in the progress of publication.

He rises with the earliest dawn, and devotes the whole of the day, in intense industry, to his favourite pursuit. The specimens from which he makes his drawings are all from nature; carefully noting the colours of the eye, bill, and legs; measuring, with great accuracy, every part of the bird. Where differences exist, either in the sexes or young, several figures are given on the same plate: sparing no labour in retouching old drawings or in making new ones, in all cases where he conceives there may be a possibility of making an improvement. In this way, he has already succeeded in figuring nearly the whole of the birds necessary to complete his splendid and important work.

He keeps a journal, and regularly notes down every thing connected with natural history. This journal is always kept in English: a language which, it must be acknowledged, he writes very correctly, when it is taken into consideration that he spent nearly the first seventeen years of his life in France. Besides this, he keeps separate journals, in which he notes every thing that he learns each day on the habits of every bird. In all his travels, he carries these journals with him; and he never suffers business, fatigue, or pleasure to prevent him each evening from noting down every interesting observation. In this way, a mass of information has been accumulated from year to year. When he sits down to write the history of a bird (which is usually in the evening), he first reads over all the memoranda which he has made with regard to its habits; and he is generally able to write an interesting paper on the subject in the course of the evening. At some leisure moment this is again reviewed and corrected: the scientific details he leaves to the last. In America there are few private or public libraries that can furnish a writer on ornithology with all the information he is desirous of obtaining on this subject. Mr. Audubon does not hesitate about consulting with other naturalists in regard to all that may be written or known on the birds of America. He wishes to

render his work as perfect as the experience and knowledge of man, in the present state of his information, can make it; and he endeavours to obtain all the additional light that industry or enquiry can shed on the subject. In obtaining this kind of assistance from those whose knowledge of books enables them to afford it, he does not conceive that he is the less entitled to the claim of the authorship of a work, the whole design of which (the most important feature in its execution), together with the composition, is altogether his own.

When Wilson, the highly talented American ornithologist, first commenced his invaluable work, he did not hesitate to apply to his scientific friends for all the information they were able to afford him. In his letter to Bartram, dated May 21. 1804, found in the 36th page of his Life, by his friend and biographer Mr. Ord, we find Wilson using the following language: — "I send you a few more imitations of birds for your opinion, which I value beyond that of any body else. Please to send me the *names* of the birds."

Now, although Wilson received all the aid which the observations and reading of his friend could afford him, yet it would be the height of injustice to his memory and his well-merited fame, to assert that Bartram was the author of his work. Let us be as just to Audubon as we are to his predecessor, and we shall not withhold from him the merit of being the author of his *Ornithological Biography*.

If the idea is entertained abroad, that the character and acquirements of Mr. Audubon are not estimated in his native land, or that his splendid publication is not appreciated here, it is most certain that the impression is altogether erroneous. The United States, although comparatively a new country, and possessing but few men of very large fortunes, duly appreciate the value of his work, and the merits of the individual.

Since his last return to America he has already received sixty-one subscribers to his work, with very little exertion on his part. It has been added to the library of Congress, and the legislatures of many of the states have become subscribers. The government has allowed him and his attendants the free use of all our public vessels in every part of the United States. Honours have been conferred on him by the learned societies of our land, and the attentions which have been bestowed upon him, by the most intelligent men in our country, are such as have never been conferred upon any former naturalist.

The additions already made to American ornithology by

the labours of Audubon are immense: suffice it to say, that he has added upwards of one hundred species not figured by Wilson. Some of these have been described in the valuable continuation of Wilson's work by Bonaparte. Still, with these deductions, there will be an immense number of new birds published in the work of Audubon, for a knowledge of which the public will be solely indebted to his zeal, industry, and experience. Amongst other interesting discoveries made by him may be noticed a new heron, and an eagle, the largest in the United States; two species of pigeon, a humming-bird, and a considerable number of the genera of the Muscicapa, Troglódytes, Sýlvia, and *F*ringílla.

His services alone, in correcting the errors into which his predecessors had fallen, from the want of opportunities such as he has enjoyed, are invaluable, and will be duly appreciated by the lovers of natural history. It may be interesting to your readers to notice a few of these. In his recent visit to Labrador, to which inhospitable region he was led solely by his ardent zeal for the advancement of science, he has ascertained that the *L*àrus marìnus and the *L*àrus argentatòìdes are the same bird in different stages of plumage. In the *L*àrus minùtus and *L.* capistràtus, a similar mistake had occurred. The *A*′rdea Peále*i* of Bonaparte proves to be the young of the *A*′rdea ruféscens, as ascertained by Audubon in the highly interesting ornithological region of Florida; the figure of Wilson of the Rállus crépitans, given as the adult bird, proves to be that of a new species found in the fresh-water marshes of our southern country, and the Fálco *L*agòpus is only the immature bird of the Sáncti Johánnis.

In addition to this, the visits of Audubon to the breeding-places of many other of our rare birds, in the extreme north and south of our country, have enabled him to investigate their habits more fully, and to describe them more correctly, than had ever been done before.

If the enquiry be made, what prospect there will be of the continuation of this work, in case the author should not live to complete it, I am happy to say that its publication is secured beyond the fear of accidents. The drawings of the birds for the whole work are nearly completed; the materials for their history are collected and recorded; and there exists sufficient acquirement in the members of his interesting and talented family to carry on the work.

Let the literary world but award to Audubon the justice which he merits; let the public continue to be indulgent and liberal, and this work cannot fail to prove a very important acquisition to the natural history of America, nor to reflect the

highest credit on the liberality of the British public, that has hitherto so efficiently aided him in the publication of it, nor to establish an abiding monument to the fame of its author, whilst it must continue to be selected as the chosen companion of those who delight in the contemplation and investigation of the phenomena of nature, in one of the most interesting departments of her works.—*John Bachman. Charleston, Dec.* 31. 1833. [Received Feb. 7.]

The Common Redwing is a resident Species in the extreme North of Scotland and in the Isles. (Mr. Blyth, in VI. 516.)—I should feel obliged to Mr. Blyth if he would state its locality, and whether he has had personal opportunities of examining it in its summer haunts, as, I believe, this bird has hitherto generally been looked upon in the light of a stranger, merely paying us a visit during the winter season. I can assure Mr. Blyth it is not a summer resident on the eastern coast of Scotland or in the Orkney Islands, although Dr. Barry says, in his *History of the Orkney Islands*, book iii. p. 316., 2d edit., "it may be seen in Hoy for the most part of summer, and always in harvest; where it probably builds among the shrubs in the valleys." At least, I could not discover this bird, during an extensive excursion through these islands and a great part of the Highlands in the summer of 1831; my principal object being that of inspecting the habits and nidification of the different birds that resort thither. The only instance recorded of the redwing's breeding in the British Islands is in Montagu; who says, "Mr. Bullock found a nest in the Island of Harris in the Hebrides." The solitary instance here mentioned must invalidate the idea of those heard by W. L. (VI. 218.) being identical with the redwing, unless their locality is changed since Mr. Bullock's visit; or, otherwise, he must have found their nests in greater abundance than he appears to have done.

I suspect that the young of the missel thrush (*Túrdus viscívorus*) has very often been mistaken for the redwing, as they congregate towards the end of the summer. I saw, during the month of August, at least a hundred assembled together, and at first thought they were a flock of fieldfares or redwings; but, on a closer examination, I discovered my mistake. They certainly must migrate. The fact of their migrating is mentioned in V. 581.

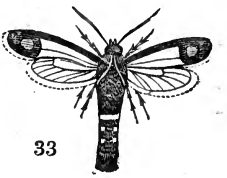
Montagu says further of the redwing, "It is said to breed in Norway and Sweden." Bewick says only the latter country. Mr. Hewitson, who visited Norway last summer, did not find it there, although he saw its congener, the fieldfare (*Túrdus pilàris*); and in his *British Oology*, Nos. xiv. and xv., says, "it

is the most abundant bird in Norway, and is generally diffused over that part which we visited, breeding (so contrary to the habits of other species of the genus *Túrdus* with which we are acquainted) in society; 200 nests or more being frequently within a very small space." Possibly some of the readers or correspondents of the Magazine, who may be personally acquainted with the Western Islands, will favour us with a more minute description of the nest, eggs, and general habits of the redwing. — *J. D. Salmon. Stoke Ferry, Norfolk.* [See p. 144.]

The Black Viper. (VI. 527., VII. 76.) — Mr. Bree's remarks (in VII. 76.) do not disincline me to repeat my former assertion, that I believe that there is but one species of poisonous reptile in England, namely, *Vìpera Bèrus*. The black viper is an extreme variety, but every intermediate shade exists.—*E. N. D. Feb.* 1834.

Criticisms on some Species of Insects published in Wood's "Index Entomologicus," and in Stephens's "Illustrations of British Entomology." — As the correction of errors must be acceptable to every impartial person, I point out some which occur in Wood's *Index Entomologicus* and in Stephens's *Illustrations of British Entomology*, which Mr. Wood takes for his guide; and as there are many figures which I do not understand, I shall be glad to have them explained, to prevent my being led further astray: — Wood, plate 1. fig. 3. Is this the *true* Europòme? or Philódice? and on what authority does it appear as British? — Plate 1. fig. 4. Is this the *true* Chrysóthome? and in what does it differ from Eléctra (or Edùsa)? — Plate 1. figs. 8. 10. 12. Chariclèa, Mètra, and sabéllicæ: Why are these distinct from brássicæ, ràpæ, and nàpi? — Plate 2. fig. 53. spìni? Is this the *true* spìni? The late Mr. Haworth told me he had one from the cabinet of the late Captain Lindegret; but it had no head. Mr. Sparshall has a Thècla, quite new, and distinct from Mr. Haworth's. — Plate 2. fig. 67. looks like Aléxis (the common blue). Wood gives it as Dórylas, and 67. (or 69.?) ♂, and 67. (or 69.?) ♀, as Aléxis; but the ♂ is figured with a border of black spots in the second wings, which is not common in Aléxis; 68. Icàrius, ♂ and ♀; and 70. E`ros, ♂ and ♀: what is the distinction between these four? — Plate 2. fig. 58. ♂, and plate 3. fig. 58. ♀: Hippóthoë. Mr. Haworth told me that they came out of an old cabinet, and were said to have been taken near Faversham. I had ♂ and ♀ from the late Mr. Latham, which were from Captain Lindegret's cabinet; whence, probably, all the supposed British specimens also came. — Plate 2. fig. 72., plate 3. figs. 73. and 74. Agéstis, Salmàcis ♂ and ♀, and

Artaxérxes: Are these three distinct, as species; or the same, arising from some local or other cause? — Plate 4. figs. 2, 3, and 4. melilòti, trifòlii, and lòti: are these distinct? Ditto, figs. 5. and 6. filipéndulæ and hippocrépidis: or only slight varieties? Fig. 26. chrysidifórmis: what is the authority as British? Fig. 31. philonthifórmis: Is it distinct from 30. ichneumonifórmis; and where, when, and by whom was it taken, and in whose cabinet is it? — Mr. Curtis, in his *Guide* gen. 790. 9., has given Ægèri*a* stomoxyfórmis of Stephens as the ♀ of his mutillæfórmis, for which he has been ridiculed; Mr. Stephens having subsequently said that the stomoxyfórmis which he has figured is a "♂, with *ciliated antennæ*"! In *my* copy of Mr. Stephens's work, the figure of stomoxyfórmis (plate 11. fig. 3.) appears to be a female, and has *not* ciliated antennæ; though culicifórmis (plate 10. fig. 3.) is a ♂, with "*ciliated antennæ;*" but Mr. Curtis does not refer to *that*. It does not appear that either Mr. Stephens or Mr. Wood has figured the *true* Sèsia stomoxyfórmis of Hüb.; of which this (*fig.* 33.) is a copy. It has two orange lines on the thorax; a band and four spots of the same colour on the abdomen; which agrees with Stephens's *Latin* description, as well it may, his being copied verbatim from Ochsenheimer, with the omission of the word in parenthesis; viz. "Alis (hyalinis) anticarum marginibus fasciaque nigris; thoracis *lineis duabus* abdominis barbati cingulo *punctisque lateralibus fulvis;* palpis omnino nigris." But Mr. Stephens, in his English description, says, "thorax glossy, *immaculate;* abdomen with fourth segment fulvous, orange, interrupted by a dusky black line beneath," &c. Whether this (Mr. Stephens's) is a good species, I will not pretend to say, as I have not had an opportunity of *seeing* a specimen.


33

Catocàla elocàta. — Mr. Stephens has remarked that "this fine insect presents a conspicuous instance of the baneful practice of mixing foreign and indigenous productions together; particularly when undistinguished by any memorandum or label; as, in consequence of an unticketed specimen having been detected in the collection of the late Mr. Blunt, this species has not only been selected and figured as a British example of the genus Catocàla, but the error has also been subsequently copied into Loudon's Magazine [I. 272. fig. 136.]; whereas the specimen in question, which has thus improperly been introduced into our Fauna, was obtained

direct *from Oporto* by its late regretted possessor, who, unfortunately, was too prone to admit dubious insects into his collection, and permitted the present, with Deiléphila gàlii, and some three or four other foreign species, to disfigure his cabinet." (*Steph.* vol. iii. p. 132. n.)

Mr. Stephens is, by this assertion, called upon to prove that Mr. Blunt's C. elocàta came direct from Oporto; and I should be glad to be at the same time informed what the "some three or four other foreign species" were that "disfigured his [Mr. Blunt's] cabinet. As to the foreign specimen of D. gàlii being there, that can easily be explained: — "It was *sold by Mr. Stephens* to the late Mr. Blunt *for a British insect:*" a baneful practice, which might mislead any one. This specimen of D. gàlii is now in Mr. Curtis's cabinet. It was set like an English insect; and formed, with two specimens of *Sphínx* ligústri, the seventy-third lot at Mr. Stephens's sale of *British* insects in 1825; and, till it came into Mr. Curtis's possession, no notice was taken of its being a foreign specimen. — *J. C. Dale. Blandford, Jan.* 5. 1834.

Malàchius bipunctàtus Babington, in V. 329. — Mr. Babington has described this as new. He will find a correct figure of it in Panzer (pl. 8. fig. 2.), as the male of ruficóllis. — *J. C. Dale.*

On the Nomenclature of the Thoracic Appendages of Insects. (VI. 495. note †, VII. 77, 78.) — Sir, I thank your correspondents, Lacon and Discipulus, for giving me an opportunity of performing an act of justice towards Mr. Newman. You will recollect that the note (VI. 495. note †) to which these critics allude (VII. 77, 78.) was added in the hurry of correcting the press [It was added in the proof. — *J. D.*]; and, at the moment, remembering that Mr. Haliday was the first English author who had employed the compound term metatarsus, but at the same time thinking he had made a more extensive application of these names, I considered that Mr. Newman had merely extended the idea, and that it would but be doing common justice to Mr. Haliday to mention the circumstance. Discipulus, however, overlooks (p. 78.) the fact, that, although the word thorax may be found in the lexicon, it also occupies a place in the Latin dictionary, and that in natural-history language, it is constantly used and declined as a Latin word: hence the terms medithorax and postthorax are not so worthy of the mark of ridicule which a recent reviewer has thought proper to attach to them. Moreover, my observation upon the barbarous compound nature of these names did not (notwithstanding your editorial parenthesis to the contrary) apply to the designation of the thoracic

segments, but to the limbs attached to them. The remedy I proposed would have this result: medipedes and postpedes, medicoxæ, postcoxæ, medifemora, posttibiæ, &c. (Latin compounds), would be introduced, instead of mesopedes, metapedes, mesofemora, &c.; all of which are Greek and Latin compounds.

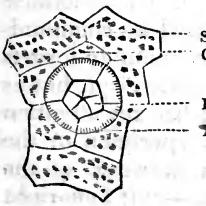
Setting this objection aside, as well as that of the primary distribution of the thoracic segments, it is still undeniable, that this system of nomenclature, although attempted to be applied, is not applicable, as it ought to be, to all the thoracic appendages. If applied only to the legs and their various parts, it is good; but, when applied to the wings, we have those organs which are attached not to the *pro*thorax, but to the *meso*thorax; termed *pro*alæ, not *mes*alæ; whilst, on the other hand, were the system to be adhered to throughout, we should be under the necessity of terming the anterior or mesothoracic wings, middle wings, or mesalæ.

I shall only add that Mr. Lacon has again shown [in p. 77.] his critical abilities, by calling the metatarsus of Haliday the last, instead of the first or basal joint of the tarsus. I am, Sir, yours, &c. — *J. O. Westwood. The Grove, Hammersmith, Jan.* 14. 1834.

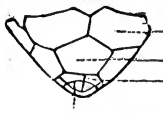
The Persian Iris, the Odour of its Flowers, and the Idiosyncrasies therewith connected. (VI. 280.) — My brother-in-law, Mr. Mapleton, tells me he lately bought a root of the Persian iris, and asked the man, at the same time, whether it smelled sweet? "Sir," said he, "some people cannot smell it at all; but, for my part, it knocks me down: I cannot bear it, it smells so strong." [*Extract from a Letter from the Rev. W. T. Bree, Oct.* 7. 1833.]

Cyathocrinite versus Encrinite. (78.) — As Mr. Conway has, in p. 78 to 80., accused me of error and misrepresentation, in stating that the pelvis and part of the costals of the cyathocrinite, figured in VI. 561., have been covered by the column, I beg to assure him that it is nevertheless true; and that, although he asserts it to be "a physical impossibility," yet it is a real fact, as several specimens in my cabinet distinctly prove, one of which (a fragment from the Derbyshire limestone) is here figured. (*fig.* 34.) Although to Mr. Conway it may appear difficult to account for the use of those plates, when so covered by the column, yet no such difficulty occurred to

34



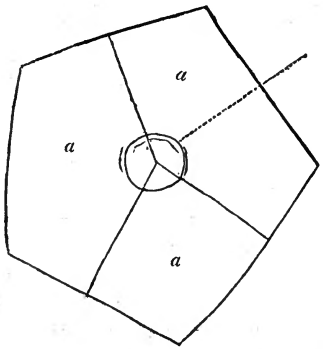
35



Miller, who says, in a note, p. 67. of his *Crinöidea*, "it is not unlikely that the real joints forming the pelvis are so much abbreviated as not to be visible externally." I also send a figure (*fig.* 35.) taken from another specimen, in which the plates, which Mr. Conway seems to doubt the existence of, are better developed than in the specimen before mentioned.

Mr. Conway asks, "Does it not always follow, as a matter of course, that, when the column is enlarged and expanded at its junction with the pelvis, the pelvis is also widened and enlarged in the same proportion, as in the genus Apiocrinites?" and then says, "This, I think, cannot be denied." But, if he had examined the genus Platycrinites, in which the column occupies only a small portion of the centre of the pelvis, as in the annexed figure (*fig.* 36.) (taken of the natural size from one of my specimens), and compared it with the genus Apiocrinites, I feel confident that he would not have hazarded a speculation for which there is so little foundation; and, in my opinion, there is much the same chance of success for his speculation respecting the gradual change [transition by an intervening series of affinities] of Encrinites into Cyathocrinites; for though I have not seen the specimen in the *Geological Transactions*, yet in every specimen of Cyathocrinites that has come under my observation, the plates of the body are alike in number and position; and the superior parts, arms, hands, &c., are invariably divided by what Miller terms cuneiform joints; whereas, in the Encrinites, the only plate which has this form in the scapula, and the only division which takes place above it is by a totally different process.

36



a a a, The three plates which form the pelvis of a Platycrinites. *b*, Mark of the column.

A little further on, Mr. Conway states that it was because he considered his specimen a nondescript that he communicated it to this Magazine; but he most unaccountably forgets himself. He did not communicate it as a nondescript, but as the *lily encrinite*. He says (VI. 125.),—"I had my attention amply rewarded by being furnished with a specimen of the lily encrinite, of which I here send you a drawing, of the natural size:" and at the conclusion (p. 128.),—"If I am right in supposing it to be the first discovered specimen of the lily

encrinite, I shall reckon myself singularly fortunate in having obtained possession of it;" the only doubt expressed in the letter being, whether it had been previously found in England or not. That it is not what he has there stated it to be, and what I particularly disputed, Mr. Conway himself now admits, and the only difference which can yet be found betwixt his specimen and mine is, that the one is tuberculated and the other smooth; but, when it is stated that I possess specimens of the bodies, both plain and covered with tubercles of various sizes, yet exactly alike in every other respect, very few indeed will refuse to concede that they must rank together till some better distinction can be found, and it is much to be regretted that a name should have been given to any of them founded upon so very variable a character.

Having freed myself from the charges brought against me, I beg to conclude with informing Mr. Conway, that it is probable that his curiosity will be gratified, before the end of the year, by the publication of such of my specimens as are of sufficient interest to be included in Mr. Phillips's intended work on the *Geology of the North and West Ridings of Yorkshire.*— *Wm. Gilbertson. Preston, Lancashire, Jan.* 20. 1834.

ART. II. *Queries and Answers.*

[*NOTICE of a Species of Mouse, possibly an undescribed one, which has abounded in Inverness-shire and Ross-shire.*] — In the May and June of 1832, over a great extent of mountainous district, including all the western divisions of Inverness-shire and Ross-shire (my enquiries have not extended into Argyle), the shepherds began to observe that their dogs were incessantly killing mice, which they naturally concluded to be what they usually call field mice. They observed that these mice increased as the summer advanced; and that the grassy parts of the mountains were much destroyed by them, as they seemed, like the cut-worm, or larva of the *Tipula gramínea* [? *cornícina*], to prefer the blanched part of the herbage, among the mosses and decayed matter of former years; so that these grassy parts became brown. A curious and very interesting fact took place in consequence of, or rather accompanied, this great increase of these mice; namely, the foxes, early in the summer, finding such a supply of food, which they appear to prefer to all others *, ceased from that time to destroy any more lambs.

* I have long known that dogs (and, I think, the shepherd's beyond all others) are particularly fond of the Alpine mouse; and, although I have repeatedly tried, in various quarters, to obtain specimens, it has been in vain, as the shepherds tell me that they only discover them by their dogs, who instantly swallow them.

But, some time in the spring of 1833, the mice were observed to have retired, like the lemmings of Norway; and the foxes, in want of their accustomed food, again fell upon the sheep (the lambs at first) with unwonted fury.

During the time that these mice were most abundant, the person who manages Mr. Frazer of Eskadale's sheep-farms, a man of rather superior acuteness and sagacity, paid some attention to them. He says, that, as near as he could estimate, they devoured about 8 bolls (64 bushels) of his potatoes; and that he dug out of one hole no less than seventeen of them, of various colours, probably young ones. He says that "their general colour was brown, with a white ring about the neck; and the tail likewise tipped with white; a light-coloured stripe down the nose and along the back." As soon as I heard of this irruption of mice, I sent repeated requests for specimens, which, I suppose, was put off as a thing that could be "done any time;" and now the mice have, it seems, departed from the land. If any correspondent would inform me if they have seen or heard of such a species of mouse, it would be very gratifying to me. I have seen two or three that I never could find any description or resemblance of in books.—*W. L. Selkirkshire, Dec.* 20. 1833.

Has the Animal Le Lerot of Cuvier's "Règne Animal" been observed in any English Orchard or Garden? With incidental Information on the Importation of Apples from Jersey and Guernsey to the West of England for manufacturing into Cider in the latter Place.— By a friend who has resided several years at Havre, I am informed that great destruction of the best fruit in the gardens takes place by the depredations of an animal about the size of a common rat, which eats the fruit as it becomes ripe. The name given to it by the inhabitants in that part of France is *le rat mulot*, or the rat field-mouse. It resembles a squirrel more than a rat, the end of its tail being tufted. From the proximity of the northern coast of France to England, and the great importation of fruit in the autumn, it is rather remarkable that the animal has not been imported into this country. I do not recollect ever seeing any animals of this kind in France or Switzerland, but I understand they are very numerous. On referring to *Le Règne Animal* of Cuvier, I find, among *les Rongeurs* [Animàlia rodéntia, the gnawing animals], an animal named *le lerot*, which must be the animal provincially called *rat mulot*. It is described "as rather smaller than the rat, of a greyish brown colour above, and white beneath. The eye is surrounded with black hair, which extends and spreads to the shoulder. The tail, which is tufted only at the end, is black; but the extremity is white. It is common in French

gardens, living in holes in walls, and doing much injury to the espaliers." Perhaps some correspondent can inform us whether the *rat mulot* has ever been seen in English gardens or orchards, and can tell us something more respecting it than my meagre description does.

On a late visit to Weymouth I noticed the large importation of apples from Jersey and Guernsey: waggon loads in sacks were frequently passing my apartments. On enquiry, I found they were sent inland to make cider. Can there be any other reason why the cider should not be made in Jersey and Guernsey, and imported from those islands, except the difficulty of importing all kinds of liquors, from the caution necessary to be observed in preventing smuggling of spirits and wine? — *R. B. Nov.* 26. 1833.

Starlings and Rooks. — In the country, I have very frequently observed that immense flights of starlings attend on large flocks of rooks: when driven from one field, they fly to another, in company, though not mingled, but each forming a separate squadron. Does either species serve as a guide to any kind of food acceptable to both? or for what purpose is this strange association? — *E. N. D. September*, 1833.

[Scolopax rusticola, in "Notes on the Starling, V. 284., has these remarks: — The starlings "are often seen in company with the rooks, and are in the habit of frequenting pastures with their larger companions. Their food, possibly, consists of the same species of worms, slugs, grubs, &c. They will often build under the rooks' nests in the rookery, and thus appear something like dependants."]

Has any Correspondent heard the Song of the Water Ouzel? — My attention was attracted to it during a fishing excursion in North Wales, on October 8. 1833; and I should describe it as something similar to the faint warbling of the lesser pettychaps, but continued a considerable time without cessation, as that of the stare [starling]. I was some time in ascertaining the fact, as the bird was sitting under a projecting bank; and, consequently, the song appeared to come from the water. I never before had an opportunity of hearing it, which I attribute to the extreme shyness of the bird. — *G. B. Oct.* 18. 1833.

[In I. 494., a correspondent has queried the name of a strange bird whose characteristics he gives: one of these is, "its cry resembled that of the water ouzel."]

Has a Geótrupes possessed of the following Characteristics been previously described? — Ater; subtus æneo-purpureus; elytris punctato-striatis; singulis macula ocellata aurantiaca prope apicem inferiorem. This insect has been captured by, and is now in the possession of, my friend J. Bannan, Esq.,

of Plymouth; in compliment to whom, I propose, if it has not been previously described, to apply to it the epithet Bannàn*i*. The only distinction which I can find between it and G. stercorànius is the very striking appearance of two circular spots, one on each elytron, not far from the apex (tip), of a dull red or orange colour, with a black spot in the centre; the whole exactly resembling, in form and size, the ocelli on the upper wings of Hippárchi*a* Janìr*a*, or meadow brown butterfly, but differing in hue. It is of about 9 lines in length, and of a somewhat brownish black above, and bronzed with tints of copper and violet beneath. Mr. Bannan has taken, in this neighbourhood, two individuals perfectly alike. The specimen taken secondly has been accidentally destroyed; but that taken first is in the highest preservation. Is it an undescribed species, or an undescribed variety only? — *W. A. Bromfield. Plymouth, July* 15. 1832.

Larvæ of the Sýrphidæ. — It is stated in p. 283. of *Insect Transformations*, that the maggots of this family attach themselves to a leaf or a plant; but in p. 5. it is asserted that they live in common sewers. Which of these two statements is the correct one? I incline to believe in the latter. — *J. H. F.*

[Both statements are correct. The larva of one of the Sýrphidæ is found attached to the leaves of the hop plant, and destroys, for its food, great numbers of the A`phis humuli, which, in some seasons, commits most serious injury to the health and welfare of this plant, and consequently to the crop of hops. All this is taught us by Rusticus of Godalming, in the *Entomological Magazine*, vol. i. p. 223., and the editor's footnote. Off a hop plant in our garden we, in 1833, bred one or two of this syrphideous fly; at least we suppose of the very same species: a competent entomologist has named our specimen, Sýrphus balteàtus.

Of the larva or maggot of another of the Sýrphidæ, the Erístalis (*M*úsca) tènax, it may safely be said, sewers, and the filthiest of places. Of this larva and its habits a pleasing description will be found in Samouelle's *Entomological Cabinet*, No. ii. t. 3., where a figure of the fly, and of the cast skin of its pupa, are given. "In the larva state, when it is called 'the rat-tailed worm,' it breathes through a tail formed of retractile tubes, like a telescope, capable of being contracted or extended, according to the varying depth of the larva in the mud below." (*Entomologia Edinensis*, p. 35.)

This fly is an interesting creature, in autumn, on the blossoms of ivy, and the Compósitæ, as starworts, sunflowers, &c.; and a hundred interesting facts on it, eligible for threading into a history of its habits, might be noted.]

REVIEWS.

ART. I. *Catalogue of Works on Natural History, lately published, with some Notice of those considered the most interesting to British Naturalists.*

SWAINSON, Wm., F.R.S., L.S., A.C.G.: Ornithological Drawings; Part I., The Birds of Brazil. 8vo, 13 plates. Plain, 7*s.*; coloured, 10*s.* 6*d.*; double plates, 15*s.*

Mr. Swainson's name stands so deservedly high, both as an ornithologist and an artist, that, in introducing this splendid work to the notice of our readers, we shall simply say that we consider it in every respect worthy of its author. Farther commendation we feel would be superfluous. Mr. Swainson has, with great judgment, abandoned the expensive and cumbrous plan of publishing in folio or quarto, and adopted that of royal 8vo. He is thus enabled to give plates at a lower price than has ever previously been done. The numbers are to be published quarterly; and four of them, containing together fifty exquisitely drawn and beautifully coloured plates, are to constitute a volume, for which the price is 2*l.* 2*s.* The first series, of which No. I. is before us, is to contain the birds of Brazil; and we are delighted to see Mr. Swainson thus erecting a monument to bear witness of his arduous and praiseworthy researches in that interesting and beautiful country. We are but stay-at-homes; and we delight in that exquisite art which can thus bring the tropics in all their glorious panoply of charms palpably and visibly before us, without the slightest apprehension from the crushing folds of boa constrictors, or the savage and insatiable cruelty of jaguars. —*E.*

Wells, Rev. *Algernon*, of Coggeshall, Essex: On Animal Instinct: a Lecture delivered before the Members of the Mechanics' Institute, Colchester, on Monday Evening, Nov. 25. 1833, and published by their Request. Pamphlet, 8vo, 40 pages. Fenton, Colchester; Longman, London; 1834.

This is so succinct and excellent a treatise on the subject, that an analysis of the lecture would induce the necessity of reprinting much of it, for which we have not space. Every naturalist should possess himself of a copy. The price cannot be great. It may be, that not much that is new is taught us in

the book; but all we have previously known is adduced connectedly, clearly, eloquently.

Fraser, James B., Esq., author of "Travels in Khorasan;" "A Tour through the Himâlâ," &c.: An Historical and Descriptive Account of Persia, from the earliest Ages to the present Time, &c. Small 8vo, 472 pages, with a map, and 13 engravings by Jackson. It forms vol. xv. of the Edinburgh Cabinet Library. Edinburgh, Oliver and Boyd, 1834.

Fourteen pages, in a chapter at the end, include what is communicated on the "natural history of Persia." This is of the popular and general kind; and although the writer, it may be seen, has striven to identify the objects spoken of with the systematised species of naturalists, this is but partly done. The information on the geology of Persia is richer than that on its zoology and botany. That which is told, is told most agreeably. We would that a similar style of narrative were obvious in all notices of objects of natural history.

Swainson, Wm., F.R.S., &c.: Exotic Conchology; or Figures and Descriptions of rare, beautiful, or undescribed Shells. Part I. 4to, 8 plates, coloured. 10*s.* 6*d.*

"Many of the most rare and beautiful species of volutes have been figured by Swainson in the first plates of his *Exotic Conchology*, with a verisimilitude that has never been equalled, and probably never will be excelled, by an artist. This talent, combined with his scientific knowledge as a naturalist, must render the above work the most eminent of its kind." Such was the opinion of the late lamented Lamarck, who, from his intimate knowledge of the subject, was better qualified to give an opinion on the merits of a work like this than any writer who has ever existed. Mr. Swainson observes that a few of the early plates were published some years ago; but unavoidable accidents having injured the remainder, they were withdrawn, and nearly the whole have since been re-executed. Six parts, one to be published every alternate month, will complete the work. Nothing can exceed the delicate, chaste, and exquisite beauty of the figures in the first part. Plates 3. 5. and 8. are gems to rivet the attention of the most fastidious connoisseur; and defy alike rivalry or copyism. There is a subdued and quiet colouring in all Mr. Swainson's works that will plead for itself against the meretricious glare and gaiety now so much in vogue. It is impossible to make Nature too beautiful; but it is very easy to make her too gaudy. — *E.*

Bulletin de la Société Impériale des Naturalistes de Moscou. Vol. IV., 6 plates; Vol. V., 4 plates. Moscow, 1832.

The papers which are the more interesting to naturalists have the following titles: — Remarks, by M. de Hedenström, in further elucidation of some points in his *Fragmens sur la Sibérie.* Séance publique du 25 Déc. 1832, pour célébrer la Vingt-cinquième Année de l'Existence littéraire de la Société. The report read at the meeting goes to show the extent, usefulness, and consequent importance of the Society's labours in the 25 years. Sur les Mastodons et le Tetracaulodon. This is a collective essay, in which the essence of what is known on the osteology, &c., of 7 species of Mástodon is given, and in which the characteristics of a related new genus, named by its describer, Mr. Godman, Tetracaúlodon (epithet mastodontöïdeum), found in the state of New York, U.S., are detailed, and compared with those of the Mastodons. Of T. mastodontöïdeum *Godman* two plates, exhibitive of the structure of its head and teeth, are given. De nova generis Felis specie. Considérations sur les principaux Organes des Insectes, par G. le Comte de Laveau. Observationes in Plantas Rossicas et Descriptiones specierum novarum: auctore Chr. Steven. Nova Dipterorum genera offert illustratque Henning Jensen. Catalogus systematicus (after Meigen's method) Dipterorum in Livonia observatorum, a B. A. Gimmerthal. Enumeratio Noctuarum Uralenses Montes inter et Wolgam fluvium habitantium, auctore E. Eversmann. Note sur un Genre de Polypiers nouveau, presenté sous le nom de Rhysmotes (epithet petiolàtus), par G. Fischer: figures of the animal and its polypidom, are added. Analecta ad Faunam Insectorum Rossicam, auctore G. Fischer. 16 coloured figures of insects illustrate this essay. — In vol. v. Enumeratio Coleopterorum Rossiæ meridionalis obvenientium, quæ annorum 1827—1831 spatio observavit I. Krynicki. Coloured figures of 12 of the species described are added. Decades tres plantarum novarum Chinæ Boreali et Mongoliæ Chinensi incolarum, auctore N. Turczaninow. A List of the Butterflies of Volhynia and Podolia. Catalogue de quelques Lepidoptères des Antilles, avec la description de plusieurs espèces nouvelles, par M. Ménétriés. In both volumes there are papers on subjects of geology, and on fossils.

Fischer, Gotthelf, de Waldheim: Notice sur le Phlocerus, Genre Noveau d'Orthoptères de la Russie. 8vo, with a plate. Moscow, 1833.

Phlócerus (*phlaō*, to compress; *keras*, a horn; compressed antennæ) Menetriès*ii* Fischer (M. Ménétriés, known by his

travels in America and in Russia, and by his entomological researches) is an insect taken by M. Ménétriés, in July, at Schadach, to the east of Caucasus, at the height of more than 9000 ft., and near to the region of perpetual snow. In affinity, its place is between the genera Podísma and Gomphócerus, according to the method of M. Audinet-Serville. Its antennæ are so compressed as to form two lanceolate leaves; and M. Fischer would have named it Phyllócerus, but that Dejean has previously used this word as a name to a coleopterous genus. The external anatomy of the insect is described in detail. A figure of the insect, and others of its parts magnified, are appended.

Wilson, James, F.R.S. E.M.W.S., &c. and *Duncan,* Rev. *E. J.*, M.W.S.: Entomologia Edinensis; or, a Description and History of the Insects found in the Neighbourhood of Edinburgh. Coleoptera. 8vo, 352 pages, 2 plates. Blackwood, Edinburgh; Cadell, London; 1834.

We, of the multitude, have been long enough, ay, far too long, excluded from the pleasure of making ourselves acquainted with the names and entomological associations connected with insects. How so? Because insects have been named, described, and figured, partly in this work, partly in that, and partly in all the rest of the works; so that only those who could buy or make access to the majority of those which constitute the bibliotheca entomologica could acquaint themselves with all the names for, and descriptions of, insects which entomological naturalists, from Aristotle to those of 1834, have invented and elaborated. A better state of things is now dawning upon us. The work whose title is given above is, as far as we know, the very herald of it. We hail its appearance with true pleasure, and truly hope that our insect-loving friends will, as ourselves, "therefore as a stranger give it welcome!" Not that it addresses itself to our regard on its strangerhood alone, but, over and above its attractiveness on this ground, also on its own (so we think) most valid merits.

"A whole is greater than a part;" so the Coleóptera of the Edinburgh neighbourhood are not tantamount to the Coleóptera of Britain. No: but they, doubtless, are so in a good degree, at least in relation to the families and the genera; but herein, kind fellow students, consists, we think, the value of the book; not in enabling us to trace out and ascertain the *name* of any and every British beetle we may meet with, "and there an end;" but (and far better is this faculty

which it will communicate) in leading us, as well as to the discrimination and cognizance of our native species, to the apprehension of principles of universal, delighting, enlightening, empowering application.

The descriptions of the sections, subsections, families, genera, and species are, in a good degree, detailed; yet, we think, lucid. Short, but pleasing, notices of the habits are interspersed; the internal anatomy of many species is noticed; the derivation and literal meaning of many generic names are given; the descriptions are all in English, and have been derived from a familiar, a living acquaintance with the creatures described; or, in the case of the rarer and very rare species, from a diligent and judicious reading. A very pleasing and a truly useful introduction of 59 pages is prefixed to the work.

Gaillon, Benj. Membre de plusieurs Sociétés savantes: Aperçu d'Histoire Naturelle, et Observations sur les Limites qui séparent le Règne Végétal du Règne Animal. 8vo, 35 pages. Boulogne, 1833.

This is an address read before the Society of Agriculture, Commerce, and of the Arts, of Boulogne sur Mer, at its meeting of Sept. 19. 1832. The greater portion is occupied with a review of the principal classes into which animals and vegetables have been divided, written in a rather declamatory style, and of no further interest or use than as serving to introduce the views of M. Gaillon respecting those sorts of *A*lgæ which inhabit the debatable grounds that lie between the two kingdoms of organised beings. The *A*lgæ alluded to are composed of globular or lenticular granules lying loose and disconnected, or embedded in a transparent mucus, or compacted together on a slimy membrane, or enclosed within capillary tubes which divide and branch away exactly after the fashion of acknowledged *C*onférvæ. They form the families Diatomàceæ, Gloiocládeæ, *B*yssöideæ, and Oscillatòriæ, and embrace some of the genera of the *C*onférveæ, Siphòneæ, and *U*lvàceæ of Dr. Hooker's *English Flora*. (vol. v.) Now, all of these, M. Gaillon maintains, are animals, and, under the name of Némazoaires, ought to be transferred to the animal kingdom; for he has seen, and many others have witnessed the same phenomena, the granules, both in the separate and combined state, move from place to place, as if actuated by volition; he has seen them, when stationary, perform motions to and fro on some fixed point; he has seen them change their form, dilate, and contract; and he has seen a globule of little coloured grains ejected from the interior, which, he main-

tains, is their spawn. At first, it would appear, the granules of all of them are separate and free, and move about in a very lively manner, but after a time they approximate and unite each after its own nature, and, by their aggregation or successive evolution, produce forms so similar to those of confervoid plants that their real nature has been hidden until these times.

Of the nature of these productions we have now then three opinions: the first, that they are vegetable; the second, that they possess successively an animal and a vegetable existence (see our I. 305.); and the third is that before us, and which believes them to be entirely animal. Were it necessary to choose between them, we confess our partiality to the eldest born; and, admitting all that has been said of the mobility and contractility of these Némazoaires as true, we may still hesitate to admit that they are sufficient for the annihilation of this opinion; the more especially when we remember the observations of R. Brown, which prove that the granules or corpuscles of even unorganised matter possess all these apparently voluntary motions, both locomotive and rotatory. But neither leisure nor space permit us to enter upon this discussion, nor yet into the question how far the observations made on these granules support the speculations which have been anew broached on the doctrine of spontaneous generation.

For information relative to the so called Némazoaires, the English reader may consult our I. 305., et seq.; Greville's *Flora Edinensis*, p. 321.; Greville's *Cryptogamic Flora*; Hooker's *English Flora* (vol. v.); Lindley's *Introduction to the Natural System of Botany* (p. 339.); and the Rev. Mr. Berkeley's *Minute* A*lgæ*, published as a Supplement to the *English Botany*. — *N.*

Nees von Esenbeck, Th. Fr. Lud., Phil. et Med. Dre., &c.: Genera Plantarum Floræ Germanicæ Iconibus et Descriptionibus illustrata. Fasciculus ii. Bonnæ, Henry and Cohen.

Of this excellent work we have indicated the scope, in noticing the first fasciculus, in VI. 439. The second fasciculus is as good as the first, and describes and illustrates the characters of the following genera: — *T*ỳpha, *S*pargànium, *A*corus, *C*álla, *A*rum, *J*úncus, Lùzula, Triglòchin, Scheuchzè*ria*, *V*eràtrum, Tofièld*ia*, *S*mìlax, *R*úscus, *A*spáragus, Convallària, *P*olygónatum, Maiánthemum *Wigg*, Strétopus *Mich.*, Pàris, *T*àmus.

Babington, Charles C., M.A. F.L.S., &c.: Flora Bathonensis: or, A Catalogue of the Plants indigenous to the Vicinity of Bath. 8vo, 70 pages. Collins, Bath; Tremlett, Bristol; Longman, London; 1834.

It is stated, in the preface, that the writer "has been induced to submit it to the public, in the hope of rendering some assistance to such of the inhabitants and numerous visiters of our city [Bath] as take interest in the delightful study of botany. It may also, perhaps, be serviceable, although in a very slight degree, by contributing to our knowledge of the geographical distribution of British plants. Some notices of the geology of the district are then added. The plants are arranged in the natural orders; the habitat or habitats are given under the name of each species. Besides the habitats, a few original remarks on the habits and botanical characters of certain species occur in the manual. This practice we think excellent: it was Relham's, in every edition of his *Flora Cantabrigiensis;* it has been applied more amply by Gerarde Edwards Smith, in his *Flora of South Kent*, than by any one else that we know of.

Rhind, Wm., M.R.C.S., &c.: — A Catechism of Botany; or Natural History of the Vegetable Kingdom. 12mo, 76 pages, 7 woodcuts. Edinburgh. 9*d.* and 1*s.*

It is far better than Pinnock's *Catechism of Botany*, published some half score years ago, but yet is devoid of that clearness and simplicity which such a book should have. It is as a man in child's petticoats. Query, Is colloquy the fittest mode in which to communicate a knowledge of a science? We should desire not to have the understanding of a child insulted with such questions as these: — "Are vegetables ornamental?" "Are there many different kinds of plants?" It is true that these, and such as these, are followed by answers profound enough and eloquent enough for an adolescent mind; but such a mind would not wish them, nor like them better because they came, "in such a *question*able shape." In p. 43., a cut of the banana tree or of the plantain tree, seems given for one of the cabbage palm. The book, however, with all its faults, if it have more than these we have hit upon, contains the best and richest stock of botanical knowledge ever offered for nine-pence.

Lyell, Charles, Esq. F.R.S., &c.: Principles of Geology; being an Attempt to explain the former Changes of the Earth's Surface, by reference to Causes now in operation.

In 3 vols. Vol. III. 8vo, 460 pages; with plates and cuts. 1*l.* London, 1833.

"In the summer of 1831, I made a geological excursion to the volcanic district of the Eifel; and, on my return, I determined to extend my work to three volumes, the second of which appeared in January, 1832. The last (the third) volume has been delayed till now by many interruptions; among which I may mention a tour, in the summer of 1832, up the valley of the Rhine, when I examined the loess (vol. iii. p. 151.), and a visit, on my way home, through Switzerland, to the Valorsine; where I had an opportunity of verifying the observations of M. Necker on the granite veins and altered stratified rocks of that district." (Preface, page xviii.)

Art. II. *Literary Notices.*

The Animals of the Class Mammàlia. — The first Part of a work on these animals, by Henry Woods, F.R.S. A.L.S., is announced to appear on the 31st of March. The work will be completed in thirty monthly parts. It is to "form a complete concentration of all that is at present known of the entire class Mammàlia, and to include the fossil species. The illustrations will exceed 500 in number."

Observations on the Structure of Recent and Fossil Coníferæ. By Wm. Nicol, Esq., Lecturer on Natural Philosophy, &c., occur in Jameson's *Edinburgh Philosophical Journal* for Jan., to the extent of twenty-one pages, and three plates, and constitute an essay deemed of great merit.

The late Mr. Haworth's Collection of Specimens of Insects, Fishes, Crustacea, Echini, Asterias, and Corallines remain unsold. Of insects there are, it is stated, nearly 14,000 species, British and foreign; above 35,500 specimens. The British specimens are distinguished from the foreign ones "by proper marks."

Phillips's Geology of the North and West Ridings of Yorkshire is likely to be published before the end of the present year: see p. 181.

A Magazine of Botany and Flowering Plants, by Joseph Paxton, F.L.S., has just appeared. It is to be continued in monthly numbers, at 2*s.* each. Coloured figures of plants are to be given.

THE MAGAZINE

OF

NATURAL HISTORY.

MAY, 1834.

ORIGINAL COMMUNICATIONS.

ART. I. *On certain recent Meteoric Phenomena, Vicissitudes in the Seasons, prevalent Disorders, &c., contemporaneous, and in supposed connection, with Volcanic Emanations.* No. 2. By the Rev. W. B. CLARKE, A.M. F.G.S. &c.

" Quid sit, unde sit, quare sit. . . . . quod ipsum explorare et eruere sine universitatis inquisitione non possumus, cum ita cohærentia, connexa, concatenata sint."— M. MINUTIUS FELIX, xvii.

[" Together let us beat this ample field,
Try what the open, what the covert yield;
The latent tracts, the giddy heights explore."
POPE's *Essay on Man.*]

HAVING already [in VI. 289. to 308.] developed the principal bearings of this obscure topic, upon which I am desirous of throwing, if possible, a ray of light, there can be no necessity to recapitulate them. I shall, therefore, select from an abundance of facts in my possession such as appear most conducive to that end; and, in order to prevent the confusion which arises from embracing too many points of view at once (although they are, as the motto aptly states them to be, " cohærentia, connexa, concatenata," in a way scarcely credible by a person who has not entered on the enquiry), consider, in this and some following papers, the heads of the argument under distinct and individual illustrations. The present will have reference to the testimony afforded to my position by

The occasional Increase, Migrations, and Irruptions of Animals, Birds, Insects, and Fishes, during Epochs of terrestrial and atmospherical Convulsion.—In p. 181. are some observations on an extraordinary irruption of *mice* in Selkirkshire and Rossshire; and, though W. L., the author of those observations,

has enquired only respecting the *species* of which the mice in question may be, I adduce his statement on another ground. He says that the mice did prodigious damage over a wide extent of country in May and June, 1832; that their increase was extraordinary; and their disappearance sudden, in the spring of 1833. Now, in July, 1833, a similar irruption of mice occurred in the county of Galway, in Ireland, doing similar damage to the crops of grass and corn; and, as far as I have ascertained, the circumstances in both cases are alike. These irruptions of mice are not without their parallel in former years; and every tourist along the Rhine must have heard of the famous Hatto II., archbishop of Mentz, who, in time of *famine*, refusing to sell or give corn to his people, fled for safety to a castle (der Mäusethurm) on the river, where myriads of *mice*, pursuing the avaricious prelate, devoured him alive. Notwithstanding the lucubrations of Leitch Ritchie, Esq.*, we must consider the tradition (even if derived, as I believe, from a fact relating to the natural history of the mouse) properly defined, by Klein (*Rheinreise von Mainz vis Köln*, p. 57.), a "fantasie," and by Fischer, (*Neuester Wegweiser*, p. 99.), a "lächerliche mönchslegende" (a ridiculous monkish legend). Nevertheless, the "Mäusethurm" has its counterpart in Pliny, if we may trust that author. "M. Varro," says he, "autor est, à cuniculis suffossum in Hispania oppidum, à talpis in Thessalia: ab ranis civitatem in Gallia pulsam, ab *locustis* in *Africa: ex Gyaro Cycladum insula incolas à muribus fugatos*, in Italia Amyclas à serpentibus deletas.† (*Nat. Hist.* viii. 29.) The same writer observes elsewhere: — "Supra cuncta est murium fœtus: . . . . ex una genitos cxx. tradiderunt; apud Persas verò prægnantes et in utero parentis repertas. . . . . Itaque desinit mirum esse, unde *vis tanta messes populetur murium agrestium: in quibus illud quoque adhuc latet, quonam modo illa multitudo repentè occidat.* Nam nec exanimes reperiuntur, *neque extat qui murem hyeme in agro effoderit.* Plurimi ita ad Troadem proveniunt: et jam inde fugaverunt incolas. *Proventus eorum siccitatibus tradunt.*"‡ (*Nat. Hist.* x. 65.) Arnobius, also, who seems to have

* Heath's *Picturesque Annual* for 1833, p. 95. In this work, the "heroes," after Schreiber, are converted into "*rats;*" but "bolche nitchevo," as the Russians say, "*that's nothing!*" See Lyell's *Geol.* (vol. ii. p. 94.), on migration of rats.

† "M. Varro tells us that a town in Spain had been undermined by rabbits; another, in Thessaly, by moles; that the inhabitants of a city in France were driven from it by frogs; and, by locusts, the people of one in Africa; that the natives of Gyarus, an island of the Cyclades group, had been driven out by *mice;* and Amyclæ, in Italy, destroyed by serpents."

‡ "The prolificness of mice exceeds every thing: . . . 120 young are said to have been brought forth by one; but, in Persia, even the unborn young

had extensive acquaintance with the natural phenomena of his times (*end of third century*), has made distinct mention of mice as agents of destruction, and in connection with terrestrial convulsions and calamities. Amongst a long catalogue of hailstorms, drought, scarcity, famine, pestilence, aerolites, and earthquakes*, are these words: — "Annalium scripta percurrite linguarum diversitatibus scripta, universas discetis gentes sæpenumero desolatas et viduatas suis esse cultoribus. Ab *locustis*, ab *muribus*, genus omne acciditur atque arroditur frugum. Historias ite per vestras, et ab *istis pestibus* instruemini *quoties prior ætas affecta* et paupertatis ad miserias venerit."† And, as if these two allusions could not be strong enough, he again introduces *mice*: "Si in Asia, Syria, idcirco *mures* et *locustas* effervescere prodigaliter‡," &c. (*Disp. contra Gentes*, i. § 2. et 5.)

I desire to make no more use of these quotations than the case in point allows. Pliny speaks of the marvellous increase of mice, and their sudden disappearance, attributing the former to *drought*; and Arnobius couples them with the locusts, whose history, and connection with diseases and terrestrial phenomena, are well known. Cuvier (*Règne Animal*, 1817, tom. i. p. 193.) says also, the *Mús* arvàlis *Lin.* "quelquefois se multiplie excessivement, et cause de grands dégâts."§ The "*quelquefois*" [sometimes] of Cuvier is undefined; but Arnobius has, I think, indirectly explained its limits.

The history of the world proves that there are certain epochs, when all nature, animate and inanimate, is excited by some extraordinary impulse. The locust is associated by all writers with famine and pestilence, and with heat and earthquakes. Locusts accompanied the black death, in 1337–8

have been found pregnant. It, therefore, ceases to be a wonder, whence such a *power* of mice should destroy the harvests. Regarding which, it is still a secret how these immense numbers so suddenly disappear; for they are not found dead, neither is there any person to be met with who, during the winter, has dug up a mouse in the fields. Many have also made their appearance in the Troad, and have now driven the inhabitants thence. Their appearance is attributed to drought."

* "Pestilentias et siccitates, frugum inopiam, *locustas*, *mures*," &c. ["Pestilences, droughts, dearth of crops, locusts, mice," &c.]

† "Glance through the various annals, written in different languages, and you will learn that all countries have frequently been desolated, and abandoned by their cultivators. By locusts, by mice, every kind of produce is attacked and eaten. Pass through your own histories, and you will be informed how the former age has, by these pests, been affected, and brought to the miseries of poverty."

‡ "If in Asia, or in Syria, mice and locusts have abounded prodigiously," &c.

§ "The *Mús* arvàlis *L.* sometimes multiplies excessively, and makes great havoc."

(Hecker, p. 31.); the sweating-sickness, in 1551*; the plague of Barbary, in 1799–1800 (*An. Reg.*); and the plague in the days of Ethelred and Arthur (Caius). They are the index of disease in Africa and the East. When they go to the north, the Arabs always anticipate a general mortality (Jackson's *Marocco*). They are always contemporaneous, in Nubia, with the plague at Cairo (Light's *Travels*); and the plague ceases when the Nile rises, which it did not in 1833. In March, 1833, locusts appeared in France, probably stragglers from a migratory horde, such as those which, A. D. 593, 852, 1271, 1335-9, 1541-51, 1693, 1732, 1747-8, 1792-9, desolated various countries of Europe, as well as Asia and Africa. The locusts and mice have not, however, alone distinguished 1832 and 1833. The mackerel and the mullet, the quail and the toad†, have been already noticed [VI. 289. 291, 292.]; the herrings must now be added, as having appeared, in 1833, earlier, and in greater abundance, than perhaps ever known. In the summer of 1833, *a singular insect*, there before unknown, ravaged the corn fields in Spain, and so poisoned the wheat, that it could not be eaten. In August, *a black worm*, as voracious as the locust, appeared in Canada, devouring the grass and wheat, and destroying the labours of the colonists. (*Quebec Papers.*) In the middle of September occurred a great irruption of *bears* ‡ about Paul's Bay, in Canada, said to be driven by hunger (*Quebec Papers*); and at the end of December, *wild boars* had so much increased at Finisterre, in France, that dreadful ravages were committed, and one animal actually entered the town of Huelgoet. (*Armoricain de Brest.*) Livy tells us of a *wolf* which entered and passed through Rome in the year U.C. 556. (*Hist.* xxxiii. 26.), during a season of thunder-storms. It is probable that the same motive impelled both animals, and that the superstitions connected with the wolf saved him from being killed by the Romans. We have, however, better testimonies to support the bears, &c.; for, in 1817, a similar irruption of those animals occurred in Russia and Kamtschatka, in such numbers as

* Dr. Caius, quoted by Dr. Babington in his translation from Hecker, p. 192.

† Respecting the toad, whose early appearance in 1833 was remarkable, I may mention here that toads were seen abroad, in the present year (1834), on the 18th of January; and that a patriarch of his tribe came out from his seclusion, in a cellar of my present residence, on the 14th of that month. Frogs have spawned, and partridges have paired, occasionally, in the end of January.

‡ Mr. Lyell (*Geol.*, vol. ii. p. 94.) quotes Dr. Richardson on the migration of bears in Canada during *cold winters*. — The case here alluded to was in autumn, and in a hot season.

had never been remembered, and it was then attributed to want of fish in the sea (*An. Reg.*), probably occasioned by some submarine convulsion driving the fish away. In 1799, a *black worm*, similar to the one named above, destroyed whole forests in America, stripping the trees, so as to leave them as bare as in winter. (*An. Reg.*)

In 1833, birds increased prodigiously, and, in consequence of the drought, were driven to desperate measures. In September the rooks, in Gloucestershire, took to robbing orchards. (*Public Journals.*) A writer in a London journal says, small birds so much increased in the vicinity of Marlow, that two whole crops of corn, besides beans, peas, and fruit, were devoured by them. (*St. James's Chronicle*, Feb. 1. 1834.) After the cessation of the black death, "marriages were almost without exception prolific; double and triple births were more common than at other times" (Hecker, p. 79.); and such was the case after the cholera, in 1833 and 1834, as it is generally remarked. In February, 1834, abundance of *mackerel*, in innumerable shoals, visited the coasts of England, as in 1833.*

In September, 1785, vast numbers of the *West India shark* appeared in the British Channel, and many were taken by the Brighton fishermen. (*An. Reg.*, 1785.) In 1783, unusual numbers of *wasps and aphides* appeared; and thousands of acres of turnips were destroyed by the *sawfly*. (Gilbert White, *Nat. Hist. Selborne.*) In 1785, *aphides* infested the south of England. (*Ibid.*) In 1796, damage to the amount of 100,000*l.* was done to turnips in Devonshire, by the *black fly*. (Jardine on White, quoting Kirby and Spence.) In 1762 and in 1782, myriads of yellow flies visited the coast of Norfolk. (*Phil. Trans.*, 1783.) They are described as being seen to be blown over from the sea, and piled dead on the shore in heaps. They were parents of a *black cankerworm*, which in those years did infinite damage to turnips. They were so numerous, that, in their search for that plant, they covered the roads, gates, and hedges. So, at the epoch of the black death (1333—1359), "the *insect tribe* was wonderfully called into life, as if animated beings were destined to complete the destruction." (Hecker, p. 44.)

If we go to the Scriptures, we find the palmerworm, the caterpillar, the cankerworm, the locust, the frog, &c., described as miraculously increased at certain epochs, and

* Mr. Bakewell, in a letter, alludes to this fact in conjunction with the earthquakes at Chichester, which have occurred between Sept. 1833 and March, 1834: a very probable connection. Three of those earthquakes, those of September, November, and January, were felt here.

often introduced, in intimate connection with convulsions of the elements, as the agents of divine wrath.* In this respect, the pagan as well as the Jewish historians agree; for Pliny, speaking of the locust, says, "*Deorum iræ pestis ea intelligitur.*" (*Nat. Hist.* xi. 29.)

The conclusion to be drawn from the foregoing notes is self-evident, if we consider that the years individually mentioned were marked by striking evidences of a disturbed state of the earth and atmosphere. Without farther reference, it may suffice to say that every one of those years was distinguished by earthquakes, meteors, or other phenomena: and, to pass over 1333—1348, the epoch of the black death, and 1817, that of the cholera, we may take 1783 as an example; a year marked by most surprising convulsions. † Indeed, it will be found that, at all periods of telluric disturbance, some extraordinary movement takes place in the kingdoms of animated nature; and, whenever there is an indication of the kind, it will be discovered that the excitement occurred at a time when the atmosphere has been unaccountably heated, the seasons affected by some extraneous modifying cause of change, and the volcanic force especially developed. On this subject, I have not the slightest doubt; for it is capable of positive demonstration, if we may believe the testimony of undisputed facts, as they are registered in the calendars of naturalists. Take the links where we will, in the chain of terrestrial phenomena, we find them preserving the character, the consistency, and the order of a series, which, examined in detail, or viewed in the mass, leads to the conclusion, that each member has the same governing law, and that, if followed up, each will be found to centre in volcanic agency. This position will, in future observations, be satisfactorily tested and proved: the arguments derived from that branch of the enquiry affecting animal life being the first general evidence to its truth. It is anticipating to say more now, than that, if the other cases bear out the assertion, the irruption of the mice in Scotland and Ireland, the incursion of the bears and cankerworms in Canada, and the movement amongst the boars of France, &c., all point out 1833 as a peculiar year; and to what are we to attribute these so recent occurrences, but to some result of that great cause which has shaken the earth, the sea, and the air, and rendered the last few months more memorable for earth-

* See, amongst other passages, 1 Kings, viii. 37.; Joel, i. 4.; Psalm lxxviii. 43—48; Exodus, vii.—x., &c.

† See, amongst other writers, Gilbert White, part 2. near the end.

quakes, floods, meteors, and hurricanes, &c. than perhaps any previous period on record, since 1348?

But I pass on to a few remarks, not actually connected with the preceding ones, but arising from the subject; reserving the full enquiry, as to the claims of 1833, to another occasion.

I have stated above, that the *want of fish*, to which the emigration of the bears in 1817 (that remarkable year) is attributed, was "probably occasioned by some submarine convulsion." That fish are frequently affected by the disengagement of some invisible mephitic vapour, sometimes destroying them, and sometimes driving them away from their natural haunts, is not difficult to be maintained. The British Channel has, since 1817, experienced two phenomena which, I believe, have never hitherto been recorded; and, as bearing on the topic before us, and exactly, in some points, paralleled by well-attested facts, it may serve a double purpose to state the particulars.

A little before Christmas, 1827, immense multitudes of fish were found floating along the coast of Sussex (about Rye and Hastings) in a *stupified* and *helpless* state; and, at low water, being unable to get back into the sea, were picked up by thousands at the water's edge. They were chiefly conger eels, many of enormous size, but several were fish *never before seen by the fishermen*. This lasted several days. The period in question was *preceded by a thick fog*. The cause assigned by the common people was, "*a heavy fall of snow, with a south wind, which, with frost and starlight nights, blinded the fish*" *!!!* I give these statements as I received them from my brother-in-law, Mr. Beaumont of Winchelsea, who had them from Mr. Tilden, of that place, who *ate of the fish, as did hundreds of persons, without any bad effect.*

On making enquiries, I have found that, about the end of January, or the beginning of February, 1830, a similar occurrence took place along the coasts of Dorset and Hants; and, as far as my informant* recollects, dog-fish were very numerous. They were washed ashore, and collected in abundance as *food*, at Bourne Mouth, and the Dunes at the entrance to Poole.†

* Lieut. W. B. Stocker, R.N., late signal officer at the flag-head station, mouth of Poole harbour.

† Poole is one of the worst fish-markets in the kingdom: there is no dependence upon it for anything. A gossip story is afloat, which endeavours to account for this barrenness. I give the current version. It happened, a few years ago, that myriads of very fine mackerel were taken off the coast; and so great was the draught of them, that, instead of realising a fortune, the fishermen were obliged to let the people carry away as many as they would. In anger, therefore, they cast back the fish,

The journals of the Philosophical Society have recorded an instance equally singular. In November, 1775, after an *unparalleled drought*, accompanied by universal and various sicknesses amongst the natives, a *dense fog* settled over the island of Sumatra, the wind being constantly in the *south*, and, during its prevalence, it was observed that the sea round the island was covered by innumerable multitudes of *dead* and *dying* fish, of all kinds and sizes, the cat-fish and mullet being the most frequent. They were driven on the beach, *for more than a month*, by the tide, in prodigious numbers. and *were eaten* by the natives. Mr. Marsden, who relates the fact, endeavours to account for it by *a want of the usual supply of fresh water to temper the salt;* an explanation worthy of the ichthyophagists of Sussex. Had the existence of volcanoes and the frequent occurrence of earthquakes in the island been considered, perhaps the mortality amongst the fish might have been differently explained, by an excess of *salts* rather than an excess of *salt*. We are not without evidence to bear upon the most probable solution of this and the two preceding statements, which agree with the latter in all particulars as to the *fog* which prevailed, and the *harmless state* of the fish as *food*. I will not in this place say more of these *fogs*, nor of the *diseases* and *drought* in Sumatra at the time; but simply put them in countenance by a reference to what is related of the year 1348, when, according to the report of the College of Physicians of Paris, *fogs* during 28 days, *in the time of the great mortality*, covered Arabia, India, Crete, Germany, Turkey, Greece, and Italy, corrupting the waters of the sea, so that *the fish died.* *

We will come at once to an elucidation of these circumstances. Sir W. Hamilton, in his account of the great earthquakes, in Calabria, in 1783, says:—"A circumstance worth

with oaths and imprecations, into the sea: and, ever since, the mackerel and some others have kept at a respectful distance. I have, in publishing this anecdote, no desire to offend the Nereids and Tritons of the Brownsea Island oyster-beds: I quote it only as a *possible* instance of the *phenomenon alluded to above*. I may, however, safely state that there was scarcely ever a place, on so many waters, where (except a few harbour plaice) so few piscatory delicacies were to be met with. When the corporation would fare sumptuously, they must reserve their banquet till the arrival of a Torquay boat, which occasionally, in bad weather, puts in here. I say this, though, with all deference to the myriads of salt cods and caplins from Newfoundland, whose odorous presence proves Poole to be a piscivorous "county." As the corporators are fond of "incorporations," they might endeavour to put our *poissonaille* on good terms with the authorities; and propose an enactment by which, in future, the flat-fish and their neighbours may be on dining terms with the gastronomists.

* Vide Hecker on Black Death, translated by Dr. Babington, p. 131.

remarking, and which was the same on the whole coast of Calabria that had been most affected by the earthquakes, is, that a small fish called *cicirelli*, resembling what we call in England white bait, but of a greater size, *and which usually lie at the bottom of the sea, buried in the sand*, have been, ever since the commencement of the earthquakes, and continue still to be, taken near the surface, and in such abundance, as *to be the common food of the poorest sort of people;* whereas, *before* the earthquakes, *this fish was rare*, and reckoned amongst the greatest delicacies. *All fish*, in general, have been taken *in greater abundance*, and with much greater facility, in these parts, *since* they have been afflicted with earthquakes, than before. I constantly asked every fisherman I met with on the coast of Sicily and Calabria, if this circumstance was true; and was as constantly answered in the affirmative, but with such emphasis, that it must have been extraordinary. I suppose that either the sand at the bottom of the sea may have been heated by the volcanic fire under it, or that the continual tremor of the earth has driven the fish out of their strongholds." (*Phil. Trans.*, vol. lxxiii.)

The same writer, describing the eruption of Vesuvius (in 1794), observes: —"A few days ago, a shoal of fish, of several hundred weight, having been observed by some fishermen, at Resina, in great agitation at the surface of the sea, near some rocks of an ancient lava that had run into the sea, they surrounded them with their nets, *and took them all with ease*, and afterwards discovered that they had been *stunned* by *the mephitic vapour* which *at that time* issued forcibly from underneath the ancient lava into the sea. . . . The divers there (near Portici) likewise told me, that, for the space of a mile from that shore, since the eruption, they have found all the fish dead in their shells, as they supposed, either from the heat of the sand at the bottom of the sea, *or from poisonous vapour.*" (*Phil. Trans.*, 1795.)

Mr. Wright of Glasgow visited Graham's Island on the 20th Aug. 1831. He says, in the account published in the *Penny Magazine* (No. 114. for Jan. 4. 1834, p. 10.), that the people with him found, on the south-east side of the island, on a strip of beach, "*half dead and stupified*, a fine large *pesce-spada*, or swordfish. This they secured, and carried back with them to Sciacca, where they found it weighed upwards of 60 lbs. English. The fate of the fish," says Mr. W., "must have arisen *from its coming too near the hot and contaminated water*, which on all sides surrounded the island to a greater or less distance." *

* It is forestalling the subject, but it is right to add here, that *my conjectures respecting the storm of June* 11. *and* 12. 1833, were *realised, by the*

During the great eruption of *Lancerote*, in 1731, all the banks and shores of the island were covered with *dead and dying fish*, many of kinds *never before seen there*. (Von Buch; Lyell, vol. i. p. 381.) The putrid vapours were so great on the 28th October, that they fell down condensed in drops, suffocating the cattle, which dropped lifeless to the ground, (Lyell, i. 381.) The eruptions of Iceland have *very frequently* slain the fish. (See Henderson and others.)

We may presume, from these effects, that the phenomena in Sumatra in 1776, and in 1827 and 1830 in the British Channel, originated in some disengagement of mephitic vapour; and though in neither case was an earthquake *felt*, still it is more than probable that earthquakes then and there *occurred:* and, if it were not out of place now, I could adduce reasons (which will be stated hereafter) for concluding that the British seas experienced some submarine convulsion in August and October, 1833. As, however, the object of *this* paper is to discuss the evidence from animated nature, we shall merely conclude it with observing, that, according to the *presumptive* proof before us, the want of fish in the Kamtschatkan seas was occasioned by a disengagement of terrestrial heat; and, if so, that the irruption of bears in Canada, considering the conditions of the year 1833, was occasioned by a similar *object* and *cause*.

Whatever be decided, it is, I think, clearly established that *this head* of my argument is founded on sufficient evidence: and thus, for the present, I quit the subject, which will be resumed in subsequent Numbers. W. B. Clarke.

Stanley Green, near Poole, Dorset, March 4. 1834.

Art. II. *Facts and Considerations on the Natural History and Political Impropriation of the Salmon Fish.* By T. G., of Clitheroe, Lancashire.

Sir,

Introductorily to the remarks, corresponding to this title, which I have to communicate, I would give a description of fish of the genus *Sálmo*, which we have in the Ribble: it may enable some of your readers to comprehend more readily what is said afterwards.

We have, first, *the salmon*, which, in the Ribble, varies in

---

appearance of Graham's Island, at that date, for the second time, at the surface of the sea, the steam and smoke rising furiously. (See *Mag. Nat. Hist.*, VI. 307. [and IV. 545—550.])

weight from 5 lbs. to 30 lbs. We never see the fresh fish here before May, and then very rarely: a few come in June, July, and August, if there are high floods in the river; and in about the latter end of September they become tolerably abundant (the fisheries near the mouth of the river have then ceased for the season), and the salmon run very freely up the river from that time to the middle or end of December. They begin to spawn at the latter end of October; but the greater part of those that spawn here, do so in December (I believe nearer the source of the river they are earlier); but many fish are seen on the spawning beds in January, and I have even seen a pair so late as March; but this last is a very rare occurrence. Some of the male kippers (kelts) come down in December and January, but the greater part of the females remain in the river until April, and they are occasionally seen, herding with shoals of smelts, in May. In this state they will take a worm very greedily, and are, many of them, caught with the fly in the deeps; but they are unfit to eat, the flesh being white, loose, and insipid, although they have lost the red dingy appearance which they had when about to spawn, and are almost as bright as the fresh fish: their large heads and lank bodies, however, render it sufficiently easy to distinguish them from fish which are only ascending the river, even if the latter were plentiful at this season; but this is, unfortunately, not the case.

Secondly, We have *the mort.* I am not sure whether this fish is what is called the grilse in Scotland, or whether it is the sea trout of that country. It is a handsome fish, weighing from 1½ lb. to 3 lbs. We first see the morts in June, and from that time to the end of September they are plentiful, in favourable seasons, in the Hodder (a tributary stream of the Ribble), although they are never numerous in the Ribble above the mouth of that river. It is the opinion of the fishermen here that this is a distinct species. My own opinion is that it is a young salmon; and yet, if I were called upon to give reasons for thinking so, I could not offer any very conclusive ones: the best I have is, that there is no perceptible difference in the fry when going down to the sea. It may be said, "How do you know that one of the three or four varieties of smelts, which you describe farther on, is not the fry of the mort?" To this objection, if made, I say, that these varieties exist in the Wharfe, where, owing either to natural or to artificial causes, there is never either a mort or a sprod (whitling?) seen.

Thirdly, We have *the sprod*, which is, I believe, synonymous with the whitling, whiting, or berling of Scotland.

It is a beautiful fish, of 6 oz. or 8 oz. in weight, and has more of the appearance of the salmon than the mort has. It seldom ascends the river before July, and, like the mort, is far more abundant in the Hodder than in the Ribble. This fish sometimes rises pretty freely at the fly, and, when it does so, makes a very handsome addition to the angler's basket; but at other times it is shy and difficult to hook. It disappears, in a great measure, about September.

Fourthly, We have *the pink*, or *par*, which is found of two or three sizes in the Ribble: the largest are all males, and, in October, the milt in them is large. They are small fishes; varying in weight from 1 oz. to 3 oz. each; and, as it is well remarked by the author of that delightful book, *Wild Sports of the West*, they have very much the appearance of hybrids between the salmon and the trout. They rise, very freely, at the fly and maggot, from July to October, and afford good sport to the angler who is satisfied with catching small fish. I trust I shall be able, in the following pages, to give some information respecting this fish, which will assist in dispelling the mystery in which its natural history has been enveloped.

I will now mention a few of the opinions respecting the various species of salmon, and also my own, where they are at variance with the generally received ones, and give the facts and reasonings which have induced me to form those opinions; and I shall be very glad, if I be in error on any of these points, if some one of your readers, better acquainted with the subject than I am, will take the trouble to set me right.

It seems to be the opinion of many, indeed of most, persons, that the salmon spawns from November to February, and that the young fry, or smelts, go down to the sea in the April or May following. My own opinion is, that they stay in the rivers very much longer. The grilse is, by many, believed to be a distinct species, whilst others stoutly maintain that it is a young salmon.

The testimony of the witnesses from the Severn, the Wye, the Lee (near Cork), and the Ness (see the evidence given before the Select Committees of the House of Commons in 1824 and 1825), would lead one to suppose that the fish were in the best season from November to March; whilst the evidence of the witnesses from the other parts of the kingdom goes to prove that this is the very worst period for catching them. One maintains that each river has its own variety of fish, which can be distinguished from the fish of any other river; another contends that there is no such difference: a third states that stake nets are exceedingly injurious to the

breed of the fish; and a fourth attests that stake nets only catch the fish when they are in the best season, that neither kelts nor fry are taken in them, and that, if they were prohibited, it would only be preserving the fish for the grampuses and seals: in short, the evidence, both regarding their habits and the best modes of catching them, having in view the preservation and increase of the breed, is so completely contradictory as to leave a doubt in the minds of every one who reads it, and has no other means of forming an opinion. I will endeavour to show, in some instances, which of these testimonies are correct, and it will be for your readers to judge how far I succeed; and I hope they will be so obliging as to correct any errors I may fall into.

1st, It is my opinion that the fry of salmon are much older, when they leave the rivers, than seems to be generally supposed, and that the growth of this fish is by no means so rapid as it is considered to be by those who have written on the subject. For several years previous to 1816, the salmon were unable to ascend into the upper parts of the river Wharfe, being prevented either by the high weirs in the lower parts, or by some other cause; and, of course, there were no smelts or par: but in that year, either the incessant rains of that summer, or rumours of the formation of an association for the protection of fish, or some other unknown cause, enabled some salmon to ascend the river 30 or 40 miles, and to spawn there. In the next spring (1817), there were no smelts, but about September they began to rise at the very small flies which the anglers in that river make use of: they were then a little larger than minnows. In the spring of 1818, there were blue smelts, or what are generally known as salmon fry, which went down to the sea in the May of that year: but these were only part of the brood, the females only; the males remaining all that summer, being, at the period when the females went down, very much smaller than they, and what are called, in the Wharfe, grey smelts, and pinks or par elsewhere. I have shown that there were two migrations from the spawn of 1816: but this was not all; there still remained a few smelts through the summer of 1819, which by that time were from 4 oz. to 6 oz. in weight, and are known by the anglers there as brambling smelts: the blue marks on their sides are very distinct, and the fish a perfect smelt, except that it is considerably larger. It is quite different from the whitling, or sprod, which is not known in the Wharfe, at least not in the upper parts of that river, whilst the brambling is never seen in the Ribble. The brambling is a beautiful fish, and it rises very freely both at the May fly and the arti-

ficial fly through the summer; it is also occasionally caught by anglers with the worm, on the salmon spawning-beds, in the autumn, with the milt perfectly developed, and in a fluid state. Although this fish is not found in the Ribble (as far as my observation and enquiries have gone), I believe that it is found in the Tweed (and perhaps also in other rivers running into the German Ocean); for a letter, addressed to Mr. Kennedy, who was chairman of the Select Committee appointed to investigate this subject, by a Mr. George Houy, states that the smelts are sometimes found there 10 in. long, which he attributes to their not being able to get down at the proper period, for want of a flood in the river; but I know that in the Ribble smelts will go down to the sea without there being a flood at all, if that flood does not come within ten days or a fortnight of the time at which they usually descend to the sea. I also know that bramblings are found in the Wharfe in years when there has been no deficiency in that respect; yet why they should be common in that river, when they are never met with in the Ribble, which has ten times as many salmon and smelts in it, I am unable to comprehend.

It is my opinion that the eggs of the salmon are not hatched before March or April. Two anglers, who were, in April, wading in the river Wharfe, came upon a spawning-bed, which they had the curiosity to examine: they found a number of eggs, in which they could see the young fry already alive, and one of them took these eggs home with him. By regularly and frequently supplying them with fresh water, he succeeded in hatching them, and kept some of the young fishes alive for some time; but they died in consequence of neglect, and were, even then, very diminutive.

The opinion generally received in Scotland seems to be, if I may judge from the evidence given before the House of Commons, that smelts go down to the sea in the spring after they are spawned, and that they return, in the summer and autumn of the same year, as grilse. When they return, and what size they are of on their first visit, I have hitherto been unable to ascertain; but I think I have succeeded in proving that they do not go to the sea so soon as is generally believed, nor do any of the witnesses give their reasons for thinking that they do. I should very much like to learn what evidence they have to offer in behalf of this opinion, I remember seeing an article in the *Scotsman* (perhaps about 12 months ago), in which it was stated that Dr. Knox had made some important discoveries in the natural history of the salmon and herring, both in their food and propagation; and, if I recollect aright, it stated that he had ascertained that the eggs remained

several months in the gravel, and that then, in a few days or weeks after, they [the fishes hatched from them] were so much grown as to go down to the sea; but none of the data which enabled him to arrive at this conclusion were given, and since then I have heard nothing about the matter. As it is so long since I read this article, I may have quoted it incorrectly, but I believe that its substance was what I have stated. The only conclusive evidence I can find about the hatching of salmon fry is that of Mr. Geo. Hogarth (*Second Parl. Rep.* p. 92.), and his account agrees with my own. He states that he took the salmon spawn from the spawning beds, and, by keeping it frequently supplied with fresh water, he succeeded in hatching some of the eggs (he gives drawings of the appearance of the fry, in three or four different stages, from the egg to the age of eight days, see *Appendix to Second Parl. Rep.*); that the young fry, by keeping them well supplied with fresh water, were very lively and vigorous for three weeks, but that they, after this time, appeared to grow languid and uneasy, and, as they would eat nothing, they died when 1 in. long. Unfortunately, he does not state at what period of the year they were hatched; but if this were in March or April, which I see no reason to doubt, it is sufficient to prove that they would not reach the size which smelts are when they leave the rivers for the sea; for, supposing him to have hatched them in the last week in March, and that they lived a month, this would bring us to the time when they are about to migrate, at which time they average more than 6 in. long, many of them are 8 in.; and at this period they are fond of feeding upon worms, flies, maggots, and caddis-worms, as is known to every schoolboy living on the bank of a river frequented by salmon.

It is also my opinion that neither salmon nor trout spawn every year; for salmon ascend the rivers as early as January, in the highest condition, with roe in them no bigger than mustard seed: these could not have spawned that season, as the kelts (particularly the females) do not return to the sea until March or April *, and at that time they are in very bad condition, and do not appear to have a particle of spawn in them; and, in the evidence of Mr. Mackenzie (*Second Parl. Rep.*, p. 21.), we have an account of a grilse kelt, which was caught, and marked, in March, 1823, and which was again caught as a salmon, on its return to the river, in March, 1824. In this case, the fish had evidently required a residence of

* In the evidence of Mr. Geo. Hogarth it is stated, that he saw upwards of 90 kelt fish in the mill lead of Grandholm, on the Don, on the 6th of May.

12 months in the sea before it was in a condition to visit the river a second time; and, in the Wharfe, it is the constant practice of the anglers to catch trout through the winter, with very minute roe in them, and in high season, with the worm and salmon roe, and also with night lines. In fact, one of the fishermen has frequently remarked to me, that he occasionally caught dishes of trout with the fly in January, in finer season than he has found them in April; which he accounted for by saying that the spawned fish (kelts) of that season had not begun to rise freely at the fly at the former periods, but that they had at the latter, so that his pannier contained as many kelts as fresh fish. Another reason has just occurred to me: it is, that, in January, the spawned fish will still be in the small brooks in which they are so fond of breeding, and of course, the bulk of the fish remaining in the river at that period would be fish in good season.

As it is some years since I acquired part of this information, I have felt afraid of giving it incorrectly; and I have, therefore, addressed a letter to a friend living on the banks of the Wharfe, requesting him to send me all the information in his possession on this subject, as well that derived from his own observation as that collected from others. He has, and since the above was written, sent me the following reply:—

"I have seen R—— (one of the best anglers and fly-makers between Cornwall and Caithness), and have had some conversation with him on the subject of salmon, &c. He is of opinion that the spawn of the salmon remains five months in the gravel before hatching. He examined the spawn in April, and found the young fry alive in the egg; and I——m (another angler) took some home, and kept one of the smelts two or three months. I have subsequently seen I——m, and he has given me the same account. All the fishermen here are of opinion that the female smelts remain one year, and the males two years, before they go down to the sea. The bramblings are supposed to be smelts which remain a year longer than the usual time; they are few in number, and are taken generally with the May fly. I have no doubt that the above opinions are correct; for we have now three distinct sizes of smelts in the river (exclusive of the bramblings), the largest of which are nearly 4 oz. in weight, and are all males, as they contain milt in October and November. The next are the females of the present year: I have had one since the receipt of your letter, which weighed ½ oz., and measured 5 in. in length (this was a real blue smelt). The third are the males of the same age, and are much smaller: these are occasion-

ally taken with the worm, and will rise at the fly all the next summer.

" We were for several years (but I do not recollect the dates) entirely without salmon, and, of course, without smelts; and we invariably found that the smelts made their appearance the year after the salmon, but were very small till the second year, when we had what we call blue smelts, which disappeared in May or June; and what you call pinks, which remained till the following year; and brambling smelts, which remained *another* year. The fishermen here are also of opinion, that neither salmon nor trout spawns every year. R—— says that one day lately" (the letter is dated Dec. 13.) " he caught seven trouts, six of which were in good season, and he brought me two the other day, one of which contained roe, and the other was in excellent condition."

My friend states, in a subsequent communication, that one of the fishermen had told him that he had caught the male smelts (par) more abundantly on the salmon spawning-beds than elsewhere; and my friend adds that the opinion there is, that, if a female salmon gets up, even if no male accompanies her, yet her eggs are fecundated by the male smelts; and they allege, in support of this opinion, that a female got up one season, and spawned, and, though no male was seen near her, her eggs were prolific. I mention this, although I apprehend that it is evidence which the unbelievers will consider inadmissible; for, though no male was seen, still there may have been one; or, admitting that one did spawn without being accompanied by a male, yet another, which contrived to bring her mate along with her, may have spawned in the same place the same season: yet, notwithstanding its liability to these objections, I have no doubt myself that, if a female were to come alone, her eggs would be impregnated by the par. It is an excellent maxim that nature makes no useless provisions; yet, if we admit that par are young salmon, for what purpose is the milt, if not to impregnate salmon roe? and, if we deny this to be the fact, we must endeavour to show that there are female par; but in all my examinations I have never been able to meet with one that contained roe.

That the Grilse are Salmon is proved, I think, sufficiently, by the evidence given before the House of Commons. Mr. Wm. Stephen states (*Second Rep.*, p. 52.) that he has known grilse kept in a saltwater pond until they had become salmon, and that fry that had been marked came back that year as grilse, and the year after as salmon; and Mr. George Hogarth states that he has as often seen a salmon and a grilse working together on the spawning beds, as two salmon or

two grilse; and Mr. Mackenzie states (p. 21.) that he, in March, 1823, marked a grilse kelt with brass wire, and caught it again, in March, 1824, a salmon of 7 lb. weight. The testimony of the witnesses from the Ness, the Severn, the Lee, and some other rivers, is too positive, and too well supported, to admit of any doubt as to the excellent season [condition] of many of the fish ascending those rivers in November, December, and January; a period when they are out of season, and full of spawn, generally, and even when many fish are caught in those rivers in the same unseasonable condition. The fact, that there are many fish in fine season in those months, may be, I think, accounted for, if we admit that salmon only spawn every other year, which I have, I think, shown to be very probable; but what it is that induces those fish to ascend rivers so many months before the spawning season I cannot explain. Probably there may be some quality in the water of these rivers, all the year, which is congenial to the habits of the fish, while the same quality may only be found during part of the year in others. It is certain that the quality of the water in rivers generally varies very much with the season: thus, the water of the Ribble is, after a flood, in summer, always of a dark brown colour, being so coloured by the peat moss over which it passes; while in winter no such tinge can be observed; and there may be other differences, with which we are unacquainted. However, whether this is the true reason or not, it certainly cannot be that the fish which spawn in October are impelled by their desire to propagate their species to ascend the rivers the January before; and if this long residence in fresh water were necessary for the proper developement of the ova in one river, we might suppose it would be necessary in all; yet this is not the case; as the red fish, which ascend the rivers in November and December, have, at that time, the spawn nearly ready for exclusion.

On one point, about which there is great difference of opinion, namely, whether the fish which are bred in a river generally resort to it, and whether each river has its own variety of fish, I am not a competent judge, as I am acquainted with too few rivers to pretend to decide. I may, however, just remark that the Hodder, though it is a much smaller river than the Ribble, is always much better stocked with salmon, morts, sprods, smelts, and par, than is the latter river; which I attribute to the fact that more fish spawn in the Hodder, as it runs for many miles through the Forest of Bowland (the property of the Duke of Buccleugh) and other large estates, and the fish are much better protected there

than in the Ribble, where, with one or two exceptions, the properties are very much divided, and few people think it worth their while to trouble themselves on the subject.

Dr. Fleming, in his letter to Mr. Kennedy (*Appendix to the First Rep.*, 1825), seems to doubt that salmon enter rivers for any other purpose than that of propagation: but, lest I should misrepresent his opinions, I will quote what he has said on the subject: — "In the evidence taken before the Select Committee, during the last session of parliament, and appearing in the Report, there are several statements, of a somewhat imposing kind, which, as they appear to me to be erroneous and apt to mislead, I shall here take the liberty of opposing them." He then enumerates several opinions expressed before the Select Committee; one of which is, "that salmon enter and leave rivers for other purposes than those connected with spawning." (See the evidence of Messrs. Little, Halliday, and Johnstone.)

"1st. That they enter rivers to rid themselves of sea lice (Monóculus *piscìnus*). 2dly, that they forsake rivers to save themselves from being exhausted by residence in fresh water, and from having their gills devoured by a maggot (Lernæ`a *salmònea*). The whole natural history of the salmon contradicts this hypothesis." Another of these "errors" is, "that 'it is asserted (*Rep.*, 1824, p. 145.) that salmon always return to the same river.' This is not probable, when we consider the circumstances in which they are placed during their residence in the sea." On the first of these opinions I am not a competent judge; but I think that the fact, that salmon enter rivers nine or ten months before they are ready to spawn, is of itself sufficient to show that there are other reasons for their entering rivers than those connected with propagation. With respect to the second, I believe that, after salmon have once entered rivers, at least when they have ascended into the upper parts of them, they never offer to descend again until they have spawned. On the third opinion, I would remark, that although I do not think that salmon *always* come to the same river in which they were bred, yet I think that they will do so if they can: and I think that the fact which I have mentioned, of the Hodder (a smaller and a tributary stream of the Ribble) containing many more salmon, as well as more morts and sprods, countenances this supposition: for why should the larger number of fish ascend the smaller river, except for such a reason?

I am of opinion that Salmon do not grow so fast in the Sea as is generally supposed. It is here generally believed that the smelts which go down in the spring come up again in

the August and September following, 5 lb. or 6 lb. in weight; and George Little, Esq., in his evidence, states this as his opinion; but he does not give any other reason for it than this, that the grilse that ascend the rivers in June, weigh 1½ lb. to 2 lb., and that those which come in September weigh 5 lb. or 6 lb. But opposed to this supposition is the evidence of Mr. Mackenzie, before referred to (*Second Parl. Rep.*, p. 21.), who states that he caught, in March, a grilse kelt which weighed 3½ lb.; that he marked it with a brass wire, and let it go; and that, in the March following, he caught it again, a salmon of 7 lb. weight. Now, a fish which weighed 3½ lb. as a kelt, would weigh 5 lb. or 6 lb. when in high condition the summer before; and if this were so, which, I believe, all persons who are acquainted with salmon will admit, this fish would appear to have gained only 1 lb. or 2 lb. in fifteen or eighteen months. Besides, if salmon grow as fast as is stated and believed by many persons, the breeds of different years would vary very much in weight; whereas it is known to every body that we have them of all sizes, from 5 lb. to 40 lb.; and it is very contrary to analogy to suppose that a fish, which is two or three years in arriving at the weight of as many ounces, should, in two or three months, acquire as many pounds.

There are, however, two or three things, about which all persons agree in opinion. One of these is, that *the breed of salmon is decreasing every year*, and that the great cause of this decrease is the want of protection, and a consequent destruction, of the fish in the spawning season. The complaint on this head is universal; from north to south, from the Shannon to the Tweed, the cry is, Protect the breeding fish, or we shall very soon have none to protect: and yet, although the destruction of the fish in the spawning season, and the destruction of the fry in the spring, are the chief reasons for this alarming falling off, yet no one seems able to devise a remedy. The fact is, no one seems inclined to make the necessary sacrifices for so desirable an object; and, without these sacrifices, it would be absurd to expect the fish to become plentiful; and, instead of furnishing an abundant supply of cheap and wholesome food to all classes, which they certainly would do if the fisheries were properly regulated, they will become either wholly extinct, or so rare as to be only found at the tables of the wealthy. James Gillies, in his evidence, states, that his brother had, in one night, killed in the Tweed, *four hundred salmon* at *one landing-place*, in close time; and all the reports are full of statements showing how unceasing and universal is the persecution the salmon undergo, not only when in season, but at all times, and most of all when every

one should do his utmost to preserve them; I mean, when they are spawning. In this neighbourhood, the properties, generally, are so much divided, and so few good fish are allowed to ascend the river, that no one has any interest in protecting them in close time; and the consequence is, as might be expected, that all sorts of contrivances for taking them are resorted to. They are speared and netted in the streams by day and night; they are caught with the fly; they are taken with *switch* hooks (large hooks fixed to the ends of staves), or with a triple hook fixed to the end of the running line attached to a salmon rod. If the river becomes low, parties of idle fellows go up each side of it in search of them, and, by stoning the deeps, or dragging a horse's skull, or large bone of any kind, through them, they compel the fish to the side, and they there fall an easy prey, in most cases, where the pool is of small extent. In a river so small as the Ribble, it will be readily believed that not many fish can deposit their spawn in safety, when practices of this sort are followed, almost openly, and where no one feels a sufficient interest in the matter to endeavour to put a stop to them. A single party of poachers killed 400 salmon in one spawning season, near the source of the river, the roe of which, when potted, they sold for 20*l.* Need we be surprised, then, if the breed decreases? The only wonder is that they have not been exterminated long ago.

I may, perhaps, be allowed to say what, in my opinion, would remedy this alarming destruction, particularly as no one seems hitherto to have devised an efficient preventive. I believe that, in 1826, there was an act of parliament passed which legalised the use of stake nets, and either repealed or modified some of the old laws on the subject; and I have also understood that the good effects of this new law are already perceptible in Scotland, to which it exclusively applied. There was a bill introduced into parliament, in 1825, which was intended to apply to the whole kingdom; but some of the clauses were so very objectionable, that, if they had been carried, it could not possibly have been enforced without stopping and ruining the manufactures which were carried on by water power; and the bill was consequently abandoned. The first thing to be done is, to give the proprietors on the upper parts of the rivers such an interest in the fisheries as will make them anxious about the preservation of the fish in the spawning season; and, to accomplish so desirable an object, no one ought to fish or keep a net stretched across a river for more than twelve hours a day, or from sunrise to sunset; and every mill-owner ought to be compelled

to facilitate the passage of the fish over his weirs by every means consistent with the proper supply of water to his wheels. At present the fisheries at the mouths and lower parts of rivers so completely prevent the access of the fish to the upper parts, that, unless there happen to be high floods, which prevent the fishermen below keeping their nets in, the upper proprietors comparatively seldom see any until the season is out. The evidence before the House of Commons on this point is exceedingly amusing. One person thinks that the upper proprietors have no right to expect any fish, as they have never paid any consideration for any when they bought their estates: another states that he pays 7000*l.* a year to the Duke of Gordon; and that, if he is compelled to observe a *weekly* (not a daily) close time, he will lose that proportion of his rent; another observes the weekly close time, and opens a passage for the fish, but places a crocodile, painted in very glaring colours, in the gap, to frighten them back again; another *says* he observes the weekly close time in his cruive fishing, but no one is allowed to inspect the cruives; another sends men to break down stake nets in the *estuary*, which reach from high to low water mark, and at the same time stretches a net completely across the *river*, from March to August, so that not a fish can pass without his permission. No wonder if fish are scarce in the upper parts of rivers, when such samples of *disinterestedness* are manifested by the proprietors of the fisheries below. No wonder that the upper proprietors should be careless about the protection of fish from which they are not allowed to derive any benefit. No wonder that they should connive at, and even encourage, the shameful destruction of the fish in close time, since that is the only time they are allowed to have any. Let the fishermen below make it worth the while of the upper proprietors to protect fish, and they will receive that protection; but it is too much to expect from human nature that they will take all the odium and trouble of preserving them, when other parties reap all the benefit.

There ought to be conservators employed to see that the fisheries are properly regulated; and these men should be paid by an assessment on all the proprietors, in proportion to the value of their fisheries.

I should also recommend an extension and uniformity of close time in all the rivers in the kingdom; for, although it is an undoubted fact that some clean fish are caught in rivers early in the season, yet they are comparatively few in number, and the capture of them involves that of a far greater number of spawning and kelt fish, which are not only of no value for the table, but the destruction of which is, in effect, the de-

struction of the millions of fish which would proceed from them. In the *First Par. Rep.*, p. 11., Mr. Walter Jamieson says, that, in the river Tweed, from January 10. to February 1., he caught 121 fish, only one of which had spawned; from February 1. to March 1., he took 44 fish, 25 of which had not spawned, 15 were kelts, and 4 were clean fish; from March 1. to March 10. he took 17 fish, 7 of which had not spawned (4 of them on the 10th), 9 were kelts, and 1 clean fish. Now, the close time varies in almost every river, and some have no close time at all. Thus, in the Ribble, the close time begins on September 15. and ends on December 31.; and in the Hodder there is no legal close time: but there is no practical difference between them in this respect, every one thinking himself entitled to kill every fish he can, at all times of the year, in both of them.

The observance of the weekly close time (that is, opening a passage for the fish from sunset on Saturday night to sunrise on Monday morning) is a mere farce, even if it could not be evaded, as it almost invariably is; for it is well known to every one conversant with the habits of salmon, that they only ascend rivers when there are freshes (floods) in them; and, in the summer, the ground is generally so dry, and vegetation absorbs so much moisture, and the evaporation is so great, that it not only requires twice as much rain to produce a flood in a river then, as it does in the winter, but, when rain does come, its effects are only visible in the river for a short time. I have known a strong fresh in the Ribble in the morning, and the river low again in the afternoon of the same day. Now, a fresh coming at the beginning of a week would disappear long before the close of it, unless the rainy weather continued; and thus the strict observance of the weekly close time would be of little service to the upper proprietors, unless the fresh came at the right end of the week.

The smelts and par ought to be protected as strictly as the salmon; and there ought to be a penalty attached to the killing of them, or having them in possession; and conservators of rivers ought to have the power of inspecting all mills and manufactories driven by those rivers, to ascertain that they have no contrivances for taking the fry on their way to the sea, as it appears that, in some rivers, they are taken in large quantities. There ought also to be a penalty attached to the killing of kelt fish, which, in that state, are not only tasteless and insipid, but actually unwholesome: yet they are pursued and destroyed with as much avidity as the fresh fish; and a very small number of the very few that spawn in safety ever

return to the sea. A penalty ought also to be inflicted for selling, buying, using, or having in possession salmon roe, either in a fresh or salted state; as its excellence as a bait for trout and eels, and the consequent high price at which it sells, are sufficient temptations to the poachers to kill the salmon in the spawning season, even if they could not sell or use any other part. Yet, destructive as this practice is, there is an extensive trade in this article, a fishing-tackle maker in Liverpool having told a friend of mine, that he sold 300 lb. weight in a season; which, supposing every egg to hatch, would produce, perhaps, five times as many salmon as are caught, in one year, throughout the whole kingdom.*

In concluding this imperfect sketch, I may remark that I have omitted many things concerning the natural history and habits of the salmon, fearing that I should trespass too much on your space and the patience of your readers; but I have wished, in addition to the communicating of some facts in the natural history of this fish, which, I believe, are not generally known, to call the attention of the public to the present state of the salmon fisheries in England. Many of the preceding observations are founded on the evidence of persons connected with the fisheries in Scotland, and are, perhaps, no longer applicable to that part of the kingdom, since there has been an alteration in the laws. Whether this is the case or not, I have no present means of ascertaining. I shall be glad if any one having a knowledge of the subject will say what benefit (if any) has been derived from the alteration. However, it is sufficient for my present purpose to show what is the state of things where there are no laws on the subject, or, which is the same thing, where there is no attention paid to them; a state of things which, instead of promoting an abundant supply of these excellent fish, and rendering the salmon fisheries nationally important, tends, by the habitual disregard of the laws by one party, the selfishness of another, and the neglect of a third, to render these fisheries of little and still decreasing value; whereas, if the lower proprietors would allow a tolerable supply of the salmon to come up the rivers

* Salmon are said to produce 18,000 or 20,000 eggs each, and I have no doubt a large salmon will produce still more; as one I examined a year or two ago, of about 10 lb. weight, had a roe which weighed 2 lb. 9 oz.; and the skin in which the eggs were enveloped (they were not in the loose state in which they are found just before exclusion) weighed 3 oz. after all the eggs were washed from it; so that there were 38 oz. of eggs. I weighed 50 of them, and found that they weighed 65 grains. At that rate, 38 oz. would give 12,788, and 300 lb. 1,615,000; but, as they would be much lighter when dried and potted, than when taken from the belly of the fish, we may safely estimate that the 300 lb. would contain 2,000,000: a prodigious number to pass through the hands of one tackle-maker in a season.

when they were worth taking, and the upper ones would preserve them during close time, there would be plenty for each and for all.

I am aware that it will be difficult to legislate on this subject, without injury to what is of infinitely greater importance, I mean the manufactures of the country. The absurd and impracticable clauses which were contained in the bill for the protection of the fisheries, which was introduced into parliament in 1825, show this. Yet, notwithstanding this difficulty, I think it is possible to protect the fish, without interfering with the interest of the mill-owners; and to make such laws on the subject as will be effectual, without calling forth a single objection from any unprejudiced person. I shall be glad if what I have said on this subject should induce any gentleman to turn his attention to it. There must be many whose opportunities of observation will enable them to determine whatever is doubtful in the natural history of the salmon tribe; whose experience will teach them the defects and absurdities of the present laws on the fisheries; and whose influence will, if they can be induced to exert it, materially contribute to the amendment of them.

Clitheroe, Lancashire, Jan. 1834.

[A SERIES of questions, by Sir Wm. Jardine, designed to elicit information on certain indicated ideas on the natural history of the salmon genus, in its species and varieties, is published in III. 479, 480. Useful information will also be found in III. 94, 196. In a note on the salmon-fishery reports, which was supplied to us, under date of May 29. 1830, by our correspondent, J. C. Farmer, there is this sentence: — "I believe, however, that the different species of salmon have different periods of spawning. At Warkworth, where there is a fishery upon the Coquet, Northumberland, I find that they appear in numbers at different times, the least valuable kinds the latest (such as the grey and bull trout), and that they appear in the same order every year." — *March* 31.

April 17.—In glancing this day through the Second Series of Jesse's *Gleanings in Natural History*, we observe pages 305. to 309. on the salmon, and in p. 305, this remark: "Where testimony in favour of this fact [the asserted very rapid growth of the salmon] is very strong, one is, of course, induced to give credence to it. At the same time I am bound to admit, from observations made on the large quantity of salmon which our numerous fishmongers exhibit from March to September, that there is some foundation for an opinion that the growth of salmon is overrated." The grounds of this opinion are then given.]

ART. III. *An Introduction to the Natural History of Molluscous Animals.* In a Series of Letters. By G. J.

Letter 13. *On their Food and Digestive Organs.*

IN reference to the present subject, I shall divide molluscous animals into three classes: — 1st, those which take their food in a liquid form, or suspended in water; 2dly, those which are more properly carnivorous; and, 3dly, those which feed on vegetable matters.

To the first class all the Mollúsca tunicàta belong, and the tenants of the bivalved shells. There is no one of either of these extensive tribes which is furnished with any organ adapted to the capture or arrestment of prey, or with jaws or teeth to tear and masticate it; and, as the greater number are immovably fixed to one spot for life, or are only capable of such motions as raise or depress them in their furrows, they are necessarily content to await what moist nutriment is brought within reach of their lips by the waves and currents of the circumfluent waters. The Mollúsca tunicàta have the power of enlarging the capacity of their large branchial sac; and it is probable that, during this action, a portion of water rushes in, with all its contained animalcules, which serve for the food of the individual. I have found, in the sac of some of the compound and smallest species (*Alcyòneæ*), myriads of very minute corpuscles, which I believed to be entomostracous insects; and Savigny, who has frequently made the same observation, has found, in the sac of species of the same tribe, crustaceous insects of a higher order and greatly larger dimensions. The latter, however, as Cuvier thinks, may have entered against the will and to the prejudice of the molluscum; for he has observed the delicate texture of the viscera torn and ruptured by such rude ingesta. (*Mém.*, xx. p. 14.)

Of the Mollúsca tunicàta there are two families: one, *Alcyòneæ*, or the social, in which numerous individuals, generally of very small size, are united together, and, as it were, immersed in a common somewhat gelatinous mass; and another, Ascídiæ, or the solitary, in which every individual is single and separate, and of much greater magnitude [see figs. 24. and 25. p. 129, 130. of the preceding Number]. In both of these families, the mouth is a circular aperture, raised a little above the surface of the common integument or sac, and is capable of being shut or opened, more or less widely, at the pleasure of the animal. The rim of it is sometimes plain, and sometimes cut into four, six, or eight equal segments; and within the orifice there is, in very many of them, a fringe formed of one or two rows of delicate cilia, which I have observed, in the Ascídia rústica, to be in constant and quick vibration

when the animal was left undisturbed. I presume them to be organs of a very delicate irritability, perhaps of taste *; and that their purpose is to hinder the ingress of noxious matters, not altogether mechanically, but because the sudden contraction of the oral aperture is a necessary sequence of their unpleasant irritations.† This aperture leads directly into the branchial sac, which, besides its office of a respiratory organ, seems to perform in part that also of a stomach; for that the process of digestion commences there, seems obvious from the fact, that numerous animalcules are generally found in it, but are never to be detected in the viscera of the abdomen. At the base of this sac there is another aperture (called by Cuvier the mouth), which conducts us, through the medium of a narrow membranous tube or œsophagus, into the proper stomach: an organ always much smaller than the branchial sac, very variable in point of situation and form, generally puckered into longitudinal plaits internally, and sometimes studded with some glandular bodies; but its minute structure cannot be ascertained with any degree of accuracy. It contains, in general, only a little liquid ‡; while the intestinal canal, on the contrary, is almost, in every instance, filled throughout with a sufficiently consistent matter, sometimes grumous, more often homogeneous, of a yellowish grey colour, and rolled into little round or egg-shaped pellets, which it behoves us not to mistake for the proper ova. This canal is usually wide, and has a flexuous course; at first descending in the common sac, and then returning upon itself, it winds along the anterior side of the branchial sac, to open outwardly by a round aperture placed near the mouth, but distinguished by its lesser prominence. In the *A*lcyònea, it is otherwise like the mouth in form and structure; but, in Ascídiæ, there is no filamentous fringe at this orifice; which is furnished, instead, either with two valvular folds, or with a simple circular plait.

In many of the solitary Ascídiæ, the stomach is enveloped in a large liver §, which pours the bile directly into it through

* "The disposition of the alimentary canal determines, in a manner perfectly absolute, the kind of food by which the animal is nourished; but if the animal did not possess, in its senses and organs of motion, the means of distinguishing the kinds of aliment suited to its nature, it is obvious it could not exist." (Cuvier, *Comp. Anat.*, vol. i. p. 55. trans.)

† "Il est garni d'une rangée de filamens charnus, ou de tentacules très-fins, qui servent sans doute à l'animal *pour l'avertir* des objets nuisables qui pourroient se présenter et qu'il doit repousser." (Cuvier, *Mém.*, xx. p. 10.)

‡ From this circumstance Savigny infers that the more gross and indigestible parts of the food are regurgitated, as they are in some nocturnal birds of prey. (*Mém. sur les Animaux sans Vert.*, vol. ii. p. 8.)

§ In Boltèn*ia* there is no liver. (Savigny's *Mém.*, vol. ii. p. 88.)

several orifices; and, in others, the parietes of the intestine are also thickened by a glandulous tissue, which probably secretes some liquor essential to proper digestion: but there is no liver in the social *Alcyòneæ*, or only some obscure traces of it in a few species, as in Diazòna violàcea; to the intestine of which, a little underneath the pylorus, are appended some little greenish tubes, simple, bifid, or trifid, which, Savigny conjectures, may be hepatic. (*Mém.*, vol. ii. p. 37.) There is also an essential difference in the position of the viscera in the two families: the Ascídiæ have the abdominal viscera applied entirely against one of the sides of the branchial sac, beyond the base of which they do not project; on the contrary, the abdominal viscera of the *Alcyòneæ* are without and under the sac from which they are dependent, and often separated by a distinct pedicle, the terminal portion of the intestine being the only part which is connected with the thorax. There are, however, some intermediate species to show that this distinction is one of inconsiderable importance in their economy.

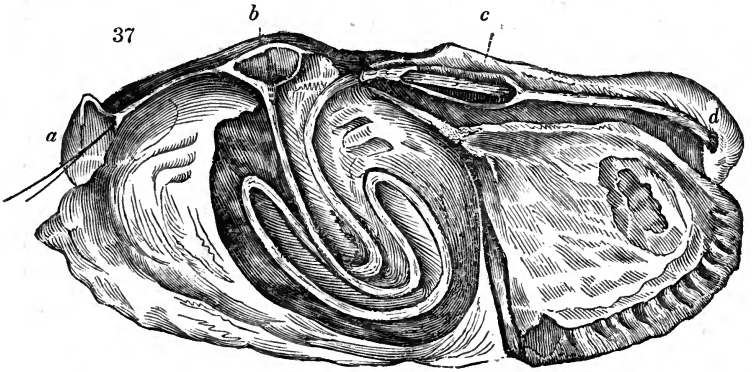
The Bivalved Mollúsca present some material differences in the structure of their alimentary canal. The mouth is always separate from the branchial aperture, and leads only to the proper stomach; it is very wide, never cut into starlike segments, nor guarded interiorly with ciliary segments, but, on the outside, is furnished with four compressed lobes, which seem to perform the office of lips rather than of tentacula *; and serve, by their constant play, to force the nutrient fluids into the mouth; for these are not sucked in with the current, but swallowed by the muscular efforts of the gullet. These labial appendages are triangular in shape, and very variable in size; they are scored, particularly on the inner surface, in the manner of the branchiæ, with which their connection is often very intimate; and they are almost always very soft, and directed backwards; but, in the Nùcula, they are rigid, and pointed towards the mouth, simulating a sort of jaws. (Blainville, *Man.*, p. 121.) The anal aperture, unlike that of the Tunicàta, is situated on the side of the body opposite to the mouth, and opens into a common excrementitious tube, the external orifice of which is often surrounded with a fringe of numerous short tubercles or fleshy filaments. The liver is always present, and closely invests the stomach, into which the bile is poured through several large pores; and, in the

* Cuvier expresses a different opinion. "Aux côtés de la bouche sont quatre autres feuillets triangulaires, qui sont les extrémités des deux lèvres, et servent de tentacules." (*Règ. Anim.*, vol. iii. p. 117.) ["At the sides of the mouth are four triangular leaves, which form the extremities of the two lips, and serve for tentacula."]

latter, we find a stylet or cylinder of firm gelatine lying loosely detached, but of a size which seems more than equal to plug up the passage. Of the use of this body, as well as of the mode of its formation, Blainville acknowledges his total ignorance.

To give you a clearer idea of the course of the alimentary canal in this class of animals, I will copy, on a reduced scale, Sir E. Home's figure of it, taken from the freshwater muscle. In this figure (*fig.* 37.), *a* is the mouth, into which a bristle

37

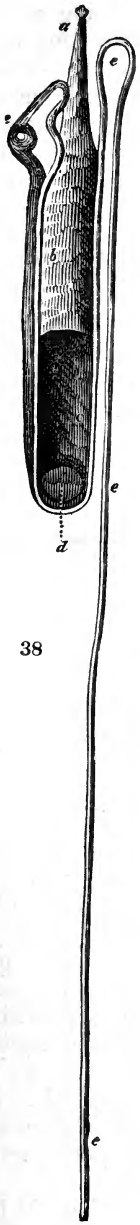


has been introduced, *b* the stomach, after which you will observe that the intestine makes five turns in the foot amidst the ovary, and then, as rectum, runs posteriorly along the back of the animal beneath the hinge and above the respiratory organs, passing through the midst of the heart at *c*, and opening at *d* above the posterior muscle closing the shells, beneath the small tube of the cloak. This description applies generally to most bivalves, but in the oyster the rectum does not pass through the heart. (Carus, *Comp. Anat.*, trans. vol. ii. p. 7.)

Our knowledge of the food of bivalves may be considered as almost entirely conjectural. It seems, however, to have been ascertained, that oysters feed upon infusory animalcules; and, as it has been asserted, that while various species of these are beneficial, others are actually injurious, it seems to follow that oysters must be able to distinguish and reject the latter. (*Zool. Journ.*, vol. i. p. 581.) Other bivalves are probably nourished by similar animalcules; for, when we reflect on their apparently helpless and inert condition, hampered with their shells, or even bound to the rock, we cannot but perceive that they are all unfit for the capture of any other prey than what floats about and within them. And how abundantly is this furnished! There are everywhere scattered on

the bed of the wide ocean extensive beds of oysters, clams, muscles, &c., containing millions of individuals, which are hourly devouring, each of them, crowds of animalcules (embracing in the term the infusory, microscopic, crustaceous and gelatinous medusæ), which, from their vast numbers and rapid reproduction, never fail them. At some seasons of the year I have seen the waters of our shores literally in a move with Entomóstraca; and I am fully satisfied that, when Scoresby calculated a cubical mile to contain 23,888,000,000,000,000, he was not exaggerating the actual fact.* In one family of bivalves furnished with a byssus, we frequently find entangled amid its fibres, or concealed within the valves, one or more small crabs (*P*innotères), of which the older naturalists, who never left an observation to stand, like truth, all naked, but ever clothed it with some pretty vestment, tell us a tale not to be passed over in this place, and which I present you in the words of Dr. Philemon Holland, the laborious translator of Pliny. "The Nacre, also called Pinnæ, is of the kind of shell fishes. It is alwaies found and caught in muddie places, but never without a companion, which they cal Pinnoter, or Pinnophylax. And it is no other but a little shrimpe, or, in some places, the smallest crab, which beareth the Nacre companie, and waites vpon him for to get some victuals. The nature of the Nacre is to gape wide, and sheweth vnto the little fishes her seelie body, without any eie at all. They come leaping by & by close vnto her; and seeing they haue good leaue, grow so hardie & bold, as to skip into her shel and fill it ful. The

* "The number of medusæ in the olive-green sea was found to be immense. They were about one fourth of an inch asunder. In this proportion, a cubic inch of water must contain 64; a cubic foot, 110,592; a cubic fathom, 23,887,872; and a cubical mile about 23,888,000,000,000,000! From soundings made in the situation where these animals were found, it is probable the sea is upwards of a mile in depth; but whether these substances occupy the whole depth is uncertain. Provided, however, the depth to which they extend be but 250 fathoms, the above immense number of one species may occur in a space of two miles square. It may give a better conception of the amount of medusæ in this extent, if we calculate the length of time that would be requisite, with a certain number of persons, for counting this number. Allowing that one person could count 1,000,000 in seven days, which is barely possible, it would have required that 80,000 persons should have started at the creation of the world, to complete the enumeration at the present time! — What a stupendous idea this fact gives of the immensity of creation, and of the bounty of Divine Providence, in furnishing such a profusion of life in a region so remote from the habitations of men! But if the number of animals in a space of two miles square be so great, what must be the amount requisite for the discoloration of the sea, through an extent of perhaps 20,000 or 30,000 square miles!" (Scoresby's *Arctic Regions*, vol. i. p. 179.)



38

shrimp lying in spiall, seeing this good time & opportunitie, giueth token thereof to the Nacre, secretly with a little pinch. She hath no sooner this signall, but she shuts her mouth, & whatsoever was within, crushes & kills it presently; & then she deuides the bootie with the little crab or shrimp, her sentinell and companion. I maruell therefore so much the more at them who are of opinion, that fishes and beasts in the water haue no sense." (Vol. i. p. 261.)

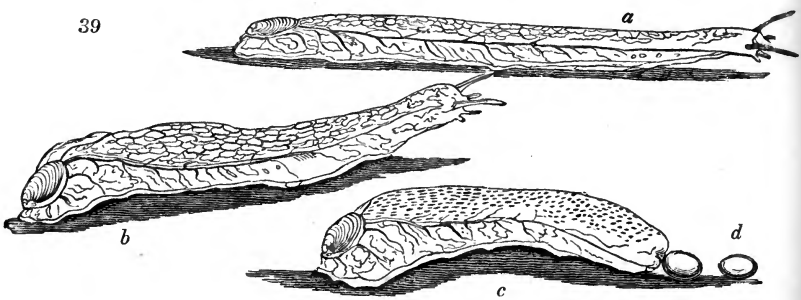
Of bivalves there are some which, as I have told you, bore into wood and rocks; but I need scarcely guard you against entertaining the supposition that they eat the material on which they work, although there are authors who have attributed to them "a stone-eating power and appetite." The *T*erédines, however, really eat the wood destroyed by them; for Mr. Hatchett proved the pulp in their intestine to be vegetable sawdust; but I agree with Sir E. Home in thinking that the sawdust serves only as a substance in which the real food procured from the sea is entangled and prevented from escaping too readily from the stomach. I will give you Sir Everard's description of the digestive organs (*fig.* 38.) of these animals, which a comparison will prove to be altogether different from those of the more typical bivalved Mollúsca (*fig.* 37.). The œsophagus (*fig.* 38.* *a*) is now very short, and lies on the left side of the neck: the canal swells out, and becomes stomach (*b*), which, in its external appearance, is a large bag, extending the whole length of the cavity of the abdomen, but, when laid open, it is found to have a septum (*c*) dividing it

* This figure represents the course of the stomach and intestines of *T*erèdo navàlis, removed from the body. *a*, The œsophagus; *b*, the stomach; *c*, the septum, dividing it into two cavities; *d*, the aperture by which the two cavities of the stomach communicate; *e*, the course of the intestine to its termination. (*Comp. Anat.*, t. 80.)

longitudinally into two equal portions, except at the lowest part, where they communicate (*d*), the septum being wanting. The intestine has its origin close to the termination of the œsophagus, is extremely small, dilates into a cavity containing a hard white spherical body the size of a pin's head, and then makes a turn upon itself. The course it follows is shown by the letters *e* in the cut. (Home's *Comp. Anat.*, vol. i. p. 373.)

ART. IV. *A Notification of the Occurrence, in the Island of Guernsey, of a Species of Testacéllus, and of some of its Characteristics and Habits, as observed there.* By FREDERICK C. LUKIS, Esq.

A SPECIES of Testacéllus is rather abundant in certain localities in this island (Guernsey); and I send drawings of it (*fig.* 39.) for comparison with the characteristics of T. scùtu-



lum *Sowerby*, as exhibited in the individuals of that species found, as stated in VI. 43. to 46., at Stamford Hill, Lambeth, Kensington, Bayswater, and on the side of the road from London to Hampstead; and with the characteristics of T. Maugèi, as figured in VI. 45. I avoid, purposely, applying a specific name to the species which occurs here, because I have never been able to ascertain, correctly, the distinctive differences of the few species which have been published; namely, T. haliotídeus [*Faure Biguet*], scùtulum *Sowerby*, Maugèi Férussac, and ambíguus *Férussac*, with córneus and costàtus of M. de Roissy. Besides, therefore, the identification of the species represented in my drawing, information on the differential characteristics of any of the species will be very acceptable.

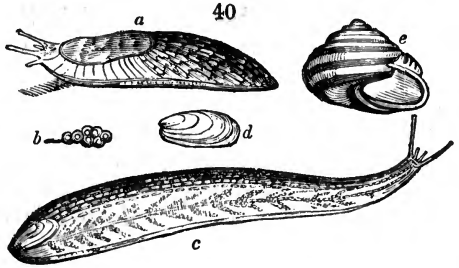
I had hoped that the late Mr. Miller of Bristol would have made some enquiries about the species which occurs here; for

a friend of his promised, several years ago, to inform him of its inhabiting this island. In 1827, a gentleman of the Island of Jersey kindly furnished me with a shell, said to have been found in the neighbourhood of Bristol: it bore, when sent to me, a label inscribed "Búlla haliotídea." On my examining this shell, I found it to be that of a Testacéllus; and, as I had not seen the T. haliotídeus, which is a native of France and Spain, I imagined that some error had crept in, and that the specimen had been received from the Continent.

As far back as 1801, the Testacéllus which is represented in my drawing (*fig.* 39.) was known to me, as it was then plentiful in my own garden; since which period it has disappeared from it; but, at the end of the valley near which my garden is situate, the ground is plentifully supplied with individuals of it.

[*Characteristics and Habits.*] The colour of the animal (*a*) is, generally, a sickly yellow spotted with brownish specks, mixed with pale orange along the lower parts. The figure, in VI. 45., of T. Maugèi [repeated here (*fig.* 40. *c*, *d*)] has the lateral furrow passing under the side of the caudal shell [erroneously: see in p. 229.]. In the animal here, the furrow, as is shown in my figure (39. *b*, *c*), commences near the top or anterior edge of the shell, by a double nearly united line, which diverges in a sort of erratic direction on both sides of the animal, dividing the sides into unequal portions, until it terminates near the head. This line is better seen when the animal is extended, as are also the granulations or shagreen which are spread over the skin. It will be observed that I have shown six, instead of four, tentacula [our engraver has omitted the sixth]. The fact is, that the animal can, at its pleasure, expand and convert the corners of the lip into a subsidiary retractile pair, in place immediately beneath the anterior pair, to which they are equal in dimensions and similar in appearance. This fact may account for the difference of opinion which has obtained on the number of these organs.

40



The eggs are perfectly oval, hard, and opaque; when fresh, white and covered with a clear viscous juice; when older, they assume a deeper tinge, much like that of the egg of our

game fowl, or that of the eggs of some fowls of the Bantam breed. They are not elastic, but have, like the eggs of the common fowl, a regular shell of lime, which effervesces strongly in acids. These eggs, if taken from the ground, and cleaned and brought into the warmer atmosphere of a room, will, in a few minutes, burst with a loud crack, and disperse their shell and contents to a considerable distance. Whilst I have been writing these remarks, one of the Testacélli before me has, in the space of twenty minutes, laid two eggs (*fig.* 39. *d*). I sketch the animal as it presented itself while engaged in the operation, during which the head and tentacula were drawn in, to the degree shown in *c*.

The mildness of the climate of Guernsey during the winter is, doubtless, the cause of the Testacéllus being to be found at this period of the year. I should, however, state that those which I found in 1801 were, as in the cases remarked in VI. 43. and 45., usually in the neighbourhood of a green-house.

Guernsey, Jan. 18. 1833.

[Of *Testacéllus scutulum* Sowerby, Mr. Thomas Blair, Stamford Hill (VI. 43.), obligingly sent me, on March 21. 1834, a supply of specimens; nine living individuals, one dead one, and five eggs. These I carefully compared with the characteristics of the Guernsey Testacéllus, as noted in Mr. Lukis's description, and shown in his admirable drawing. I could not perceive any mentionable difference between them, except that in the Stamford Hill animals the lateral furrow was less obvious, though still perceptible, than Mr. Lukis's drawing represents it to be in the Guernsey ones. I placed one of the eggs close beside the fire: it exploded, just as Mr. Lukis's had done. Most, or each, of the slugs themselves, exhibited, as it were, three pairs of tentacula, but I think that the pair produced by the protrusion of the corners of the lip were scarcely so long as the pair above them.

On holding one or more of the slugs by the body, between my finger and thumb, I felt and saw my flesh struck with some white organ projected from the mouth of the slug. This, and a recollection of the worm-eating (vermivorous) habits of this species, instigated me to capture a smallish earthworm, and place it against the mouth of first one slug, then another. One endeavoured to take it, and its first act in the effort was darting out the organ I have mentioned, affixing it to the worm, and drawing the worm into its mouth. The worm, by its writhing, twisted itself out again, and this more than once, during the (about six) times which I, in the

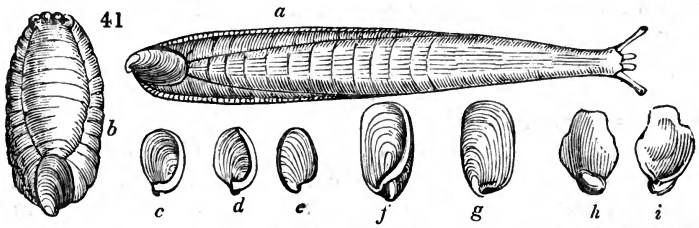
course of about a quarter of an hour, excited the slug to project the peculiar organ noted. By observing this organ as accurately as I could during the slug's brief exposures of it, and by cutting open the one dead slug, I satisfied myself, in a good degree, that this organ is white, horny, of the figure of the longitudinal half of a hollow cone, with the hollow upwards (so as to resemble a deep spoon), and that the slug, when informed of a worm's presence by the contact of its own head with a worm's body, projects this organ under the worm, to the flesh of which it adheres by a tenacious viscum, and perhaps, also, as the organ is hollow, by the aid of suction. It is projected and applied in an instant, and when applied, the action of a muscular structure, connected with its origin, draws it, and with it the worm, into the slug's mouth. The skin and parts of the head of the slug are then gradually turned in, as one would turn in the finger of a glove, or in the manner shown in Mr. Lukis's figure (*fig.* 39. *c*). Mr. Blair informs us, in VI. 43., that the T. scùtulum swallows worms (and occasionally a small slug) whole, and the introversive process mentioned (although the testacellus may not be able to employ introversively any very considerable portion of the upper part of its body) must avail it in swallowing worms which it happens to catch by either extremity. Mr. Blair has, however, seen (VI. 43.) "one firmly fixed to the *middle* of a large worm, the head of the slug being so buried in it that it appeared to be nearly cut in two." In the worm that had, as I have observed above, twisted itself out of the slug's mouth, I noticed, after it had twisted itself out, a piece of its flesh absent close beside the tip of the front extremity, and blood apparent there; and this, as I had not observed any defect in the worm when I applied it to the slug, I take to have been bitten out by the slug. This assumed fact, that quoted before it from Mr. Blair, and the likelihood that it is impracticable for the testacellus, whose body is somewhat slender, to swallow a large worm doubled, suggest that, although this slug may usually swallow earthworms, &c., whole, it occasionally, also, partakes of the earthworms piecemeal.

Mr. Blair thinks (VI. 44.) that the Testacéllus usually gets hold of the worms underground. However this may be, the animal seems to insinuate its head and neck easily, and not very slowly, into loose broken soil; and the slender attenuated form of the body, when extended, is not unfavourable to Mr. Blair's idea; and as the orifice, in the Testacéllus, for the admission of air, is at the posterior extremity, just under the outward edge of the shell, protected, as it were, by the eaves of the shell, fancy may imagine the shell designed to

keep the orifice clear of soil, while the animal progresses through this pulverulent material. [I have since seen that M. de Férussac has expressed, and more positively, both these ideas; and Mr. G. B. Sowerby, also, that on the remarkable power of extension and attenuation of body given to the Testacélli. *Fig.* 41. *b* shows their great power of contraction.]

Mr. Blair's remarks, in VI. 43., intimate that the Testacéllus does not hibernate; Mr. Lukis's facts, above, teach the same thing; and a couple of facts known to me point to the same conclusion. The Testacélli (of the species T. scùtulum, at least) seem to be, with regard to hybernation, in precisely the condition of the naked slugs, whose case has been so accurately described by G. J. in p. 116, 117. The fact told of a T. scùtulum, in VI. 44., from Mr. J. Sowerby, jun.*; and that related above by Mr. Lukis, of a Testacéllus laying its eggs after being twenty minutes in a warm room, suggest that the Testacélli are, indeed, especially sensitive of variations in temperature.

Since the above remarks were written, we have striven to meet Mr. Lukis's wish for a statement of the diagnostics of the species of Testacéllus. Mr. J. D. C. Sowerby has, in relation to this object, supplied the following figures (*fig.*41.);



and we have transcribed, with his permission, from his copy of Baron de Férussac's *Histoire Naturelle Générale et Particulière des Mollusques Terrestres Fluviatiles*, the diagnostics there given of T. haliotídeus, Maugèi, and ambíguus; and from Mr. G. B. Sowerby's *Genera of Recent and Fossil Shells*, the one there given for T. scùtulum, which is a species that was unknown to Férussac at the time that he published those here quoted from him.

T. haliotídeus *Faure Biguet*. *Animal:* Flavidum, rufum, vel griseum, maculatum aut immaculatum; tentaculis cylindricis. *Testa:* Ovata postice acuminata, cornea, crassa, extus rugosa, intus nitida; clavicula [inner lip *G. B. Sowerby*] alba lata et plana.

* Since removed from among us by death. This most amiable and most promising young man died of a tubercular consumption, on February 7. 1834, aged 18 years. His loss to us all, and to science, is feelingly regretted by every one whom his uncommon modesty allowed to know him.

[*a* pallide lutescens, immaculatum *Fér. Hist.* vol. i. p. 94. t. viii. fig. 5. to 9.]

[It is this last condition of the species which is figured by Férussac, whose figures are copied in our *fig.* 41. *a*, *b*, *c*: *a*, seen from behind; *b*, as seen when contracted; *c*, the shell, as seen on the inside. In Sowerby's *Gen.*, No. i., two views of the shell of this species are given, to contrast with those of T. scùtulum and Maugèi, there also exhibited. "T. haliotídeus is not uncommon in France." (*G. B. Sowerby*, in *Gen.*) It is a native of France and Spain. (*Mr. Lukis*, in p. 225.)]

T. scùtulum *G. B. Sowerby. Testa* ovata, antice paulum acuminata, extus plana, clavicula arcuata, elevata. The *animal* bears a near resemblance to that of T. haliotídeus, not having the double row of tubercles running from the head to the anterior part of the shell, so conspicuous in T. Maugèi. G. B. Sowerby, in *Gen.*, No. i., fig. 3, 4, 5, 6. [Of these figures of T. scùtulum, derived from an animal or animals taken in the neighbourhood of London, fig. 3. represents a front view of the animal; fig. 4., a view of the same animal when extended; fig. 5. (copied in our *fig.* 41. *e*), an outside view of the shell magnified; fig. 6. (copied in our *fig.* 41. *d*), an inside view of the shell magnified. If the Guernsey Testacéllus (*fig.* 39.) be, as I have, in p. 226., conjectured it to be, of the species T. scùtulum, then *fig.* 39. farther exhibits the animal, the shell, and the eggs of this species, and all of the natural size; and Guernsey may be added to the habitats of this species already noted in p. 224.]

T. Maugèi Férussac. *Animal:* Rufescens; maculis brunneis sparsis ornatis; tentaculis filiformibus; ora corporis aurantia. *Testa:* Ovato-elongata, fulva, exilis, striatula; spira elevata; clavicula angusta. Fér. *Hist.* vol. i. p. 94. t. viii. fig. 10. 12., Sowerby *Gen.* No. i. fig. 7. to 10.]

[The synonymes exhibited by Férussac, under T. haliotídeus and T. Maugèi, teach that these two species had been more than once confounded. Our *fig.* 40. *c*, (repeated in VI. 45., and VII. 225., from the *Encyc. of Agriculture*, ed. 2. § 7706.), is wholly erroneous, as compared with Férussac's figures, in the matter of the part of the animal in which the lateral furrow is commenced. In Férussac's figures, the furrow is represented as commenced in this species (T. Maugèi) just in front of the shell, and as carried thence to each of the two sides of the animal's body. *Fig.* 40. *d* is a view of the shell of this species, taken (as well as that of the animal *c*, though this too inaccurately) from an individual derived from Bristol; and *fig.* 41. *f*, *g* are views of the shell copied from Férussac's figure. "T. Maugèi is a native of Teneriffe; but [is] naturalised in a garden at Bristol."—*G. B. Sowerby*, in *Gen.*]

T. ambíguus *Férussac. Animal* [unknown]. *Testa:* Depressiuscula, fragilis, subtiliter striata; pallide viridis; spira indistincta; apice occultata; apertura amplissima, simplici.

[Férussac has (in *Hist.* vol. i. p. 95. t. viii.) given two views of the shell, which are copied in our *fig.* 41. *h*, *i*. "We cannot consider De Férussac's ambíguus as a species, inasmuch as it has every appearance of being an internal shell [of some species of the family of slugs]."—*G. B. Sowerby*, in *Genera*, under T. scùtulum.]

Férussac has consigned eight folio pages, and twelve figures besides, to the elucidation of the three species quoted from him: but the greater portion of the descriptive matter is an exposition, in a generic manner, of the anatomy, faculties, habits, and manners of the Testacélli; that is, of the two species (haliotídeus and Maugèi), with the animals of which he is acquainted. He has, besides, in another part of his

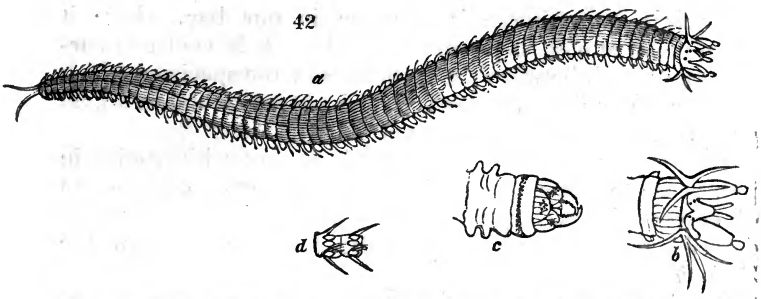
work, namely, in his "Observations Générales sur l'Organisation et les Facultés des Pulmonés sans Opercule," in generalising on the conditions of the tentacula in various genera, spoken and analogised on the tentacular function of the lips in the genus Testacéllus. It is hence apparent that a rich store of facts and observations is already on record on these interesting animals; and, had we been earlier aware of this, we could scarcely have resisted quoting several of the more instructive of them. As it is, we can only thus refer to them *, and express our sincere regret that Férussac's excellent work is so rare in Britain; or, at least, in London. See V. 192.] — *J. D.*

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

19. LYCO'RIS MARGARITA'CEA. (*fig.* 42.)

THE body of this worm is from 4 in. to 6 in. long, contractile, semicylindrical, of the thickness of a large quill, and tapered towards the tail: it is of a brown colour, more or less deeply tinted with metallic green, particularly near the head and on the anterior margins or sides of the segments, and, in certain lights, is finely iridescent. A red vessel runs down the middle of the back, giving off to each foot a small branch, which is again slightly ramified; and a similar vessel may be traced along the flat ventral surface, which is marked with a central furrow, and stained in some degree with the opaque internal viscera. The head is square, with four small eyes; two placed on each side at the base of a conical projection, on

* We must just notice the following: — M. de Férussac, in his "Observations Générales sur l'Organisation et les Facultés des Pulmonés sans Opercule," in speaking of the means given to various animals of this class for defending themselves from the heating and drying effects of the solar rays, mentions a *manteau particulier* which is given to the Testacélli. This, in his generic character of the Testacélli, is thus described: — "Manteau: simple, gélatineux, contractile, caché habituellement sous le test, divisé en plusieurs lobes susceptibles d'envelopper tout le corps par un développement extraordinaire, lorsque l'animal éprouve le besoin de se garantir de la sécheresse." Mr. J. D. C. Sowerby has seen one or more animals enveloped in this "manteau:" the body is then in its most contracted state. In the dead testacellus, of which we have spoken above, we perceived a starlike scar at a little distance from the front extremity of the body, which we avoided mentioning, for fear of being found in some error. On the organs of generation, however, Férussac has remarked, "Réunis; orifice en arrière du grand tentacule droit:" and this remark, and the subsequent inspection of a preserved specimen at Mr. J. D. C. Sowerby's, assure us that the scar we had seen was this orifice.



a, L. margaritàcea, natural size; *b*, the head, magnified; *c*, a view of the proboscis from below; *d*, the feet, with the filaments and bristles.

which are articulated two longish papillæ: and beneath these, and exterior to them, there are two much larger papillary processes, terminated with a small knob-like point, which is entirely retractile within the lower portion. On each side of the head, originating from a common swollen base, there are four setaceous tentacula of unequal lengths. The mouth is somewhat inferior, wide and terminal, furnished with a short thick proboscis, divided into two portions by a circular fold, and capable of being extruded at pleasure: its point is armed with two curved serrated horny mandibles; and around these there are placed, on as many swellings, six distinct patches of small black horny prickles, the side patches larger than the others; two still smaller patches, on mammillary swellings, are situated just under the projecting lobe of the head; while, at the very base of the proboscis, we find a band of similar prickles, some larger than others, arranged in several irregular series. The whole surface of the proboscis is marked with pale longitudinal lines (muscles?), frequently anastomosing. The segment immediately behind the head is footless, and scored with faint whitish lines, or sometimes spotted; and oblique lines of the same kind may be seen, with a magnifier, on the sides of the other segments. These are very numerous, shorter than their breadth, smooth, and furnished with papillary feet, filaments, and setæ. The feet of the first two segments consist of only two fleshy papillæ, but all the rest have three arranged transversely: the papillæ are short, obtuse, and equal; and, at the base of the superior one, as well as under the inferior one, there is a tentacular non-retractile filament; while a small brush of setæ issues from the inner side, and near the root of each. These brushes are made up of a single strong black bristle and a considerable number of slender straight hairs, and can be pushed out or withdrawn at will. The tail is terminated with two short filaments.

Lycòris margaritàcea is common in our bay, where it lurks under stones, between tide-marks. It is evidently carnivorous; and, between the mandibles of the specimen which served for our figure, a small *Gámmarus* was found in a fatal grasp. Fresh water is an instant poison to it.

I have been induced to select this worm for illustration in preference to many others, since it gives me an opportunity of correcting several errors which I have committed when describing the same species in the fourth volume of the *Zoological Journal*. It is there stated that I had not observed the proboscis to be divided into two joints, which, however, is the case; and the patches of prickles round the base of the mandibles are described as being four instead of six in number. I have there also constituted a species under the name of Lycòris víridis, which, a longer acquaintance with this family satisfies me, is merely a variety of the present, of a deeper and more uniform green than usual; for the character on which I mainly rested the distinction between them (namely, the first segment being striated longitudinally in one, and spotted in the other) is, as I now find, one of no value. To acknowledge errors of this kind is a paramount duty *, although it may prove him who commits them to be one of little tact and experience.

The following synonymes are, I think, referable to this species:—

Nèreis cærùlea, Pen. Brit. Zool. vol. iv. p. 93. t. 27. fig. sup., Turt. Lin. vol. iv. p. 88., Turt. Brit. Faun. p. 135., Stew. Elem. vol. i. p. 390., Bosc Vers, vol. i. p. 170. Nèreis margaritàcea, Leach in Supp. Encyc. Brit. vol. i. p. 451. t. 26. Lycòris margaritàcea, Lamarck Anim. s. Vert. vol. v. p. 312., Johnston in Zool. Journ. vol. iv. p. 420. [and now in Mag. Nat. Hist. vol. vii. p. 233.], Stark, Elem. vol. ii. p. 139. L. víridis, Johnston in Zool. Journ. vol. iv. p. 419.

Berwick, Dec. 4. 1833.

* Entertaining this opinion, I could have wished that the correction of one or two similar, but more gross, errors of mine had been made, long before this time, in the same journal in which they originally appeared; and as it is now apparently discontinued, I may here be permitted to state that the *G*álba marina of *Zool. Journ.*, vol. iii. p. 321., is the larva of a dipterous fly, whose ova are frequently deposited and hatched amidst the roots of sea-weed that has been cast ashore; as Mr. MacLeay proved, in an unpublished letter to the editor of the journal just referred to, very shortly after the publication of the error.

Mr. MacLeay is of opinion that my Campóntia *e*rucifórmis (*Zool. Journ.*, vol. iii. p. 325.) is a similar larva; but I am still unsatisfied on this point, for I find it at all seasons at the roots of *C*onférvæ *in pure sea water*.

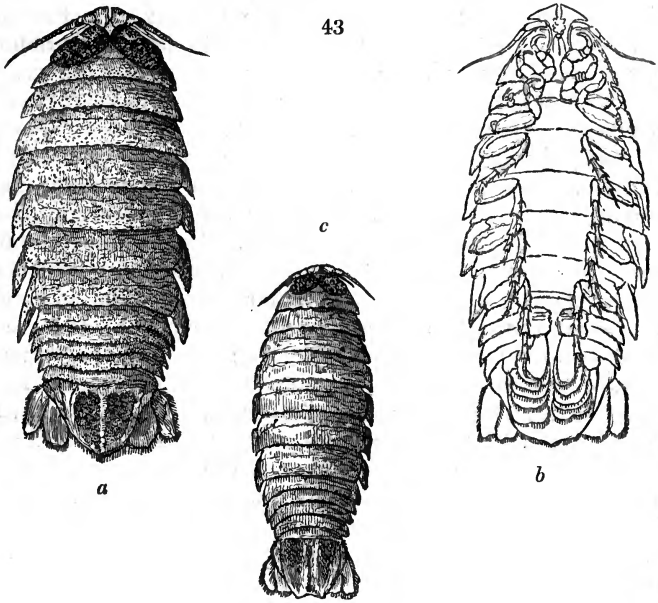
*L*umbrìcus pellùcidus (*Zool. Journ.*, vol. iii. p. 327.) is a larva, as I long ago stated.

Palmỳra ocellàta (*Zool. Journ.*, vol. iii. p. 329.) is a young individual of the Polýno*e* imbricàta, accidentally deprived of its dorsal scales.

20. Æ'GA MONOPHTHA'LMA. (*fig.* 43.)

Cl. Crustàcea, Ord. Isópoda, Fam. Cymothòades.

43



Description. — Body oval; pale brown, approaching to flesh-red, and, when alive, tinged with purple; dotted all over with numerous punctures. Antennæ, white, setaceous: the superior very short, with the two basilar joints much dilated, and forming a broad, movable, coloured plate before the eyes; the third joint small and cylindrical; the ultimate one, multiarticulate: inferior antennæ more than twice the length of the superior, the three basilar joints short, unequal; the fourth, longer and cylindrical; the ultimate longer than the whole, and multiarticulate: the bases of the antennæ approximate, but do not meet; and the superior just reach to the origin of the last joint of the inferior. Head small, almost entirely occupied by the large oblong eyes, which meet, and, as it were, coalesce in front: eyes reticulated, compound, dark brown, anterior and marginal, extending obliquely backwards, occupying all the cranial segment except a small point projecting between the bases of the antennæ, and a small triangular space behind. Underneath and between the inferior antennæ there is an oblong concave small plate; below which

the mouth is situated, armed with a pair of jaws, and furnished with two filiform palpi, one on each side, quadriarticulate; the last joint unguiculate. Segments of the body seven, subequal, marked with a faint line across the middle, the margin pale; segments of the tail six, the first five narrow, equal, transverse; the terminal one broad, oblong, roughish, depressed, with a strong keel down the centre, ending in a short point or mucro: the margins of these segments are minutely spinous. On each side of the segments of the body there is a strong movable process, pointed posteriorly, and with two slight ridges down the middle: these processes or coxæ cover and serve for the insertion of the legs, of which there are seven pairs. Legs white; the first three pairs unlike the others, and directed forwards; the thigh thick, elongate, with a circular curved head moving in an acetabulum; the tibia short, and smaller; the tarsus 3-jointed, with a strong curved claw: thigh of the posterior pairs elongate, thickish; the four succeeding joints much more slender, almost equal, spinous, and terminated with a curved claw. The legs are all punctured in the manner of the body; but the ventral surface of the segments is smooth. Each caudal segment is furnished on each side with a pair of broad oval membranous plates, ciliated on the margins, and articulated, by twos, to a compressed stalk; and there is, on each side of the last segment, an additional pair of foliaceous plates jointed to a movable, acutely-pointed, somewhat triangular process. Of these plates, the inner is wedge-shaped, the other oblong; and both are densely ciliated round the edge.

This description is taken from the larger specimen figured (*a*, dorsal aspect; *b*, ventral aspect); the smaller one (*c*) differs in having the two inferior joints of the superior antennæ not disproportionately enlarged; and the large segment of the tail is emarginate, truncate, with a shallow furrow down the centre, and two obtuse raised keels at its sides. In other respects, I perceive no difference. The figures are of the natural size.

Æga monophthálma swims with rapidity by the aid of its caudal fins; and, when it comes in contact with a solid body, it claps against it, and adheres tenaciously. Our specimens were taken adhering to large codfish, of which, it is probable, they are the "pedicular" parasites; but, unlike some of their race, they seem to be very rare, at least in our bay, for I could only procure three specimens; and our fishermen had never observed them before.

I have described this as a new species, the more confidently that I have the authority of my friend Mr. J. E. Gray for doing so. In general form and size it resembles *Æga* emarginàta; but very obviously differs from that species by the remarkable proximity of the eyes, which, in the emarginàta, are separated by a considerable interval. The smaller specimen seems to possess the specific characters of the *Æga* bicarinàta of Leach; and I should mention that this specimen had not been seen by Mr. Gray when he gave me his opinion: but Dr. Leach would scarcely have left the peculiarity in the position of the eyes without some notice, had his species exhibited it. If I am right in deciding that it is of the same species as the larger individual, and probably the male of it (and, surely, the differences are not sufficient to warrant a belief that they are distinct species), then it would seem to follow, first, that the great dilatation of the basilar joints of the antennæ is a sexual character, or one dependent on age, and of insufficient value, therefore, to be ranked among characters which are seized upon to divide tribes or families from each other; and, secondly, that the conformation of the extreme caudal segment is not sufficient to discriminate species, as Dr. Leach seems to have believed, for his specific characters embrace no other part.

Berwick upon Tweed, Jan. 20. 1834.

ART. VI. *On the Structure of the Annulate Animals, and its Relation to their Economy.* [Continued from p. 125.] By Ω.

THERE is nothing more unaccountable than the tenacity with which we cling to old opinions, simply because they are old; nor than the pompous and solemn gravity with which we tell the most palpable and absurd untruths, simply because our forefathers told them. Wherefore can this be? The problem we will, however, leave, for solution, to the metaphysicians. One of these established fallacies has descended, with all its pomp, from the time of Aristotle to within a few years of the present day; namely, that insects are without blood. When, however, the great discovery of the circulation of blood in the higher animals was made, insects were designated as being without a *circulating* blood. This distinction was considered perfect, until one or two enquiring minds, wishing to ascertain why this difference should exist, examined for themselves, and found it did *not* exist.

The circulation of blood in annulates appears to have been generally doubted in this country, until Mr. Bowerbank, one

of our most successful microscopists, published, in the *Entomological Magazine* [vol. i. p. 239.], a minute and most interesting account of it as observed by him in the larva of an *Ephémera*. Mr. Bowerbank's observations corresponded very closely with those of Professor Carus, a Continental naturalist, who had published his discoveries a short time previously, but whose descriptions Mr. Bowerbank had never perused.

The circulation in annulates is not, as it is in vertebrates, entirely confined to limited and well-defined vessels; neither is there any heart for the reception and expulsion of the blood; but there is a large wide channel, extending the whole length of the animal, through which the blood is constantly rushing upwards from the posterior towards the anterior extremity. This current is kept in motion by the alternate opening and closing of double valves, distributed at regular intervals throughout its extent: this operation causing a motion, as each portion is afresh impelled upwards, which is precisely equivalent to the pulsations of a heart. The valves open upwards only, and between them, on both sides, are other valves in the great channel, which as regularly open inwards to admit fresh supplies of blood from the lateral portions of the body. On each side of the animal there is a downward current, confined to no distinct or ascertainable channel, but permeating indifferently all parts in the neighbourhood of its progress: portions, however, part off from the main current at intervals, and flow through the side valves of the central channel already described. The pulsations in this downward current are more faint, and its progress is somewhat more slow, than that in the upward central current. On the opening of a side valve, the blood may be seen rushing towards it from every part in the neighbourhood, as though it were in a state of freedom among the transparent and muscular parts, and not limited to any vessel. No blood ever leaves the main channel, but through the aperture at the anterior extremity, where it turns inwards towards the œsophagus, and cannot be traced, by the microscope, any farther. In the antennæ, legs, and nervures of the wings a similar double current is observable. Such is the usual circulation of blood in an insect.

In the lobster, and other large marine annulates, a somewhat more perfect system is observable; that is, the limits of all the vessels are perfectly well defined, and may be ascertained and figured with confidence and even ease. In these, there is a manifest approach to the circulation of fishes, which possess it in the most simple state of all the

vertebrates. The marine annulates farther resemble fishes in breathing by gills; a most beautiful and wonderful contrivance, which enables them to extract from water a sufficient quantity of air to aerate the blood, and thus precludes the necessity, so obviously attendant on all other modes of respiration, namely, a constantly repeated ascent to the surface for fresh supplies of atmospheric air. In these animals, consequently, the blood must ascend to the gills, in order to be brought into contact with the air so produced; but in the hexapod or true insects, which constitute by far the greater portion of the annulate kingdom, the respiration and aeration of the blood are managed on an entirely different principle.

The circulation of blood in hexapod insects we have already examined; let us now turn to the circulation of air. This is not confined to a single region, as the gills in fishes, or the lungs in man; but seems to be almost universal: it consists of an infinity of tubes ramifying through the body in every direction, from one end to the other. These air-tubes, termed tracheæ, have generally nine nearly equidistant external openings, termed spiracula, on each side of an insect. From each spiraculum a main trachea seems to enter the body, and immediately divides into two, three, four, or five minor tubes, one of which usually unites with the next spiraculum; thus forming a principal trachea, which extends the whole length of the body, on each side of the great dorsal channel for the blood already spoken of. From the main spiracular tracheæ minor transverse tracheæ frequently arise, and, passing above and below the great dorsal channel, unite with similar minor tracheæ, twigging off from the opposite side; and thus the whole system of tubes becomes connected, and acts by a common impulse.

To a casual observer, it may seem, perhaps, somewhat strange that a system of respiratory organs so apparently complicated should have been given to a race of beings which we consider of so very little importance in the universe: but an examination, however cursory, will show that here, as in every other of the Almighty's works, there is nothing superfluous; that there has been no labour in vain.

Respiration and circulation are so intimately connected, that the operation of each depends on the operation of the other. Now, in insects the blood is cold; and for this excellent reason, that, in so small a bulk as that of an insect's body, so large a portion of the blood is exposed to the air, that a heat superior to that of the atmosphere could not be maintained. This being the case, circulation of the simplest pos-

sible kind was all that was required, and is all that has been given. It is well known that the blood of animals, when deprived of all communion with atmospheric air, stays in its course, and ceases to perform its functions. Now, by the simple system of circulation above described, it is evident that the blood could not be brought, with any regularity, to one particular spot, there to communicate with and receive air sufficient to renew and maintain its vital power. It becomes, therefore, a matter of necessity, that, as the blood does not go to the air to receive revivification, the air must be introduced to the blood for effecting that purpose. The most simple, the most direct, way of accomplishing this was by piercing the sides of the animal at regular intervals throughout its length, and inserting tubes through which the atmospheric air should pass with perfect freedom into the system, and mingle with the blood in any quantity that nature might demand. This is the very plan that we find has been adopted.

To this, the breathing of the marine annulates, already noticed, may be cited as an exception; it may be said that their blood is cold, and yet they breathe by gills. This is true; but it is also true that their residence in the depths of the ocean precludes the possibility of their using spiracula; we therefore find the system of their circulation raised, to cooperate with their improved respiration. It was quite needless that their blood should, farther, be warmed; for we find that even in fishes the blood is perfectly cold, for the same reason as in insects, because their bodies are (when young) too small to resist the temperature of the surrounding medium.

There are numerous aquatic annulates which belong to the hexapod or true insects, which are provided with a system of respiratory organs precisely similar to that of the terrestrial insects; these have the power of enveloping, with a bladder of atmospheric air, those parts of the body in which their spiracles are situated; thus not only protecting the spiracles from receiving any injury from the ingress of the water, but keeping up the necessary supply of air to the blood. The bladder of air is renewable at pleasure by rising to the surface.*

(*To be continued.*)

* Do not the sacs, within which trachean *Arachnides* have been found parasitic upon the aquatic *Dytiscus marginalis* (see p. 161.) serve the same purpose as this "bladder of atmospheric air" serves to the aquatic hexapod insects? and, farther, all the cysts, with which a variety of animals parasitic upon aquatic animals are found covered? See VI. 94., for a notice of some parasites found encysted.—*J. D.*

ART. VII. *A Statement of the Quantity of Rain which has fallen at High Wycombe, Bucks, during the last Ten Winters, with Remarks.* By JAMES G. TATEM, Esq.

THE table beneath shows the quantity of rain which has fallen in this place, in the months November, December, and January, during the last ten winters. It may serve to correct the general impression, that more rain fell during last winter, than had fallen in any winter of several preceding years.

Years.	Number of days of rain.	Quantity of rain in inches and decimals.	Thermometer.					Number of days in which the wind blew from the	
			Maximum.	Day.	Minimum.	Day.	Mean.	Eastwrd.	Westwrd.
1824-25	50	9·12495	55·50	Nov. 18.	24·	Dec. 5.	39·63666	12	80
1825-26	54	8·6825	55·50	Nov. 1.	9·50	Jan. 1.	35·67333	35	57
1826-27	50	6·45625	52·	Nov. 11	12·50	Jan. 3.	36·82959	30	62
1827-28	55	11·435	56·	Nov. 13.	15·50	Nov. 22.	40·10819	32	60
1828-29	44	4·9675	55·75	Nov. 28.	8·75	Jan. 24.	34·98127	48	44
1829-30	31	4·495	53·75	Nov. 12.	4·	Jan. 18	32·17486	43	49
1830-31	48	7·42875	56·75	Nov. 1.	9·75	Dec. 24.	35·53344	50	42
1831-32	44	7·445	56·	Nov. 22	20·50	Nov. 28.	37·60604	30	62
1832-33	40	7·40625	56·50	Nov. 2.	21·50	Jan. 21.	37·58872	45	47
1833-34	63	10·925	58·	Nov. 1.	24·50	Nov. 25.	41·87835	20	72

From this table it appears, that, in the winter embracing 1827-28, rain fell to the amount of 11·435 in.; while, in the winter which is just closed, only 10·925 in. of rain have fallen: giving an excess of upwards of half an inch to the former period. The great difference has been, that rain has fallen more frequently in the last winter (namely, on 63 days); while, in that of 1827-28, rain fell only on 55 days: and to this circumstance may be attributed the prevalent opinion.

That great humidity of atmosphere is constantly attended by a high degree of temperature, is well known to every meteorologist; but the mildness of the last three months, or brumal quarter, was most extraordinary. In the brumal quarter of 1827-28, the mean temperature was 40·10819°, which was very much above the average; and the extremes were 56° and 15·50°. In the recent one, the extremes were 58° and 24°; and the mean 41·87835°: the extremes occurred in November in both instances. Out of 92 days comprising the quarter lately expired, the wind blew from the westward on 72 days; but, in the brumal quarter of 1827-28, only on 60.

It is curious to observe, that the greatest quantity of rain fell when the extreme of cold was experienced in the month of November; and it is only by the record of observations like these, that the meteorologist can hope to promote a science (of the greatest importance to mankind) as yet in its infancy; and possessing but few of the charms which captivate and allure the student in other sciences, cheer him in his course, and reward his toils.

Art. VIII. *Short Communications.*

The Fox and the Dog have been known to feed upon Fish.— That foxes feed on fish is, I believe, a fact hitherto unknown to naturalists; at least, speaking for myself, during a life of many years devoted to the study of natural history, I have never heard of it. That it was not impossible, however, I should never have doubted, from a curious corroboration of its possibility, which happened more than once under my own observation. I occasionally took out with me in a boat, when fishing, a small terrier of the Scotch breed. One day, having caught three or four dace, after some minutes I turned round to examine them, when, lo! they had disappeared; and I could in no way discover the cause. Shortly I caught another, and threw it down, when, to my great surprise, the dog quietly took it up, and (after very composedly craunching its bones) swallowed it with apparent satisfaction, and then looked up with a hungry eye, as if to request a farther supply. As far as I can recollect, the dog ate about half a dozen before any symptoms of "hold, enough," were manifested.

Now for the fox; whose case, though it depends upon circumstantial rather than positive evidence, I have no hesitation in believing to be perfectly true. In the course of last autumn, I believe, in October or November, a gentleman's keeper in my parish, in passing a pond very early, after a moonlight night, found upon the bank the remains of a pike which had weighed about 5 lbs. The flesh was consumed, with the exception of what adhered to the head and tail. The fish he was well acquainted with, having often noticed it before, and during the preceding summer had as often, in vain, endeavoured to take it by night lines, &c. Of course, his first thought was, "how got it there, so strangely out of its element?" A poacher would certainly not have left it. Fishing eagles had never been seen or heard of in this part of the country; and otters had long been an extinct race in the neighbourhood. But, on closely examining the mud and soil, he soon discovered a clue to solve the mystery; the adjacent parts being padded with footmarks, which his long and practical experience convinced him were those of a fox. It is probable, too, that, like himself, the fox had long had an eye to this well-fed pike, as it then occurred to him, that he had often before seen similar footmarks about the pit side banks. To have witnessed the capture would have been an interesting scene indeed. It is most likely that the wily animal, on examining the water, discovered the pike near the surface, prowling about for food, and, availing himself of its approach-

ing within reach, pounced upon his prey, and succeeded in grasping it with his teeth; this, however, he could not have done without considerable tact and difficulty, as the floundering resistance of a five-pounds'-weight pike must have lasted some time, and been very powerful. — *E. S., F. L. S.* [For notes on other habits of the fox, see p. 134.]

Birds.—*The small dark brown Thrush notified by W. L.* (p. 144., *and previously*); *with some Remarks on the British Thrushes.* — "It is much to be wished," as the Rev. W. T. Bree has observed (p. 75.), "that W. L. had procured a specimen of his thrush, in order to put the point beyond dispute;" for, until this is done, it seems somewhat premature to pronounce it a distinct species. The common song thrush varies in size very considerably, and in the number of black spots upon the breast. Of two males now before me, both in tolerably good condition, one weighs 2½ oz., and the other but 2 oz. The former of these has remarkably few black spots on the under parts; whereas, some that I have seen have been so thickly studded that the ear-coverts have appeared wholly black. Lewin and others have even described, as a distinct species, what they call "the heath thrush;" which now is, I believe, universally admitted to be merely a small variety of the *Túrdus mùsicus*. I must be pardoned, therefore, for still entertaining doubts as to W. L.'s thrush being an undescribed species; first, because I know that the common song thrush (to which it seems so closely to approximate) varies in size very much; secondly, because the song thrush may often be observed upon the wildest heaths, and, in such situations, is generally small; and, thirdly, because so common a bird as that of W. L. appears to be, if really distinct, could not well have escaped the ken of the many experienced practical naturalists who have visited the parts it inhabits, seemingly so plentifully. However, I hope that W. L. will soon succeed in obtaining some specimens of his thrush, that he will actually compare it with the song thrush, and favour Mr. Loudon's readers with a minute description of its characters, that the matter may at once be satisfactorily set at rest, without farther cavil.

That the first notice of it (VI. 218.) referred merely to the redwing, was the opinion of many persons besides myself (VI. 516.), and was strengthened by the fact of no allusion having been made to this species; although its manners, as observed in the south of England, were pretty accurately portrayed: and which bird it further seemed to resemble in size. The redwing, it may be remarked, resembles much more the song thrush, in colour and general appearance, than it does the

fieldfare (as stated in VII. 144.); and it would be often mistaken for the song thrush (which sometimes associates in flocks), and *vice versâ*, were it not for its frequently repeated alarm cry (resembling *powk*), and the characteristic large pale streak over the eye, similar to that — not of the stonechat, as stated at p. 145., but — of the whinchat.

In reply to Mr. Salmon (p. 175.), I can state, upon good authority, that both the redwing and the fieldfare have been repeatedly seen, throughout the summer, in a wood called the Wood of Logie, upon the estate of Sir John Forbes, at Fintry, in Aberdeenshire; but I am sorry, still, to be unable to furnish any description of their nidification. My informant, an experienced observer, is quite positive with regard to the species; but has never searched for their nests, not being aware, at the time, that they were so little known. He has heard the fieldfare sing, and as described by Dr. Booker. (p. 151.) I may remark here, in corroboration of Mr. Salmon's observation (p. 175.), that a flock of about forty missel thrushes, which frequented this neighbourhood about the latter end of last August, were very generally mistaken for fieldfares; although the great difference in their notes rendered them easily distinguishable. That these were about to migrate, I have hardly a doubt; though a few solitary missel thrushes have been singing about this place all the winter.

The flocks of redwings and fieldfares in these parts sometimes associate, and, occasionally, a few song thrushes may be observed among them; but they more frequently keep separate, the fieldfares remaining mostly in small parties of five or six (probably families); three or four of which sometimes unite, but often separate again: in this, as in other respects, closely resembling the missel thrush, which, in winter, is generally seen in small flocks of five or six. The fieldfare farther resembles the missel thrush, in feeding more upon berries than the redwing and mavis; which latter birds, especially the mavis, appear to prefer snails to any other kind of food; knocking off their shells in a very expert manner, and gulping them down whole. The blackbird is very partial to snails; but neither it nor the missel thrush (which latter is, however, rather indifferent to them) understand how to shell them like the redwing and song thrush; but (at least in confinement, if the shell is not broken beforehand) generally make a sad bungle, besmearing themselves all over with slime. Instead of commencing operations by knocking off the shell, they try to pull the snail out of it; which, of course, they find

to be a very awkward matter. A song thrush will devour five or six snails before a blackbird can swallow one.*

Though the fieldfare remains plentiful here until late in April, I do not think it ever sings in these parts. Its usual note, *suc, suc, suc,* is all that I have ever heard from this species; and though a little singing may appear sometimes to

* [. . . . . We looked out, and saw a thrush, with its beak thrust into a snail shell, standing by a garden pot, which was sunk in the ground to its rim. The bird had ceased for a minute from its labour; and now again began *whacking* the unhappy snail against the flower-pot, in order to break the shell; which, with the greater portion of its inhabitant, hung dangling from his beak. The exertions of the thrush were surprising; his whole body shook with the vigour with which he carried on the assault and battery; and it soon enabled him to draw forth another shred of the snail: this he ate, and again returned to the attack, beating it for at least a dozen times, when more of the mangled wretch was dragged out, and despatched. The next essay of the bird did not appear to please him; for he left the garden pot, and carried his prey to a sharp stone, against which he recommenced beating it. The stone was, perhaps, loose, and did not afford the required resistance: instinct, therefore, (was it not reason?) induced him to return to his first resisting medium. Again, then, were we amused by the sagacity of the bird; and our sympathies excited by the sufferings of the lacerated snail, which was thus drawn out bit by bit, and ultimately devoured. — *Campanella. Berkshire.* Received Jan. 9. 1834. — All the species of *T*úrdus, or thrush, the blackbird (*T. M*érula) included, collectively destroy a great quantity (Mr. Blyth has, above, stated which of the species destroys the most) of the shelled snails. The periods in which they most destroy them are, I think, during the frosts of winter, and through July and August. In winter, after a night or two sharply frosty, with just a sprinkling of snow on the ground, it is pleasing to stroll beside hedgerows, and see the *T*úrdi starting in and out, on the face of the hedge-banks, and between the base of the stems of the hedges, in search of the snails. If you proceed slowly, a smart reiterated tapping, not loud, but obvious, is heard at uncertain intervals, as the *T*úrdi may find their prey. This they break, not wherever found, but on some stone fixed firmly with one face exposed in the bank's side, and, I think, station themselves below the stone: I have, in my own vocabulary, called such stones, chosen of the thrushes, the thrushes' chopping-blocks. These birds, through July and August, explore hedgerows, orchards, and gardens with great diligence for snails, and kill vast numbers of them. The hard texture, at this season, of paths and roadways, makes these sufficient chopping-blocks for the birds, whose havoc is shown by the many empty shells then met with in every path; for they at this time do not usually break the shell into pieces, but peck a hole through the last and larger coil. I have, to myself, sought to account for the *T*úrdi consuming more snails in July and August than at other times. Their doing it in frosty weather is clearly from necessity; but in July and August this cause might seem not to obtain. I have, however, thought it does. The face of the earth is then invested with crops of herbage, which, I have conceived, lessen rather than enlarge these birds' scope of forage; while, of fruits, the gooseberry and the cherry are past, and the autumnal fruits not ripe. The *T*úrdi will, when need prompts, eat the earthworm, when they meet with it (in part) exposed within their range. For previous mentions of the agency of thrushes in consuming snails and other molluscous animals, see in II. 151.; III. 193.; 238., and note † in the same page; VI. 218.; VII. 242.

proceed from a flock of them, it may generally be traced to a few accompanying redwings. The thrushes generally, I think, form rather an exception to the Rev. W. T. Bree's observation (p. 75.), of birds acquiring, each season, their full song by degrees. Most of the smaller kinds certainly do acquire their song gradually; but the missel thrush and the mavis sing as loudly and clearly in November as in March; and the deep-toned voice of the blackbird is as rich and as full when he first bursts forth into melody, in early spring, as in April, when the practice of many weeks should have matured his vocal powers. From analogy with these, therefore, I am inclined to question whether the redwing's voice improves from the time it first begins to sing; for it is the same in May as in January. A day or two ago, I think, I heard one in its full perfection; it did not see me; and was alone, away from its companions, and piping forth with the utmost glee and spirit. Its notes were low and soft, some of them very sweet; and it now and then introduced a few that were loud and pleasing: but, altogether, its song by no means equalled that of the mavis. The redwing, in short, is not a bird worth confining for the mere sake of its music. — *E. Blyth. Tooting, Surrey, March* 26. 1834.

The Solitary Thrush, or Brown Starling (IV. 213.)— I have twice shot this species in the neighbourhood of London; and, until I had read Rennie's description, in Montagu's *Dict.*, p. 56., did not know of what species the birds were. — *O. Clapton, March*, 1834.

The Rook. (148.) — Will the idea (in 243. note *), that the soil's being covered up, in summer and autumn, with ground crops, prevents access to it for ground grubs and insects, account for the rook's then feeding on grain, nuts, fruits, &c. (whence the epithet frugilegus has been applied to it)? Some will rather refer the latter habit of rooks to their sympathy in the sentiment, "nos numerus sumus, et fruges consumere nati;" and I, for one, think that the rooks do quite rightly in acting on it. Mr. Saul of Lancaster has just informed Mr. Loudon that the Rev. Mr. Ridley had found that the husk of grain taken by the rook is separated, in the rook's stomach, from the grain itself, and is afterwards discharged from the mouth of the rook in masses of the size of a pigeon's egg. Mr. Saul has sent a specimen. The husks appear those of oats. — *J. D.*

A Second Brood of Waterhens adopted and catered for by the Individuals of the First Brood. [From a letter to the Rev. W.T. Bree, by J. M. Boultbee, Esq.; dated Kineton, Aug. 20. 1833.] — At the bottom of the walk between the house and

our garden in winter runs a brook, but in summer there is only still water, which is inhabited by waterhens, &c. The waterhens have become quite tame, from persons constantly passing and repassing. This year, in the spring, a pair of them hatched some young ones; and, as soon as they were feathered, made another nest, and hatched some more. The young ones of the second hatch left the old birds, and have been adopted by the young ones of the first hatch, who have each taken one, and seem to take as much care of them as the old ones could have done: they feed them, and never leave them. Only one young one has remained with the old hen.— *J. M. B.*

[Facts on other points in the history of the waterhen may be found in IV. 517. 519., V. 381. 601. 730., VII. 73.; and in the *Field Naturalist*, i. 499.]

A Male Redstart has aided in sustaining and protecting the Offspring of another Pair of Redstarts. — I discovered the nest of a pair of redstarts (Sylvia *Phœnicùrus*), called here fire-tails, in a hole in a wall in my garden, from the male bird's constantly sitting on a particular tree near the place where the nest was, and from his continually uttering his plaintive and garrulous note while any object to excite alarm was in sight. I mention this, because, from his attention to his mate, I was particularly interested in the pair, and watched them with great care. In about two or three days after I had discovered them (the hen was then sitting), the male bird, while on his usual station, was, to my great grief, killed by a stone which his familiarity had tempted an idle boy to throw. I saw him killed myself. On my going by the place the next day, I was excessively surprised to see a male redstart sitting on the very same tree from which, the day before, the other had been knocked down. On my going near the nest, it flew away with evident tokens of alarm; and on my putting my hand to the nest, the hen bird flew off. All I need say in addition is, that the eggs were hatched, and the foster-father (for such he certainly was) assisted, as the cock birds usually do, the hen in bringing up the young brood. The circumstance has puzzled me extremely, both then and since. How could the redstart be possibly acquainted that the hen was without a mate? She could not have been off the nest long; for, if the eggs had once got cold, they could never have been hatched; and the redstart is a solitary bird, and by no means common here. — *Subrusticus.*

The Origin of the Songs of Birds. — A person known to me put some goldfinches' eggs under a canary; and although the young goldfinches hatched by the canary from these eggs learned the song of the canary, yet they by no means lost their own innate note: their song was, consequently, a mix-

ture of the two. —*A. Clifford. Near Stamford.* [See III. 145. 447., IV. 420.]

Saurian? Reptiles. — *Recent Appearance of the Great American Sea Serpent.* — In the last edition of my *Introduction to Geology*, chap. xvi. p. 312., I stated an opinion that the great sea serpent, which had been frequently seen near the coast in the United States of America, might probably belong to some species of saurian animal of a genus analogous to the fossil ichthyosaurus; and that the description of it as having paddles like those of a turtle, and immense jaws like those of the crocodile, agreed rather with that of a saurian animal than a serpent. The body was said, by some who had seen it, to be of great length, and equal in bulk to a large water cask. In a note to the American reprint, just published, of that edition of my *Introduction to Geology*, Professor Silliman states that "Dr. Jacob Baglew of Boston has published a collection of documents on the subject of the sea serpent, which presents a mass of evidence sufficient to establish any fact that can be established by human testimony. See his account in the *American Journal of Science*, vol. ii. p. 147—164. Almost every year since has added to the amount of evidence; and *the present year*, 1833, *has been particularly fruitful in such testimony*." He adds, "Attempts to capture or kill these extraordinary animals have proved hitherto abortive; but, in some more fortunate conjuncture, our eastern seamen, proverbial for their intrepidity and dexterity in hunting the whale, *will* yet bring in the sea serpent or animal, whatever it may be, that has borne that name. Mr. Bakewell's ingenious conjecture, that it may be a saurian, agrees, however, much better with the supposition that it is a plesiosaurus than an ichthyosaurus, as the short neck of the latter does not correspond with the ordinary appearance of the sea serpent. — *B. Silliman.*" Believing that this farther confirmation of the present existence of the sea serpent may be interesting, I communicate it. — *R. Bakewell. Hampstead, April*, 1834.

Insects. — *Extreme Cold does not destroy the Life in Insects' Eggs; and some Facts on the early Appearance in Switzerland, during the cold Weather of early Springs, of Gonépteryx rhámni, Vanéssa urticæ and V. Io, and Amphídasis pilosària.* — Kirby and Spence, in their *Intr.*, vol. ii. p. 446., and Professor Rennie, in *Insect Transformations*, p. 95., speaks of the little effect produced on the eggs of insects by intense cold; and the winter of 1829 afforded full evidence of the fact. During the night of the 2d of February, 1830, the index of my self-registering thermometer fell to 18° Reaumur, or $8\frac{1}{2}$° below zero of Fahr.; at eight o'clock in the morning

of the 3d it was still 16° Reaum., or 4° Fahr.; and at the same hour several thermometers in the neighbourhood of Berne marked 24° Reaum., or 22° Fahr. The succeeding summer was as productive as usual of insects; not only of those which are hatched from the egg, but also of those which hibernate in the pupa state. I have, however, remarked a singular fact, namely, that, during the year 1832, a sharp look-out only enabled me to find one, and that a feeble individual, of *M*elolóntha vulgàris, usually very abundant, and having a marked inclination for a particular plum tree in my orchard; a vigilant search failed to procure me a single *L*ucànus *C*érvus. A neighbour and myself, aided by a troop of young foragers, were not able to obtain more than seven full-grown larvæ of *C*óssus lignipérda; and Cetònia auràta, and some other species which pass three years in the larva state, were, although not quite so deficient as the *M*elolóntha vulgàris, the *L*ucànus *C*érvus, and the *C*óssus lignipérda, decidedly far less numerous than usual. Are we to conclude from this, that, although intense cold fails to destroy the eggs, full-grown larvæ, or pupæ, it is fatal to the young larvæ of such species as pass three winters in their first state of existence?

I should be glad to know whether this circumstance has been noticed elsewhere: but the observations, to be conclusive, must have been made in a district which was exposed during some time to a temperature not higher than zero of Fahr., as our experience of our ordinary winters proves that a degree of cold occasionally only equal to zero is but little fatal to the insect world. On the 25th of February, 1830, Fahrenheit's thermometer being at 60°, Vanéss*a* urticæ and Gonépteryx rhámni were on the wing; having, I presume, safely passed the winter term in the pupa state. Writers on entomology generally speak of these early visiters as unimpregnated females, which, having issued from the chrysalis in autumn, after the disappearance of the males, have lived through the winter in the perfect state; and the circumstance is adduced as a wonderful instance of an extraordinary prolongation of life, granted, by an omnipotent and beneficent Providence, to individuals produced at a season when the purpose for which that life was bestowed could not be accomplished in its accustomed period. I by no means call in question the correctness of this opinion *in its general application*, not having particularly noticed the subject, except during the last few years; and I consider that observations made in one place, or in one climate, are insufficient either to establish or refute a general fact. In most parts of Switzerland the rule certainly does not apply: and I would caution young entomologists

not to assume as a matter of course, and without examination, that the first butterflies they see in spring have hibernated in the perfect state. Here, notwithstanding the rigour of our winters, a sudden elevation of temperature usually brings out Vanéss*a* urtìcæ and Gonépteryx rhámni from the 10th to the 15th of February, which seems to be much earlier than their customary first appearance in England. During some years I have invariably noticed the first of both the above species on the same day; and on the 11th of February last [1833], after a week of warm weather, the thermometer being at 54°, many dozens of each kind were on the wing: I was struck with the freshness of their colours, and as V. urtìcæ will allow you to approach pretty close while it is fanning its wings as it basks in the sunshine on some rounded pebble, I marked down several, and satisfied myself that they were as bright and unsullied as when reared in the breeding cage; none appeared torn, or in any way injured. Their independent manner of flight, and bearing towards each other, seemed to indicate that there was no admixture of the two sexes, and I should imagine, from their appearance, that they were mostly or entirely males, but, not being prepared with a net, I was not able to capture any for close inspection. With respect to Gonépteryx rhámni there can be no difficulty; the difference of colour in the two sexes being so great that a male must be most wofully weatherbeaten to be mistaken at any distance for a female. In our neighbourhood is a place which swarms with this species, and in summer the females greatly exceed the males, probably from their congregating for the purpose of laying their eggs. I frequently visit this spot in the early spring; and can safely assert that neither there, nor on the sunny slopes at the edges of our forests, have I ever seen a single female among many hundreds of males which have been on the wing as early as February. I have caught numbers expressly to examine their condition; and, having always found them peculiarly bright and perfect, I am compelled to draw the conclusion that, in this climate at least, the early flight of Gonépteryx rhámni consists entirely of newly excluded males, and that probably the same is the case with Vanéss*a* urtìcæ. Usually after a fortnight or three weeks of almost summer weather in February, a blustering north-easter brings a return of sleet, snow, and frost in March, and it has always been after these have passed that I have seen the first female butterflies. The first female Gonépteryx I have seen this year was a solitary individual, on the 29th of March.

Two circumstances occurred this year confirmatory of the above opinion. On the evening of the 10th of February

a stranger tapped at my window for admittance, which was instantly granted: he proved to be a male Amphídasis pilosària *Fr.* whose perfect condition left no doubt of his having burst from his chrysalis since the morning. It is true his near affinity to Hibérnia and other brumal phalænas might induce us to look for him in cold weather; but Duponchel assigns March and April for the period of his appearance in the climate of Paris, certainly not earlier than Gonépteryx and Vanéssa are admitted to quit their pupæ. The second case was the exclusion of a male Vanéssa Ío on the 23d February, from a chrysalis which had undergone its transformation in a loft on my premises, and which had been left completely undisturbed and untouched, to proceed in its regular course.

In Vol. III. p. 243., Mr. Bree speaks of the 18th March as the earliest date at which he ever knew a *P*apílio issue from the chrysalis, [for dates of early appearances, though not from the chrysalis, see V. 595., VI. 88. 176.]; and I attribute their precocity in Switzerland to the increased excitability which seems to be the common result of severe and long-continued cold, occasioning the almost magic transition from "thick-ribbed ice" to verdure and flowers, which is represented to take place in Lapland, Russia, and America. Every writer on Switzerland has noticed

The Proximity of the Alpine Flowers to the eternal Snows and Glaciers; and as the snow next to the ground most usually melts the first, at least when the bed is of considerable thickness, it is not rare to see some of the hardiest and earliest blowing plants in full bloom, under a projecting canopy of frozen snow which constantly drenches them with an icy shower. The most beautiful effect I remember to have seen, was upon the Faulhorn, in the month of July, 1824. Between the spot where visiters who ascend on horseback quit their saddles, and the foot of the highest slope, was a bed of snow of about a quarter of an acre, quite hard, but not more than half a foot thick; a few days before my visit, a horse had crossed this bed, and on each spot where he had stepped, the snow had disappeared, leaving a succession of circles about 6 in. in diameter, which were literally filled with flowers of all hues, but scarcely one reaching to the level of the surface of the surrounding snow. — *J. P. Brown. Thun, Switzerland, April* 5. 1833.

Had not some of these been in flower actually under, and while covered by, the snow? Mr. Dennis, nurseryman, Chelsea, has found that the species of Prímula, of *C*yclamen, of *O*rchídeæ, of Pelargònium of the Cicònium or horse-shoe group, and a yellow-corollaed Pinguícula from the United

States, produce their corollas, and those of, or nearly of, the colours respectively proper to each species, in an obscured condition of light almost equal in obscurity to that of a covering of snow. It is notable that the flowers and herbage of each of the plants indicated above turn black in the course of being dried for specimens. — *J. D.*

The Vitality of the Eggs of some Species of Insect is very persistent. — Some years since, I had in my bedroom a glazed case containing two stuffed blackbirds. To my knowledge, it had been in the house twenty-three years, and at least half that time in my room. I often used to examine the case, as thinking it curious that the birds should remain so long in a state so perfect as that they were in. One morning, as I was rising, I was much surprised to see the case full of innumerable small winged insects, all come to life, as it were, at the same moment. I again examined the case, and nothing seemed to indicate the least decay in any one part of it. The thought that the vitality of these eggs had remained so long preserved is an almost incredible one. The whole plumage of the two birds fell off at the time of the appearance of the insects. — *H. B. Blois, Nov.* 16. 1833.

Coleopterous Insects. — *Certain Localities of the Glowworm* (*Lampỳris noctilùca* L.) (*fig.* 44.), *and the Conditions of them.* (I. 155. 299., V. 368. 764.) — In reference to the remarks on the "Luminous Appearance on the Ears of a Horse" (V. 764.), I have merely to observe that I can hardly think the glowworm has ever been found in the lowland districts of Somersetshire; at least, I have never found it there. This I know, that, some years ago I brought a small live colony of glowworms, I forget the number, from West Harptree, in the neighbourhood of Mendip, where they abound, and deposited them in my garden at Huntspill; but I could never see one of them afterwards. I conclude, therefore, that the climate, or soil, or both, did not agree with them, and that they perished. I may just add that I have seen the glowworm in great splendour at Redbrook, near Monmouth, on the banks of the Wye. — *James Jennings.* 14. *Goswell Road, Nov.* 12. 1832.

44

Lampỳris noctilùca: *a*, female; *b*, male.

In the villages north of Cambridge, to the extent of six

miles from the town, and just within which distance the fens of the county may be said to begin, I have never seen a *Lampỳris noctilùca*, or heard of one's being seen. "The glowworm" of these parts is the *Scolopéndra eléctrica*, which is by no means rare there. I have, however, been told that the *Lampỳris* does occur at Cherryhinton, a village in which chalk abounds, situate three miles south by east of Cambridge. In Suffolk, a county in which land in general is high and dry, and chalk comparatively abundant, the *Lampỳris* is not unfrequently met with. It occurs in the villages of Whepstead, Horningsheath (pronounced Horringer), Hawstead, and Nowton, all near Bury St. Edmunds. The Rev. H. Hasted, of this town, ònce remarked to me, that, on travelling by coach at night, he observed, a little past Newark, clusters of the *Lampỳris* beside the road; and he also expressed to me his opinion that it is an insect confined to, or at least most prevalent on, chalky soils. — *J. D.*

The Glowworm is plentiful in many Parts of the Kingdom. — They affect damp woods and hedgerows. The females exhibit their light most in showery weather, and are by no means a pleasant spark to the farmer, whose hay is lying on the field. They are seen most frequently from midsummer to the end of August. Their light is "the torch of Hymen;" for the winged males fly to any other luminous body; to the lantern of the benighted traveller; or to a lighted candle, if a window happens to be open, as is often the case in warm summer evenings. I have caught half a dozen at a time of these "gay Lotharios" from off the supper table, and turned them adrift to seek their "flames" farther afield. The males have lamps also, but very faint even in the dark: of course they are invisible during their flight in the open air [Albert seems of a different opinion, see V. 764.]. When the nymph is in full glory, she has the power of dimming her lamps, if disturbed by an unwelcome visitor, but can soon rekindle them when her fears are over. This I have often proved in passing and repassing a marked individual. These insects hide themselves by day; as then their enemies (some of the warblers, it is supposed) are on the alert. — *J. Main. Dec.* 24. 1833.

What is the Difference in the Appearance of the Larva and Imago of the common Glowworm (*Lampỳris noctilùca* L.)*?* — On Sept. 2. 1833, I took many glowworms, near Keswick, Cumberland, having been attracted to them by their light. The light was much paler than that seen in July. I collected them of all sizes. If the larva emits light, can it be called the torch of Hymen? — *Edward Wilson, jun. Chapel Allerton, near Leeds, April* 15. 1833.

[We believe, but are not certain, that the differences of appearance in the larva and imago of the glowworm will be found exhibited in one of Professor Rennie's volumes on insects. — Albert has, in our V. 764., supplied useful information on the conditions of the *L*ampỳris in both its sexes, and "through all its stages:" he has not, however, provided a full answer to the above question. In the *Entomologia Edinensis, Coleoptera*, a rich store of facts, delightingly told, on the structure, changes, and habits of the *L*ampỳris, is supplied, in p. 202 —207.]

The Eggs of the Glowworm (*Lampỳris noctilùca* L.) *are luminous.* — A young lady lately showed me some eggs of the glowworm (*L*ampỳris noctilùca *L.*), which emitted a pale greenish light in the dark, and continued to do so for three or four days after they had been deposited. I am not aware that this fact has been before noticed. The eggs are globular, of a pale yellow colour, and about one twentieth part of an inch in diameter. — *Hugh E. Strickland. Worcestershire, July* 21. 1833.

[Mr. Main marks from "midsummer to the end of August," for the usual period of glowworms being seen in a luminous state. Mr. Bree has seen a luminous glowworm as early as June 14. (see VI. 491.), and as late as the end of October (V. 367, 368.); Mr. Wilson has seen some (see above) as late as Sept. 2.]

Interesting Facts in relation to a Species of Beetle (*Sílpha?*) *and the* Scolopéndra eléctrica L. (II. 406., V. 368. 400.) — As I was passing through the ornamental grounds of a friend, on an evening in September, 1832, my attention was directed to a luminous appearance on one of the flower-beds. The accumulation of light seeming too great to proceed from the taper of a glowworm, or from any other insect, I approached for the purpose of examination, and I had the gratification of witnessing the following curious and beautiful exhibition: — A spot of ground, nearly a square in form, and not less than six or seven inches across, was totally suffused with luminous matter; within this spot was a beetle, which I should say, judging from its shape, was a Sílpha. This was also covered with the fiery fluid, and seemed to be bewildered by it; for its proceedings were most irregular and extraordinary. Now it traversed the illuminated space in a manner the most rapid and confused; now it suddenly stopped, and thrust its head against the soil, to rub off the matter with which it was surcharged, and again it resumed its headlong course in a series of perpetually decreasing circles. This practice was continually repeated; and, in short, the poor insect seemed so stupified that it was incapable of pursuing a rectilinear course sufficiently long to extricate itself from the enlightened area.

While the beetle was entertaining me with this singular scene, a *Scolopéndra* eléctrica, a perfect line of silvery light, was, at the same time, at the distance of three or four inches from the exterior of the illuminated spot, slowly, but gracefully, winding its way, without leaving the least mark or vestige by which its course could be discovered. The whole spectacle was most splendid; and I deem it worthy of communication, because, in my humble judgment, it serves to corroborate the suggestion of those admirable observers of nature, Messrs. Kirby and Spence, " that the luminous substance is probably given to some insects as a means of defence." In the case before us, the beetle probably attacked the *Scolopéndra*, and a severe struggle ensued, in the course of which the latter discharged the luminous fluid, and, by so doing, stupified its enemy and preserved itself. There is one circumstance equally worthy our observation and admiration. Admitting that the *Scolopéndra* is furnished with a large reservoir of luminous matter, still must that matter be of an extraordinary and surprising nature to allow of such attenuation and expansion as I have described, without suffering any diminution of splendour and refulgence. It would have been a gratification to have been able to say what became of the beetle; whether it ultimately extricated itself, or fell a victim to the powerful substance in which it was enveloped; but I was unfortunately driven from my station by a heavy fall of rain, and was destitute of all means by which an insect can be secured. — *J. S. T. April* 29. 1833.

On walking with a friend, one evening after dark, at Michaelmas time, in the village of Horningsheath, Suffolk, named above, we were attracted by a patch of brilliant light, the size of the palm of my hand, or larger, on the side of the hedgebank which skirted our path; and within the extent of this light we could perceive an insect of considerable size moving about. A glowworm (*Lampỳris*), no doubt, thought I, and secured the moving insect by putting it into my hat; and this done, we returned to a party we had left at the cottage from which we had taken our stroll. We had hoped to gratify the party with a sight of our glowworm, when, on taking off my hat before the candle, my insect proved devoid of luminousness, and, to my horror, no glowworm, but Goèrius òlens. Then, since, and now, I could and can only account for finding this wolf of insects within the broad patch of light, by supposing that it, in its evening foraging, had met with a glowworm, and that this, in its resistance of the grasp of, and struggles against, the Goèrius, had suffused the earth with the patch of light which we had seen. See also in I. 299. — *J. D.*

The Goèrius (*Staphylìnus*) *òlens, or Great Rove Beetle*, has, in some places, the complimentary title of the devil's coach-horse; and, by the children in Cambridgeshire, is called cocktail, from its habit of turning up, when irritated, its abdomen, armed at the extremity, over its body or thorax. This creature kills and devours beetles small and large, earwigs, woodlice (*Onìscus Aséllus*), earthworms, perhaps glowworms (see before), and I have known it eat of the putrid remains of the great snail of gardens (*Hèlix aspérsa*). To the earthworm the Goèrius is a dire enemy. It fixes its piercing cutting mandibles into the soft flesh of the worm, and almost buries its head within it, and becomes too fastly fixed for all the writhing and contortions of the worm to produce the effect of dislodging it. In the course of gardening practice, I have seen several earthworms under this painful infliction from individuals of the Goèrius. The instance of its eating of the putrid remains of a garden snail, I witnessed on July 8. 1829. My memorandum says, "this might be because that, in consequence of the heat now, no dewworms occur near the earth's surface." On October 16. 1831, I met with a G. òlens, accompanied by the following circumstances: — it lay dead in a bye footpath; it had been partially crushed, and had in its mandibles a dead earwig, while the earwig had within its forceps a tarsus of, and off the left fore leg of, the Goèrius. Near the Goèrius lay a pearly egg, about two tenths of an inch long, and more than one tenth of an inch in diameter. The shell of the egg was of the consistence of parchment, and the yolk it enclosed was viscous and of a yellowish white colour. This, doubtless, was the egg of the Goèrius which the same passing foot that had partially crushed its body, and thus destroyed the destroyer, had, perhaps, prematurely forced out of it. I dissected the remains of the Goèrius, but did not perceive another egg, or the rudiments of one, within them.

In Kirby and Spence's *Introd.* ed. 1818, vol. ii. p. 237., *S*taphylìnus (Goèrius) òlens *F.* and the Forfícula gigantèa *F.* are mentioned as insects which brandish their armed abdomens as a "means of defence." It may be right to add to these the common earwig (Forfícula auriculària), which, in a moment, if molested about the head, endeavours to punish the molester with the forceps at its tail: so also, doubtless, the F. mìnor (on whose flight I have recorded a fact in IV. p. 436.) In Kirby and Spence's *Introd.*, ed. 1818, vol. iii. p. 33., *S*taphylìnus òlens is set down at one twelfth of an inch in length: is not this a misprint for $1\frac{1}{12}$ in.? — *J. D.*

The Wasp Beetle (*Clỳtus Arìetis*), *when impaled, produces an*

obvious Noise, and in the following Manner.— Upon my piercing a specimen of this insect, through the elytron with a pin, I was surprised to hear it emit a very curious noise, of which I will endeavour to convey an idea; for although I observe that this fact has been noticed in another quarter, yet the description there given is, in my opinion, too vague to allow a reader to form any notion of it. The noise is more like barking than any other noise to which I can compare it; the voice, if I may be allowed that term, being acute and distinct, yet not audible at a great distance. It is not heard except when the insect moves its head and thorax up and down, and it appears to be caused by the latter rubbing against the juncture which exists between that part and the elytra and abdomen. If the insect be held by the body, or the finger be pressed upon its elytra, so as to detain it underneath, the noise is immediately produced in its endeavours to release itself. Whether it produces this noise when at liberty, I know not, having never seen but this one specimen. I may remark that it is a considerable time in dying upon the pin; my specimen, although impaled and exposed to strong spirits of ammonia, survived this treatment four days. — *James Fennell. Paddington, Aug.* 1833.

[Three individuals of C. *Arietis* have been known to occupy three years in attaining maturity: this after they had in one of their earlier stages, probably in that of the egg state, been subjected to the action of a very high temperature. See the *Entomological Magazine*, vol. ii. p. 114.]

Notes on some Species of Insects which consume Pulse, Grain, Biscuits, &c. — I remember that the beans, and, I believe, other corn, of the Cambridgeshire farmers, when thrashed, dressed, and laid by, used to be, in the days of my boyhood (and, doubtless, is still), infested with a small insect, which my fellow boys used to call a *mule* or *wule*. Perhaps this is but a corruption of the word weevil; but, if my recollection is accurate, the insect itself, which was very common, and very abundant, was one of the *Ptinidæ*, not of the *Curculionidæ*. — *J. D.*

In relation to this remark, which was written anterior to Christmas time, 1832, I then sought for specimens of the expected ptinideous insects among some few old peas and old beans, which had lain by for two years or so at my father's (Waterbeach, Cambridgeshire); and, although some of the peas were strung together, and some of the beans also, by the matted webs and excrement of insects that had gnawed them, I could then find but very few larvæ, and only one perfect and live insect, an elegant curculionideous one, whose presence there, my prejudice inclined me to suppose, might be accidental.

On returning, I submitted the insect and the amount of my notion, to Mr. Westwood, who was so kind as to reply as follows.

March, 1833. Respecting your impression that the Cambridge mules, or wules, which attack the dried peas and beans, are not curculionideous, but rather ptinideous, I can give you no information from direct observation. The insect which you have enclosed found alive at Christmas, among the peas, is certainly the corn weevil, *C*urcùlio (*Calándra*) granària. For my own part, I think its occurrence in this situation, at that period, and in company with larvæ, was not accidental; because insects of this kind are found in the larva, pupa, and imago state, at the same time. The date of your capturing the specimen of the weevil, therefore, affords no clue to the decision of the question; for these kinds of indoor insects seem to take but little notice of the seasons. Moreover, the *Calándra* does not confine itself to the wheat in an undressed state; since your valued correspondent, C. A. Babington, Esq., has kindly supplied me with specimens of the insect which were found in the decayed floors, and under heaps of malt, in a malt-house in Cambridge, the grains of which they devoured. In company with this insect were also found in profusion the following beetles:—Trogosìta *c*arabòides, Cucùjus monilicórnis, Alphitóphagus quadripustulàtus, and Tenèbrio molìtor. The ship biscuit is also equally attacked by the *Calándra*; and Sparrmann (vol. i. p. 103., quoted by Kirby and Spence, vol. i. p. 228.) mentions that it infests *ground peas* used on board of ship. Thus the chances are that the occurrence of your single specimen of *Calándra* among the peas was not accidental. On the other hand, it is by no means improbable that your supposition that one of the *P*tínidæ, belonging to the genus Anòbium, may, by the Cambridge farmers, be termed the weevil or mule, or wule; and, in fact, that the larvæ which you found were those of a species of Anòbium, the term weevil being employed (as it appears to me) in a generic sense to designate any insect found feeding upon grain, in the manner of the *Calándra*, without reference to its possession or want of a rostrum [by the possession of which the *C*urculiónidæ are characterised]. Hence the term weevil would be at once applied to an Anòbium, or any one, or all, of the other insects found by Mr. Babington, if it, or they, were caught preying upon grain: and it happens that an insect decribed by Linnæus under the name of *D*erméstes paníceus is stated by Sparrmann to attack the biscuit and ground peas, in conjunction with the true weevil (*Calándra* granària). This insect Messrs. Kirby and Spence consider to belong to the genus Cryptóphagus, from having observed that a beetle of that genus (thus making a farther

addition to the number of misnamed weevils) often swarmed in the ship biscuit. Gyllenhall, Fabricius, &c., followed by our recent English entomologists, consider, however, the *D*erméstes paníceus to be an Anòbium; and the observations of Mr. Stephens upon the habits of the Anòbium paníceum seem to prove the correctness of such opinion. This author, in his invaluable descriptions of British insects, states that its larva "feeds upon farinaceous substances, and is particularly attached to old bread and wafers, the latter of which it fastens together in masses of three or four, within which it undergoes its metamorphosis, the insect appearing in plenty in June: it will also attack neglected collections of insects." (*Illustr. Coleoptera*, vol. iii. p. 341.) This, however, is the only species of Anòbium which is recorded as being attached to such substances. — *J. O. Westwood. March*, 1833.

On April 16. 1833, I obtained (at my father's), from among peas and beans, a larva, on which Mr. Westwood, on my sending it to him, favoured me with the following remarks, on

May 22. In addition to what I have stated respecting the various insects which attack grain and pulse, and which thence appear to have received, in common, the name of weevils or wules, or mules, it may be stated of the dried peas or beans of which you have recently forwarded me a small boxful, that they were infested by a small grub which eats through and attaches together, by silken ties, several of them, filling up the interstices of the web with its own excrement, so as to form a gallery, from which it occasionally protrudes its head, somewhat like the grubs of the caddis flies (Phrygàneæ). It is evidently the larva of the little moth, *T*ínea granélla, which appears to have occasioned much alarm on the Continent. This, therefore, is another insect to which the name of wule would, in common parlance, be applicable.

The seeds of other leguminous plants, or, as they are commonly termed, pulse, are subject, in different parts of the world, to the attacks of other insect depredators, especially the various species of *Br*ùchus, numerous instances of which are recorded by Messrs. Kirby and Spence, vol. i. p. 178. 3d edit. [p. 175. of the 4th edit.]. Another instance has recently occurred of the depredation committed by another species of this genus. Dr. Hamilton of Plymouth having recently transmitted to Mr. Loudon seeds of the Cæsalpín*ia C*oriària, or dividivi, "the legumes of which are so valuable as a substitute both for oak bark and galls, some of the seeds contained the insect caught *flagrante delicto*" [in the very act of eating them]. These seeds are about a quarter of an inch in length, and of an oval flattened form, like small beans; and in the in-

jured specimens, on the upper side, at one end, is a circular aperture, sufficiently large to show that the interior of the seed has been entirely eaten, and the space is occupied by a small beetle, which, upon extraction, proves to be a species of *B*rùchus (somewhat smaller than the common *B*rùchus granàrius which infests our peas), with the wing cases of a dark reddish brown colour, with several dull greyish lines along the upper surface. Its history is doubtless similar to that of the common pea *B*rùchus, the female of which deposits her eggs in the seed, whilst the pod is in a comparatively small and young state. When hatched, the grub feeds upon the seed in which it was deposited, and which is amply sufficient for its nourishment. There seems, however, to be this difference in the economy of the two species: *B*rùchus granàrius leaves the pea, and eats through the pod, whilst in the larva state, so as to undergo its transformations in the earth; whilst it would seem that the *B*rùchus of the seeds of the Cæsalpín*ia C*oriària passes its pupa state in the seed, in the inside of which it assumes the perfect state. Dr. Hamilton adds, "I have frequently received the insects in a living state, when seeds of the Cæsalpín*ia C*oriària have arrived from Carthagena in July and August. In these cases, on the parcels being opened, they have expanded their little wings, and flown about in all directions." — *J. O. Westwood. May* 22. 1833.

M*elolóntha fúllo.* — A most perfect specimen of this rare insect was taken, some time last summer, at Sandwich, Kent, and is now in the cabinet of Miss Harvey of Upper Deal. — *W. T. Bree. Allesley Rectory, Oct.* 11. 1833.

Hemipterous Insects. — *Notonéctæ, the Boatflies.*—These are very curious insects. In August last, I caught three in a small piece of water in my garden; two of which turned out to be the N. furcàta, and the other N. glaúca; and, having put them in a large tumbler of water, I kept them for several weeks. These individuals were about three quarters of an inch long, having six legs (or, more properly speaking, four legs, and two other appendages), which they use as oars; much longer than the others, three-jointed, and fringed with hairs. The eyes are large and prominent. On each side of the abdomen are tufts of hair. The elytra, or wing-cases, are hard; and, on removing this covering, the wings are found beautifully folded up. Although the water appears to be their natural element, yet they are able to live a long time out of it, as I had an opportunity of experiencing. One of my specimens I discovered one morning lying motionless on the water, to all appearance dead. I took it up, and put it in a box, intending to dissect it the first convenient opportunity.

The following day, I was about to commence my operations, and was not a little surprised to find it alive; and, on restoring it to the water, it swam away as merrily as ever: it having, like spiders and many other insects, feigned death. Their position in the water is on the back [*nōtos*, the back; *nēktēs*, a swimmer]; and, by means of their oars, they cut along and through the water with surprising rapidity. By occasionally changing the water, and always keeping the fragment of a leaf (a water-lily leaf is the best, because it is porous and will float) on the surface, they may be kept for a long time in this confinement. They usually keep by the edge of the leaf; and, whenever a fly or any other small insect falls or is thrown on the water, one or other of them will seize it in an instant; clasping it with its legs, and sucking its juices through the proboscis, which, when not feeding, lies along the thorax. Though not so voracious as the large water beetle (*Dytíscus marginàlis*), which, as Mr. Knapp says, "riots the Polyphemus of the pool," they are bold and greedy, and will attack both spiders and earwigs, and devour several of them in quick succession. The oars (if they may be so called) of this insect are admirably adapted to its mode of life while in the water; but, when they have occasion to change the element, they apparently are greatly embarrassed with them from their length, which causes them to walk in an awkward and ridiculous manner; and their progress is, consequently, slow and laboured. Where and when they deposit their eggs, or how long they remain in their larva state, I have not been able to observe, nor to find recorded, anywhere. The only mention of the insect that I can find in Mr. Rennie's three volumes on insects, in the *Library of Entertaining Knowledge*, is the brief one in *Insect Miscellanies*, p. 187. (erroneously referred to in the index as "p. 178."): — "Ray tells us that his friend Willughby had suffered severe temporary pain, in the same way [that is, from the sting], from a water bug (Notonécta glaúca *Lin.*). — *Hist. Insect.*, p. 58." As Ray's entire description is very short, and admirably accurate, I beg to give it: — "Unciæ $\frac{5}{8}$ longa est; elytra fusca sunt; scapulæ virescunt; posterius par pedum valdè longum remorum instar; antennis caret; proboscis brevis est, qua in cutem intrusâ acerrimum dolorem excitat qui tamen brevi cessat." A figure, beautifully drawn and coloured, is given in the first volume, pl. 10., of Curtis's *British Entomology*. — *O. Clapton, Feb.*, 1833.

A Notice of the Eggs of the Glaucous Boatfly (*Notonécta glaúca; and Facts on Species of* Dytíscus. — On the 26th of February, 1832, I put into a basin, filled with mixed marsh

and spring water, three specimens of *Dýticus* (or *Dytíscus*) glàber, two of *D.* minùtus, two of Notonécta glaúca, and one of N. striàta. On the 1st of March, one specimen of *D.* glàber had disappeared; and another had its head severed from its body, and a *D.* minùtus feeding on its entrails; the N. striàta was also dead. On the 3d of March, the other, *D.* glàber, had also disappeared: whether it had taken wing during the night, I cannot determine. The N. glaúca, from time to time, deposited its eggs: they are about one sixteenth of an inch in length, as thick as a pin, of a whitish yellow colour, and so heavy that they fall to the bottom of the water. — *William Gardiner, jun. Dundee, April* 6. 1833.

For a notice of the parasites to which *Dytíscus* marginàlis *L.* is subject, see Mr. Curtis's communication in p. 161. — *J. D.*

Lepidopterous Insects.—[*Of* Sphínx (*Deiléphila ?*) *nèrii.* (V. 154.) "a fine larva was taken in a lady's garden at Teignmouth, Devon, in August, 1832.... The periwinkle [*Vínca*, probably màjor, perhaps mìnor] is abundant in the garden." (*C. Blomer*, in *Ent. Mag.*, vol. ii. p. 116.) Early in September, 1833, a lady residing in Dover captured Deiléphila nèrii. "From the state of the specimen, which I have examined, it must have been very recently disclosed." (*J. F. Stephens*, in *Ent. Mag.*, vol. i. p. 525.) These two facts admirably elucidate the excellence of the arguments of W. A. B., in our V. 149—156.; and more particularly that of those touching the *S.* nèrii, in 154, 155. In V. 155., line 16., for "birdweeds," read "bindweeds;" the British species of *C*onvólvulus and of Calystègia are meant.]

Deiléphila lineàta Stephens. (V. 151.) — Of this extremely rare and beautiful moth a fine individual was captured in July, 1831, in the garden of T. Wells, Esq., of Bromley, Kent. Its sex I have not determined; but I am satisfied of the identity of the species, from a comparison of the specimen with the figure in Stephens's *Entomology*, and with a specimen in the collection of Mr. Ward of Wellclose Square. — *George Penny*, [*A.L.S. Milford Nursery, near Godalming, Surrey.*]

Còlias Hỳale. [*C. Edùsa, Vanéssa, Antìopa, and Cýnthia cárdui.* — The appearance, in more than usual abundance, of Còlias Edùsa, in particular seasons, is a fact well known to entomologists, and has often been made the subject of remark. Our other native species *, C. Hỳale, seems also to be subject to the like irregularities. This is justly esteemed a very rare insect; its principal, if not its only, habitat in this country being

* I venture to speak of the native species of the genus Còlias as being two only. C. Europòme, it is now pretty generally admitted, has been introduced into the list on more than questionable authority. C. Chry-

the sea coast of Kent and Sussex. During the last two seasons (1832 and 1833), however, it has made its appearance and has been captured, in comparative abundance, near Deal and Walmer, and in the vicinity of Dover. The following notices, which have been communicated to me by Miss Harvey of Upper Deal, a lady whose taste has made her conversant with all branches of natural history, may not be without interest to your entomological readers. Towards the end of July, or beginning of August, 1832, no less than fourteen specimens of C. Hỳale were taken near Deal, by a young entomologist, who at the time was not aware of the rarity of the insect; two others were likewise taken, by different persons, about the same time and place; and three also by Mr. Le Plastrier, in the neighbourhood of Dover: in all, nineteen specimens in the season of 1832. In the beginning of August, 1833, four specimens were taken by the above-mentioned young entomologist, near Deal, and nine by my kind informant, Miss Harvey herself, on August 19, 20, and 22.; besides three others, which were seen, but not captured: Mr. Le Plastrier also succeeded in procuring four near Dover; making twenty specimens in the summer of 1833.

The occasional, yet indeterminate, appearance of these and some other *P*apiliónidæ, especially Vanéss*a* Antìop*a** and

---

sótheme, if we may judge from the British specimens so called, appears to be scarcely distinguishable from Edùs*a*; and C. Hélic*e* is no other than a white variety of the female Edùs*a*. Thus the well-ascertained British species will be reduced to Edùs*a* and Hỳal*e*.

* "There is something very extraordinary in the periodical but irregular appearances of this species (Antìop*a*), Edùs*a*, and cárdui. They are plentiful all over the kingdom in some years, after which, Antìop*a*, in particular, cannot be seen by any one for eight or ten or more years, and then appear again as plentiful as before. To suppose they come from the Continent is an idle conjecture, because the English specimens are easily distinguished from all others by the superior whiteness of their borders. Perhaps their eggs, in this climate, like the seeds of some vegetables, may occasionally lie dormant for several seasons, and not hatch, until some extraordinary but undiscovered coincidences awaken them into active life." [On the relation of the eggs of certain insects to seasons, see Mr. Brown in p. 246.]

My lamented friend the late Mr. Haworth, from whose work (*Lepidoptera Britannica*, p. 28.) the above remark is quoted, once suggested to me, that it might probably require two or more extraordinarily fine seasons *in succession* to produce a British Antìop*a*. The theory, however, as he afterwards candidly admitted, was not found to be borne out by experience. Many years ago, this fine insect was so plentiful in Norfolk, that, as Mr. Haworth assured me, a friend of his was able to capture it during the season, even on wet or cloudy days, as it sat in a quiescent state among the foliage of the oak, &c. About fourteen or sixteen years ago, the species made its appearance in the neighbourhood of Coomb, near Coventry, and attracted the attention even of non-entomological observers.

Cýnthi*a* cárdui, is a point which entomologists have hitherto been unable to account for. Experience shows that it does not depend on the warmth and fineness of the summer, nor on the mildness of the preceding winter; nor can it be satisfactorily attributed to any known cause. As, however, these two allied species, C. Edùs*a* and Hỳal*e*, are both subject (as already said) to similar irregularities in their appearances, it might be expected that the same circumstances (whatever they may be) which prove favourable to a copious flight of the one, should also be alike favourable to that of the other. This, however, appears not to be the case. In the year 1831, when I happened to be resident at Dover, in August and September [see V. 330.], C. Edùs*a* was to be met with in tolerable abundance; very many specimens were seen and captured; in short, it was considered (as I was informed) a more than usually good season for the insect in that neighbourhood. No specimens, however, of C. Hỳal*e* (so far as I am aware) were taken or seen in the district that year, save one in the possession of Miss Harvey, captured in the month of June. Again, the seasons of 1832 and 1133, in which so many specimens of C. Hỳal*e* were met with, did not (as I am informed) produce a corresponding abundant supply of C. Edùs*a*. Miss Harvey speaks of having seen only two examples of this insect in 1833, and of Mr. Le Plastrier having taken several between Dover and St. Margaret's in the end of September. She also mentions that Cýnthi*a* cárdui appeared at Deal in the first week of October, in greater abundance than she had seen it for five years. This insect was also plentiful about Dover in the autumn of 1831. In Warwickshire I have not seen a single specimen of C. cárdui during the present autumn.

These periodical appearances of particular insects are certainly curious. Should the above remarks attract the attention of your readers, some may, perhaps, be able to throw more light upon the subject. All that I have to offer is a bare statement of the facts.—*W. T. Bree. Allesley Rectory, October* 11. 1833.

A Profile of the Human Form is observable upon the upper Side of the Primary Wings of Còlias Edùsa, female. A Profile of Chancellor Brougham is observable on the Reverse of Hippárchia Janìra. — It is observed, in vol. i. p. 518. of the *Entomological Magazine*, "that on the reverse of Hippárchi*a* Janìr*a* may be traced a very tolerably defined profile, in some specimens no very bad likeness, of the Lord Chancellor Brougham." This is not very evident in the specimens I have examined. A much stronger resemblance of the human profile (I do not

say portrait of the chancellor) is exhibited on the upper side of the primary wings of the female of Còlias Edùsa. In some specimens, which, I need hardly observe, vary very much, the face is so conspicuous, as at once to catch the eye of the beholder on the first inspection of the insect. The black spot towards the centre of the wing forms the eye of the profile; the profile itself being yellow upon a black ground, and fronting the tip of the wing. — *W. T. Bree. Allesley Rectory, Dec.* 4. 1833.

Vanéssa urtìcæ, a singular Variety of, captured near Leicester, in June, 1833. — The ground colour of the upper wings is, as usual, red; in each wing two of the abbreviate bands of black, and the intermediate one of pale orange, coalesce into a dark blotch; and two of the smaller spots are wanting. The band on the posterior margin is less distinct than in ordinary specimens; the blue, and yellow edging entirely wanting. The inferior wings are brown, with a lighter tinge towards the base, and very indistinct markings at the edgings. The individual was captured by my brother, Mr. J. G. Glossop, and myself, in one of our entomological rambles. — *F. H. N. Glossop. Enderby, near Leicester, Nov.* 21. 1833.

A specimen of a variety of V. urtìcæ, very similar to that captured by Mr. Glossop, was exhibited at the November meeting (1833) of the Entomological Society. — *E. N. D.* [to whom we have shown Mr. Glossop's drawing.]

Notes on Pteróphori, with a Description of P. similidáctylus Curt. — I may announce the discovery of a new Pteróphorus, under the name of P. similidáctylus *Curt. Guide*, gen. 1040. 17. "Cinereous-ochre or grey; base of head and collar dark brown, superior wings partially dotted with black, deeply cleft at the apex, and falcated, the costa and inferior margin a little darker, terminating suddenly, forming at the cleft an oblique and darker line partially edged with white, cilia fuscous; inferior wings trilobed, but simple; legs white, anterior tibiæ with the inside and apex fuscous, intermediate with a bunch of fuscous scales at the middle and another at the apex, the posterior fuscous outside; the tips of the joints of the tarsi fuscous. It resembles, in size and appearance, the P. megadáctylus of Hüb.; but the falcated apex to the lower lobe of the superior wings will at once distinguish it: and the legs are spotted and very similar to those of P. trigonodáctylus *Haw.*; but it does not belong to the same section." (*Curt. MSS.*) It was first taken by Mr. Curtis at Niton, Isle of Wight, and afterwards by Mr. Cocks and myself at Braunton Burrows in Devon, where we found a fine variety of a dark lead colour, which we

thought at first to be another species. Mr. Morris and I have also found it, about the end of July, at Charmouth.

P. spilodáctylus *Curtis, Br. Ent. Pl.* — I found a larva of this moth at Blackgang Chine, Isle of Wight, on some wormwood, June 10. 1832, which produced the moth in July 11. following. The larva is rather darker, but very similar to that of galactodáctylus (which is light green, with a white pubescence), and is found on the underside of burdock leaves, close to the fibres, which it so much resembles that it requires some care to discover it. I found it in Clapham Park Wood, Beds., on May 30. 1820, and bred it on June 29. following; since which I have found it in plenty in a wood near Andover, Reading, and at Glanville's Wootton.

P. carphodáctylus *Hüb.*, or citridáctylus *Haw.* I took two specimens at Glanville's Wootton, May 15. and June 1. 1818; and Mr. B. Standish sent me one from Whittleseamere, August 4. 1821; since which time I have not found it. Mr. Curtis took P. tephradáctylus *Hüb.*, in the Isle of Arran, which is the only one I have ever seen alive. P. trigonodáctylus I generally take in plenty, where the coltsfoot grows, at Barton Cliff, Hants; one also at Glanville's Wootton, and another at Loch Rannoch, in constant succession, from May 20. to October 4. What I have seen in cabinets as P. calodáctylus, tesseradáctylus, and punctidáctylus, appear to me to be varieties only of one species: they all appear here from April to October, and are by no means rare; and the P. calodáctylus I found in the Isle of Arran, and near Arrochar and Loch Katrine, in Scotland. This last seems the most distinct of the three, being of a reddish colour; but I see no character that can be called *specific* which will not comprehend the other two; and it is perhaps doubtful if more than one be synonymous with the Continental species. Mr. Curtis gave me a pair of Adáctylus Bennèt*ii* Br. Ent. Pl., a species which has the wings undivided; and Mr. Haworth had one allied to hexadáctylus, taken by Mr. Stone, and to which he gave the name of ptilodáctylus. — *J. C. Dale. Blandford, Jan.* 5. 1834.

Hymenopterous Insects. — *Véspa británnica* (VI. 538.) *occasionally builds underground, as well as in Beehives.* I have by me some specimens of this insect taken in 1828 from a nest in a bank. I have also some nests similar to figs. 69, 70. (VI. 537.), taken from beehives, but I cannot say to what species they belong, not having captured the architects. Three years ago, a beautiful globular nest, about 8 in. in diameter, was shown to me, suspended from a branch of a fir tree in a shrubbery; and a few nights after, I cut down the branch, and made preparations for suffocating the in-

habitants, when I found, to my surprise, that they had spontaneously deserted their nest, and left it me, an uncontested prize. This was probably formed by the *V*éspa holsática, as it agrees with a correspondent's description (VI. 539.) of the nest which he had obtained of that species.—*H. E. Strickland. Nov.* 22. 1833.

Wasps (V*éspa vulgàris*) *their Relative Abundance or Rarity in* 1833. (VI. 490. note †.)—Wasps were unusually numerous here last summer. Half a dozen or more might always be seen buzzing about in every window in the house. The garden was full of them, and they devoured nearly the whole of the latest ripe red gooseberries. Eight or ten nests were destroyed within 50 yards of the house.—*A Subscriber. Vale of Alford, Aberdeenshire, Nov.* 20. 1833.

Wasps will partake of the extravasated sap which drains down the exterior of trunks of diseased elm trees; at least, I witnessed two doing this, on July 27. 1833, in Kensington Gardens: with them, and also partaking of the sap, were a blow fly and blue flies.—*J. D.*

[*Némátus ribèsii* Stephens (III. 245., *with a figure in* 246.; *but under the erroneous name of* T*enthrèdo càpreæ* L.]. — In this neighbourhood we had, last summer, two, and, in some gardens, three, visits of the gooseberry caterpillar. The first was a very destructive one; the second was about the end of August, or beginning of September; and the third about a month later. This is quite unusual here, though apparently not so in some other places (see III. 245.) A colony of wood ants (*F*ormìca rùfa?) in a garden is found here of great effect in keeping it clear of this pest.—*A Subscriber. Vale of Alford, Aberdeenshire, Nov.* 20. 1833.

[" The caterpillars of the Némátus càpreæ are never found on the gooseberry bush, but feed on the leaves of the sallow [*S*àlix càprea *L.*], and of several species of willow and osier, to which they are said to be sometimes very destructive. The Némátus of the gooseberry and currant bushes, though it nearly resembles N. càpreæ, and has been confounded with it by Fabricius and other naturalists, has been clearly shown to be a distinct species; it has been named Némátus ribèsii by Stephens." (*Scotus*, in the *Horticultural Register*, iii. 188.)]

Trichiosòma lucòrum Leach (V. 85. 748.; VI. 157.), *the Larva of, ejects from the Pores of its Body a white Liquid, in thin fountain-like Columns.*—This interesting fact, and the details of it, mistakingly ascribed, in VI. 157., to the larva of *T*enthrèdo amerìnæ *Lin.*, belong to the larva of the Trichiosòma lucòrum *Leach.* Our correspondent was led into the mistake by identifying the larva with that figured by

Shaw, in his *Zoology* (vol. vi. p. 274. pl. 90. fig. 1.), as the larva of the *Tenthrèdo amerinæ* of Linnæus, with which it "corresponded in every particular." A larva, however, which he took has since developed an imago; and this, with the cocoon, has been submitted to an eminent entomologist, who has pronounced them of Trichiosòma lucòrum; and also added: —

"*Tenthrèdo amerinæ* Lin. is a very scarce insect; and, although it is said to occur in Britain, I doubt the fact. One mutilated specimen, of doubtful origin, is in one of the London cabinets."

Our correspondent thinks that the larva of Trichiosòma lucòrum, which displayed the facts described, might be a diseased individual. If so, its acts may not be usual to the species. Additional observation, which, as the insect is not rare in Britain, many can give, is necessary to determine this. — *J. D.*

Ichneumons and other Hymenopterous Insects; their Habit, when in a winged State, of devouring the Larvæ of other Insects. (VI. 414—417.) In September, 1833, Mr. Newman sent us a warm commendation of Mr. Lewis's interesting discovery of this habit, as described, in a communication by Mr. Westwood, in VI. 414—419. Mr. Newman added: "In saying that I have observed this larva-devouring property in ichneumons, I would only wish to corroborate Mr. Lewis's statement, not to claim the discovery." Of the species of hymenopterous insects, carnivorous in a winged state, Mr. Westwood has, in VI. 417., instanced the Pímpla stercorator (the species whose acts Mr. Lewis has there described), wasps, and ants; probably the *Sphéx sabulòsa* may be added to these (see VI. 477., and Gill's *Technicological Repository*, for Oct. 1828); and possibly the species of ichneumon which Mr. Newman has observed, in a winged state, to devour larvæ, are farther additions to the list of hymenopterous insects which are, in the winged state, carnivorous. — *J. D.*

Ichneumons; their Power of stinging (VI. 417. and note *). — To the facts and instances adduced there by Mr. Westwood, two facts are given in Kirby and Spence's *Introd.*, i. 121. note *, which prove the same thing. — *J. H. F. Dec.* 1833.

Ants conveying in their Mouths other Ants of their own Species (VI. 287. and 476.); *and the Courage of the Wood or Fallow Ant* (*Formìca rùfa*). — On the habits of ants, I would particularly recommend to the reader the *Natural History of Ants*, by M. P. Huber (translated by J. R. Johnson, M.D., London, 1820), as exceedingly interesting. According to my own observations, the practice of ants carrying each other is very

frequent among the wood ants (*Formìca rùfa*); but I have not been fortunate enough to observe it among the other species. Whether, however, this carrying process be for the purpose assigned by Huber, that of removing to a new habitation, I much doubt. I have never been able to trace the carriers to their destination: but, I think, it cannot be for the purpose of removing to a new place of habitation; for the old habitations, to which my observations have been directed, still remain in the same place from year to year, inhabited as usual. I would ask, is not this operation confined to particular seasons? Has any one observed it at all times during the summer? We want more facts on the subject. That the ants thus carried are "prisoners taken in a conflict with some neighbouring enemy," as supposed by Mr. Hill (VI. 476.), is, I think, improbable. I have always observed, if the carrier be deprived of its prey, it will run about confusedly; but, the moment the prey is restored, the carrier immediately takes it up again, and there is no resistance offered by the prisoner. If they were captives taken in battle, I presume they would resist a second capture, or be anxious to make their escape when removed from the grasp of the enemy; but I have never seen any disposition of the kind manifested. I have often been amused by the courage exhibited by these little beings, when disturbed or annoyed. They erect their bodies, fixing and balancing themselves by their hind and middle legs, in most formidable attitude; whilst their mandibles and first pair of legs are used for defence. When provoked to this, they eject a liquid from the mouth with great violence: in one instance, I am sure, it was thrown to the distance of three inches. The operation is repeated two or three times if the provocation be continued, but with less force each time; and they then appear exhausted, and disinclined to continue the contest, and decamp with all possible alacrity. — *C. Conway. Sept.* 21. 1833.

A Battle between Ants of the Species Myrmìca rùbra, and Ants of the Species Myrmìca cæspitum. — On Sept. 4. 1832, I was walking beside a wall a foot or so taller than myself; off the upper part of which, in one place, I, in passing, observed small insects to be descending, as it were, by a flying leap. This led my eye to the pathway along which I was walking at the foot of the walk, where, for the length of five yards, and the width of three, the ground was sprinkled, and, as it were, in part animated, with winged ants; most of them in pairs, but some single ones, which seemed to be earnestly seeking partners. The pairs were severally composed of a red ant and a dark-coloured one, which strenuously combated

each other; but I did not at this time feel certain whether in the feeling of love or of war, as the imperfect examination I then gave them, and the actions of the single ones, left me undecided. The next day, however, cleared up the question, by exhibiting numerous dead ants, of both the red and dark kinds, on the site of the previous day's activity. I picked up dead specimens, which I have since submitted to Mr. Westwood; who has kindly informed me that (as far as it is determinable from bad specimens) "the red ones are of Myrmìca rùbra, the dark ones of M. cæ'spitum." — *J. D.*

Instances of determined Resistance of Detention in the large black Wood Ant. (VI. 287.) — A few days since, I caught one, and held it by the legs [? leg], but so as not to hurt it. After it had made various fruitless efforts to escape, it deliberately and without cessation began to bite off the leg [? legs], which it did in about a minute. I caught another, which was beginning to do the same thing; but I let it go. — *H. B. Blois, Nov.* 16. 1833.

Ants and their carnivorous Habits, as noticed by Mr. Westwood, in VI. 417. — In one of the volumes of Gill's *Technicological Repository* (the number for June, p. 335, 336.), an interesting account is given, by Mr. Carpenter, in amount as follows: — In walking across a field, he observed the footpath covered, for many yards in length, with the wing-cases of numerous cockchafers, with a number of the heads of the insects still alive, though separated from the rest of their bodies, and the bodies of others actually crawling about without heads. The cockchafers had been left in that state by the birds, who were succeeded in the work of destruction by numerous small black ants. These "had crawled up the sides of the chafers, and had taken possession of the interior of their bodies, and were devouring them alive. Many of the heads, I observed, were also being carried away by the ants to their nests. If the sense of feeling in these insects was as acute as in the higher order of animals, the pain they endured must have been dreadful. I had, indeed, before frequently seen an individual of one species of insect making a meal from another species; but never before did I witness such a host of cannibals engaged in their work of eating up, alive, insects that were actually crawling away with their devourers within their bodies!" Be it remembered, that the bodies of the cockchafers, although not dead, had been mutilated and mangled by the birds. The ants, like the dogs in the city of Constantinople, were removing the animal remains, and, by so doing, preventing the contribution to miasma which the putrescence of them might occasion. I have witnessed several ants engaged in

removing the dead and partly dried body of an earthworm of moderate size. In the kitchen of a house known to me, in Kensington Gravel Pits, ants of a very minute species were very abundant during the summer of 1833: they would partake of the meat, and of the butter, &c., when they could get to it. — *J. D.*

A Mode of destroying Ants in gardens is asked for by G. T., in *Ent. Mag.*, i. 521. These modes for destroying them, or attracting them to the end of their being destroyed, have been published in the *Gard. Mag.* v., 730., vii. 315.: — Baits: the refuse part of melons, slices of raw turnip rubbed over with honey, recently cooked bones of roast or boiled meat or fish. Poisons: a well-compounded mixture of equal parts of loaf sugar, oxide of arsenic, and well-pulverised white bread, strewed, as occasion may require, both as to time and quantity, in the haunts of the ants. The mixture to be kept in a bottle dry for use. Ants, however, it seems, by the remarks under Némátus ribèsii, in p. 265., may be useful in a garden. — *J. D.*

Remarks and Facts on Ants.—My children have just finished reading a few interesting anecdotes respecting the natural history of the ant. I have read in books, and heard from the lips of learned teachers, many such anecdotes, chiefly taken from the statements of Solomon, that "she (the ant) provideth her meat in the summer, and gathereth her food in the harvest." The gentleman who wrote the book which my children have been reading [We presume, a paper in the *Spectator;* as we remember a tantamount paper in that work.] says that he had two commonwealths of ants in a flower-box, in his window, two stories high, which he thought of planting tulips in: but, seeing the ants, he was sorry to disturb them; and was more amused with the ants than he could have been with the tulips. This may be true: every one to his taste. I am no great admirer of tulips; but I detest a nest of ants. However, then follow the anecdotes, many of which are truly marvellous. He says that wheat is their favourite food; but that they are also fond of rye and oats. He observed one ant bring in its paws [? jaws] a full-sized grain of wheat up to the window from the ground; but, being so tired, it dropped it from top to bottom. The ant went down the wall a second time, and found its grain of wheat, and brought it back up the wall; but, just as it was getting it into the box, it dropped a second time. The ant again descended the wall, and again found its favourite grain; but, being then so very much fatigued, another ant assisted it to scale the wall, and deposit the precious grain in their storehouse! If the above account

be true, it is very interesting; but, if it be false, it is very wrong to put such books into the hands of children. I have had as much to do with ants and ant-hills as most men; and never yet could find their winter store of provision, any more than I could find honey in a wasp's nest. I have had men [levelling down and] spreading ant-hills for days together, and have offered them a quart of ale for a thimbleful of the ants' winter food, of either wheat, rye, or oats; but never could attain my object, nor the men theirs. I have strewed rice and wheat about an ant-hill, and seen them lugging it away; but I firmly believe the stupid creatures only mistook it for their own eggs. The ants, like the wasp, and most [many] other insects, live entirely upon fluids, or suction; and lie quite dormant in the winter: their stomachs could no more digest wheat or rye, than my stomach could digest horse-nails. The wasp is seen to eat rotten wood, &c.; but it is only for the purpose of forming its comb-cells. The caterpillar and silkworm eat green food; but this is only for the purpose of preparing them for their change. The butterfly and moth live only by suction. The ant is nothing more than a biennial, or, at most, a triennial insect: when it comes to perfection, it becomes a winged insect, propagates its species, and then dies. What sorry naturalists must those, then, be who hold up the ant as a pattern for improvident man? Truly, such writers should be looked upon by modern readers as quite *anti*quated.

They are still less acquainted with the history of the ant, who say she "hath no guide, overseer, or ruler." I shall never forget the first time I saw a nest of the large black ant; it was in a large forest in the south of England. I saw something alive lying right across my footpath: I took it for some monstrous serpent; but, on looking more attentively, I perceived it to be a thoroughfare of black ants: it actually resembled one of the crowded streets of London. I traced it to both ends: the one terminated at a huge ant-hill, as large as a heaped-up bushel; the other end went up a huge oak tree, and there dispersed all over the limbs, branches, and twigs of the tree. Is it to be thought that they were "preparing the acorns as food in the summer, to be gathered by them as meat in the harvest?" Really, these large ants might lug away small acorns, on level ground, as easily as the small red ant could carry a large grain of wheat up a brick wall two stories high. But, no; they were merely sucking the honey-dews, and excretions proceeding from smaller insects. Neither would they all have kept one track if they had not had a guide; nor brought home their full bellies, if they

had not had a governor, or, what is more likely, some *self-interest*. . . . . I wish my homely remarks may prevent the telling again of any untrue statements of the foresight, &c., of the ant, to children. — *John Howden.*

Dipterous Insects, with others. — *A Mode of deterring House-Flies from entering Apartments.* — A paper, by W. Spence, Esq., was read at the last Meeting (April 1.) of the Entomological Society, on the mode successfully adopted, in Italy, of excluding these pests of hot climates, in the autumnal months, from apartments. The mode is, simply, keeping constantly nailed on the outside of the windows thread nets, with meshes of an inch or more in diameter; through which, though the windows (French) are wide open, the flies (either taking the nets for spiders' webs, or from some inexplicable dread) never attempt to pass: and thus, in a room so defended, not a fly is to be found, while they swarm elsewhere. Mr. Spence concluded his paper by adverting to an unexpected coincidence, which had occurred to his eldest son, between this practice and a similar one mentioned by Herodotus (lib. ii. cap. 95.), as having been practised by the Egyptian fishermen, 2300 years ago, of securing themselves from the attacks of gnats. [See Mr. Sells's notice of the use of the mosquito net, in V. 480.]

Plants. — *Malcòmia marítima* Brown *a British Plant.* — The merit of having first added this lively little annual to the British Flora, I believe, is due to Miss Harvey of Upper Deal, a lady zealously devoted to natural history, who has kindly supplied me with specimens gathered by herself, in April last, "under the cliff about half way between St. Margaret's and Dover, in various places, for a quarter of a mile, where the banks were grassy. The specimens exactly resemble the garden ones, save that the leaves and plant are altogether smaller." Of the specimens sent me, few exceed two inches in height, and some scarcely one.

The sea coast, it may be remarked, must always be considered, more or less, a somewhat suspicious habitat for any plant of exotic aspect, there being so many chances of foreign seeds, or even roots, having been accidentally thrown on shore, and deposited in such situations.

The Guernsey Lily (*Amarýllis sarniénsis* L. fil.), a native of Japan, owes its establishment, as a species indigenous to European soil, to the melancholy circumstance of a Dutch or English ship, coming from Japan, having been cast away on the island, from which the plant has acquired its ordinary English appellation.

Nevertheless, we ought not any longer to deny the Mediter-

ranean stock a place in the list of natives, since, at the very least, it now appears to have become naturalised on our shore, and at any rate may, with as much propriety, be considered a British plant, as many others whose claims have been admitted. My intelligent informant very justly remarks that "there are no gardens or houses under the cliff between St. Margaret's and Dover, nor are there any in that direction above near the cliff;" so that it is not likely the stock in this situation should have been the mere outcast of a garden.

While on the subject of Kentish botany, I take the opportunity of stating that Miss Harvey finds the beautiful

Ophrys fucífera in great profusion at particular spots between Walmer and St. Margaret's. In a letter accompanying some fresh specimens in flower, received in May last, she remarks: — "Two years ago I found five specimens, and thought myself fortunate: within the last week I have gathered three hundred, and yet have left an abundance. They seem more prolific than any of the orchis tribe. The specimens vary very much in the number and colour of the flowers, and in the size of the leaves." (See *Catalogue of rare or remarkable Phænogamous Plants collected in South Kent*, by G. E. Smith.)— *W. T. Bree. Allesley Rectory, Oct.* 11. 1833.

Alýssum marítimum Lam. is another plant abundant on the shores of the Mediterranean Sea, and supposed to have arisen on the shores of Britain from seeds borne hither, on the waves, from the former place. Mr. Winch has, in some one of his published works, enumerated all those species of the plants called British which he conceives to be not aboriginally so, and has traced the first appearance here of some of them to the importation of ballast, and to other adventitious sources. —*J. D.*

Trichonèma Bulbocòdium Ker grows wild, in great abundance, among turf, in a dry sandy soil, on the Warren (a sandy tract) between Dawlish and Exmouth, Devonshire. The exact spot is on the left of the old road from Exeter to Dawlish, before you ascend the hill to Mount Pleasant, and almost in front of the small cottages there: it extends, at intervals, to the ferry. My friend W. C. Trevelyan, Esq., of Wallington, Northumberland, and myself, found it there, on March 24. 1834, in full flower: its ribbed corolla, of a purplish blue colour, is strikingly beautiful. Trichonèma (*I*xia) Bulbocòdium has never before been found wild in England. It is well figured, in *English Botany*, as a native of Guernsey; and it abounds in the south of Europe. — *John Milford. Coaver House, near Exeter.*

Aspérula arvénsis L. was not, in the summer of 1832, dis-

coverable in its only known British habitat, near Plymouth, to which I was directed by Mr. Banks himself, and which I diligently explored. I have gathered A. arvénsis wild on the Continent, where its habitats differ in condition from that at Plymouth. From all I could learn, I was led to conclude that the appearance of this plant, in the Plymouth habitat, was purely adventitious; and that it must, until new habitats shall have been discovered, be expunged from the list of native British vegetables. —*W. A. Bromfield, M.D. Hastings, Feb.* 8. 1834.

Dorónicum P*ardaliánches* L. grows, in comparative abundance, at Saling, near Great Bardfield, in Essex; but it may, from its situation on the bank of an old enclosure, where there is an ancient mansion, have escaped from a garden [either by the wind's disseminating some of the winged fruits (seeds) of its discoid florets (those of its rayed florets are not winged), or from some of its abundantly produced stolones having been removed from the garden as rubbish]. — *J. G. Lexden, 3d of 4th Month* (*April*), 1834.

Sisýmbrium polyceràtium L. grows wild at the base of the walls of certain streets of Bury St. Edmunds. I have forgotten its origin there; but I think that it emanated from the garden of the late Sir Thomas G. Cullum, Bart. The streets in which I have seen most of it are, Northgate Street, Garland Street, Short Brackland, &c.; but the cleaning efforts of the surveyor's men do not allow so many plants as could be wished to bear seeds. —*J. D.*

Drósera rotundifòlia L. *occasionally exhibits its Flowers in an expanded State.* (VI. 469.) — Drósera rotundifòlia must, unquestionably, be considered a shy and capricious plant as regards the expansion of its blossoms; and we have yet to learn the laws by which its motions in this respect are regulated. That they do not depend solely on the presence or absence of sunshine is quite clear; for, though I have known the plant from my early boyhood, I am not quite certain that I ever saw its blossoms fairly expanded till this summer. Botanising, the 27th of July last, on the shores of Coleshill Pool, where the Drósera grows in great profusion, I was surprised and delighted at beholding the flowers on every plant fully and beautifully expanded. The day was warm and bright, but the sunshine at intervals interrupted by passing clouds: the hour of the day, I think, must have been from a little before twelve to one. In the preceding summer, about July 24. to 26., I happened to have paid two visits to the same spot, when the weather was equally fine and bright; and on both these occasions gathered many specimens of Drósera, but not a single one was to be found with its flowers

expanded. When this lovely little plant fairly unfolds its charms, its dewy leaves glistening in the sun, it may truly be regarded as one of the brightest gems of Flora. Your correspondent, Mr. Brown, appears duly to appreciate its "loveliness." (VI. 469.) May I be allowed to add, that I should have much pleasure in shaking that gentleman by the hand, and, did circumstances permit, in accompanying him to the native marshes of Scheuchzèria palústris, Cárex helionástes, and other rarities. Yours, &c. — *W. T. Bree. Allesley Rectory, Sept.* 9. 1833. [Mr. Brown will please to observe the date.]

The Sap of the Sycamore (A'cer *Pseùdo-Plátanus* L.) *is sweet.* (V. 346.) — I used, when a boy, to cut notches in the sycamore trees which used to shelter my father's kailyard (they grew in two clumps, nine in one, seven in the other), and sip the sap as it dropped from the wounds. — *John Howden.* [Sugar is manufactured from the sap of several acers.]

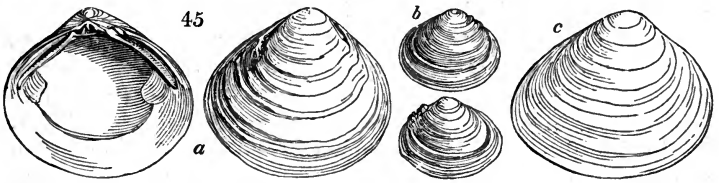
Affinities between Plants and subjacent Rocks. (VI. 335. 424.) — Neither the foxglove (Digitàlis purpùrea *L.*) nor the bilberry [*Vaccínium* Myrtíllus *L.*] ever, I believe, grow upon limestone. The hills of limestone and gritstone in this neighbourhood are of nearly the same altitude, and dip into each other in a most singular manner. We have also large tracts of uncultivated land, both of limestone and gritstone. Now, the Digitàlis grows so abundantly on the gritstone, from the summit of the hills to the bottom, that I have, for years, been in the habit of noticing that the different substrata may be determined by the presence or absence of this plant; for I have never seen a single plant on limestone, even where it has grown abundantly, within a few hundred yards, upon the sandstone. — *W. Cautrell. Wirksworth, Derbyshire, Sept.* 26. 1833.

Geology. — *For Lacustrine Formations, among the Tertiary Beds of this Part of the Country,* but little search has been hitherto made; although there is every reason to believe that they exist in several parts of Essex. Mr. Edward Charlesworth of Ipswich lately pointed out to me a very interesting section of one of these formations at Stutton, by the side of the river Stour, about six miles south of Ipswich. It consists of a tenacious grey-coloured clay in one part, and a greenish sand in another, extending along the margin of the Stour to the distance of about 100 yards. The tide, at high water, reaches the foot of the cliff, which it occasionally undermines; and it appears to have made great encroachment upon the land, from the extent of ooze in that part of the river. Some of the shells are coloured by the red oxide of iron; and the clay, in patches, has a ferruginous appearance. It appears a locality that would well reward an elaborate research. I have paid it but

a single visit; and the following list of organic remains is the result of that day's labour: —

Conchífera bimusculòsa: Conchàcea fluviatília; Cỳclas oblìqua, córnea, and pusílla; Cyrèna trigónula [*Wood*]. *Naíada:* Anodónta sp.?; Ũnio sp.? *Trachelípoda:* Colimàcea; Succínea amphíbia and oblónga; Hèlix horténsis, lùcida, fúsca, ruféscens, and paludòsa (*Montagu*); Carỳchium mínimum, Pùpa marginàta, Bùlimus lùbricus. *Lymnæàna:* Lymnæ'a auriculària, péregra, fossària, and palústris; Planórbis carinàtus, córneus, vórtex, contórtus, imbricàtus. *Peristomiàna:* Paludìna impùra, Valvàta piscinàlis and cristàta. *Crustàcea:* Branchiópoda; one Cỳpris. Some fragments of bones, and the lower jaw of one of the gnawers, a species of Arvícola.

Cyrèna trigónula [Wood].—The accompanying shell (*fig.* 45. *a*, *b*) is very abundant at Stutton. I have ventured to name it



trigónula until some more appropriate epithet be given to it. The shell may be thus characterised: — Testa ovato-trigona, subæquilatera, crassa, subimbricata, dentibus cardinalibus tribus in utraque valva, dentibus lateralibus magnis serratis. It approaches near to C. trigòna of Deshayes, *Paris Foss.* pl. 19. fig. 16, 17.; from which, however, it is easily distinguished, by its being nearly equilateral and subimbricated. The generality of the specimens are much eroded externally; but one or two which I have distinctly show the depressed imbrications.

All the other species of shells I have been able to identify with recent analogues; the Ũnio and Anodónta are scarcely perfect enough to decide upon. I have received a few specimens of the Valvàta piscinàlis, from a freshwater formation at Copford, about five miles west of Colchester. But this is a spot I have not yet visited: perhaps some correspondent in that neighbourhood may make us better acquainted with its contents. — *S. V. Wood. Woodbridge, March* 27. 1834.

[Mr. J. D. C. Sowerby has drawn the figures *a* and *b* from some of the specimens obligingly forwarded by Mr. Wood. Mr. Sowerby remarked that the Cyrèna trigónula *Wood* assimilates closely to the Cyrèna depérdita *Sowerby* in *Mineral Conchology*, fig. 162. and our *fig.* 45. *c*, but differs from it in its posterior side being less angular, and in its newer geological position.]

MISCELLANEOUS INTELLIGENCE.

Art. I. *Retrospective Criticism.*

The Vulture's Nose. [p. 165—169.]—The American philosophers have signed a solemn certificate that they feel assured that the two species of vultures which inhabit the United States "are guided to their food altogether through their sense of sight, and not that of smell" [p. 169.]: I, on the contrary [V. 233—241., VI. 163—171.], that all vultures can find their food through the medium of their olfactory nerves, though it be imperceptible to their eye.

I cannot consent to deprive the vultures of their noses merely on the strength of experiments which, from circumstances, may prove fallacious, notwithstanding every possible precaution; and, in the cases before us, I find myself constrained to dispute the legitimacy of the deductions at which these gentlemen calculate they have arrived. The effluvium from the dead hare and the offal which they had procured might have been prevented from ascending by the covering of brushwood; or it might have been depressed to the earth by humidity, or by a current of wind. Either of these suggestions may be adopted in the present instance, because the dogs, which had no tainted footsteps to guide them, still found that which insured their discovery of the carrion.

The sad experiment of putting out the poor vulture's eyes fills me with distressing emotions. The supposed fact of the tortured captive not smelling his favourite food, when placed within *an inch* of his nostrils, forces us to conclude, either that Nature had not intended that his beautifully developed organs of scent should be of the least service to him, or that the intensity of pain totally incapacitated the lone prisoner from touching food. I am of the latter opinion. Unquestionably the pain caused by the dreadful operation rendered the miserable sufferer indifferent to all kind of sustenance. I myself have been unable to eat when in the gripes; and I once knew an old owl which died of sheer want, rather than swallow any thing in captivity. What would the American philosophers think of me, had I got this owl's demise well authenticated by the signatures of divers scientific men, and then despatched it across the Atlantic, in order to prove that owls do not secure their prey by means

of their feet, because, forsooth, the incarcerated owl in question never once struck her talons into the food which had been placed within an inch of them.

Nothing can show more forcibly the utter fallacy of the American experiments, than the attack of the vultures on the coarse painting which represented a "sheep skinned and cut up." Till I had read the account of it, I had always imagined that the vulture had a remarkably keen and penetrating eye. I must now alter my opinion. If the American gentlemen do not mind what they are about, they will ultimately prove too much ("quod nimium probat, nihil probat" [who proves too much, proves nothing]), and at last compel us Englishmen to conclude that the vultures of the United States can neither see nor smell. They assure us that these birds are not guided to their food by their *scent*, but by their *sight alone;* and then, to give us a clear idea how defective that sight is, they show us that their vultures cannot distinguish the coarsely painted carcass of a sheep on canvass from that of a real sheep. They "commenced tugging at the painting," and "seemed much disappointed and surprised" that they had mistaken canvass for mutton. Sad blunder! Pitiable, indeed, is the lot of the American vulture! His nose is declared useless in procuring food, at the same time that his eyesight is proved to be lamentably defective. Unless something be done for him, 't is ten to one but that he 'll come to the parish at last, *pellis et ossa*, a bag of bones.

The American philosophers having fully established the fact, that their vultures are prone to mistake a piece of coarsely painted canvass for the carcass of a real sheep "skinned and cut up," I am now quite prepared to receive accounts from Charleston of vultures attacking every shoulder-of-mutton sign in the streets, or attempting to gobble down the painted sausages over the shop doors, or tugging with might and main at the dim and faded eyes in some decaying portrait of the immortal Doctor Franklin.

The absurdity of all this must be evident to every body.

I, in my turn, hope to prove satisfactorily, by *inference*, that which the American philosophers have failed to demonstrate by EXPERIMENTS. I state that effluvium from putrid matter, being lighter than common air, necessarily ascends in the atmosphere, unless artificially impeded (as probably was the case in the first experiment of the American philosophers), or prevented from mounting by superincumbent humidity. Now, the organ of scent, which is strongly developed in the vulture, coming in contact with this effluvium, when it is allowed to float in the atmosphere, enables the bird to trace

the carrion down to its source. Hence I infer that vultures can find their food through the medium of their olfactory nerves: and, this being the case, I am of opinion that there ought to be no great mystery attached to the act of the vulture's finding putrid bodies, when those bodies are out of sight, either on account of distance, or of interfering objects.

When the American philosophers shall have proved to me, that effluvium from putrid substances does not ascend in the air, and that the organisation of the vulture's nose is imperfect, then I will consider myself vanquished; "efficaci do manus scientiæ." After those gentlemen shall have accomplished this, should their vultures pine in famine, by continuing to mistake canvass for carcass, why, rot 'em, they may die, for aught I care to the contrary.—*Charles Waterton. Walton Hall, March* 6. 1834.

Audubon's Claim to the Authorship of the Biography of Birds. [p. 171.]—I feel myself imperatively called upon by the statement which the Rev. Mr. Bachman has given us of "the purity, vigour, and originality" of Audubon's style of writing the English language, to bring into one view the contradictory testimonies of many pens. Young Audubon tells us [in VI. 369.] that he has "the authority of a gentleman," whom we cannot mistake, I mean Mr. Swainson, to state that it is "his firm conviction" that Audubon is the "*bonâ fide* author" of the *Biography*. Swainson himself declares [p. 550.] that he has "read Mr. Audubon's original manuscripts," and that "the English" is as good as the English of the *Wanderings*. Audubon himself informs us that a friend aided him "in smoothing down the asperities of his ornithological biographies." The Rev. Mr. Bachman does not "hesitate to state that Audubon is the author of the book." R. B., after telling us that Audubon, at the age of seventeen, "could not speak the English language," remarks that "it cannot, therefore, be the least disparagement to Mr. Audubon, if, when he had a valuable work to publish in English, he should wish to receive the assistance and correction of a native." He adds that "Mrs. Audubon is well qualified to correct her husband's manuscripts." I know that Audubon was engaged, before his marriage, to teach French in St. Francisville; and, for a small consideration, he undertook to teach the elements of drawing in Philadelphia. Audubon states, in his introductory address, that, "for a period of nearly twenty years, his life was a succession of vicissitudes," and that he "tried various branches of commerce, but they all proved unprofitable." Professor Jameson informs us that Mr. Audubon "devoted

twenty-two years of his life to the study of the natural history of the birds of North America. During the greater part of that long period, he lived principally, and nearly alone, in the woods." Audubon tells us, in his introductory address, that he left the village of Henderson, where he had "resided for several years." He also tells us of his "residence at Louisville," where he had a "partner" in business, and "a counting-room." On returning to Louisville, he remarks that his thoughts were, "for once, at least, in the course of his life, entirely engaged in commercial speculation." In p. 58. of the *Biography* he says, "We were on a trading voyage ascending the Upper Mississippi;" where, by the by, he shot his bird of Washington, which is considered no other bird than the bald-headed eagle. In another place, we are informed that "years were spent away from his family, with no other object in view than simply to enjoy the sight of nature." We know, from Audubon himself, that he had abandoned all commercial pursuits at the time that he first fell in with Charles Bonaparte, which is now about ten years ago. Pray, how old is Mr. Audubon? Powers of genius! amid such avocations of shop and wood, where did this Frenchman gain his surprising knowledge of our language? I respectfully request the Rev. Mr. Bachman to pay attention to the testimonies here advanced.

Audubon and his Ornithology. [p. 174.] — The account which the Rev. Mr. Bachman gives of the recent ornithological labours of Mr. Audubon is quite uninteresting to me, because I can put no trust in what Mr. Audubon published on natural history, prior to his departure from this country. Charles Bonaparte, with whom Audubon had "accidentally formed an acquaintance" (see his introductory address), petitioned the Academy of Natural Sciences of Philadelphia that Audubon might be admitted a member. The necessary measures were adopted, and Audubon was blackballed. I am aware that he has since been elected: but thereby hangs a tale. Will the reverend eulogist have the goodness to enquire, why that respectable and learned society of gentlemen deemed it incumbent upon them to refuse the application of Charles Bonaparte?

I here beg to draw the attention of the reverend gentleman to the two following extracts. The first is from Audubon's *Biography of Birds;* the second from Ord's *Life of Wilson.*

"I rose, took down a large portfolio, laid it on the table, and showed him (Wilson), as I would show you, kind reader, or any other person fond of such subjects, the whole

of its contents." Again: "Mr. Wilson asked if I should have any objections to lending him a few (drawings) during his stay; to which I replied, that I had none. He then bade me good morning, not, however, until I had made an arrangement to explore the woods in the vicinity along with him, and had promised to procure for him some birds, of which I had drawings in my collection, but which he had never seen." This, indeed, was truly polite and friendly on the part of Mr. Audubon. Again: "I presented him to my wife and friends, and, seeing that he was all enthusiasm, exerted myself as much as was in my power to procure for him the specimens which he wanted. We hunted together, and obtained birds" (mind, reader!) "which he had never before seen."

Now for Wilson. I myself have seen, in Alexander Wilson's own handwriting, the following extracts:—"March 17. Groped my way to Louisville, and put up at the Indian Queen tavern."—"March 19. Rambled round the town with my gun. Examined Mr. ——'s drawings in crayons. Very good. Saw two new birds he had. *Both Motacillæ.*"—"March 20. Set out this afternoon with the gun. Killed nothing new. People in taverns here devour their meals. Many shopkeepers board in taverns; also boatmen, land speculators, merchants, &c. *No naturalist to keep me company.*" Mr. and Mrs. Audubon and family boarded at this tavern. "March 21. Went out this afternoon, shooting, with Mr. A. Saw a number of sandhill cranes. Pigeons numerous."—"March 23. Packed up my things."—"I bade adieu to Louisville, to which place I had four letters of recommendation, and was taught to expect much of every thing there; but neither received one act of civility from those to whom I was recommended, one subscriber, *nor one new bird;* although I delivered my letters, ransacked the woods repeatedly, and visited all the characters" (mind this, reader!) "likely to subscribe. Science or literature has not one friend in this place. Every one is so intent on making money, that they can talk of nothing else; and they absolutely devour their meals, that they may return sooner to their business. Their manners correspond with their features."

Here we have two statements as opposite "as the antipodes are to us, or as the south to the septentrion." In which of these two statements are we to put faith?

In Ord's beautiful *Life of Alexander Wilson,* I follow the poor Scottish wanderer across the Atlantic wave; I peruse, with deep interest, his many letters to his friends; I grieve with him in his sorrows and disappointments; I bear him

company in his astonishing expeditions; and am enraptured with his unrivalled *Ornithology.* In it I find no contradictions to distract me; no extravagances to astound me; no statements to awaken my suspicion. His descriptions are consistent, his observations instructive, his plans heroic, and his exertions unequalled. I admire him in life, and mourn, with unfeigned sorrow, over his untimely end.

In looking into Audubon's writings, I fully agree in Dr. Jones's opinion [VI. 550.] of the account of the rattlesnake swallowing a large grey squirrel, tail foremost; I condemn the narrative of the passenger pigeon; I find Audubon's account of himself at variance with itself, and at variance with the account which his friends give of him; and I pronounce his *Biography of Birds* to contain errors which any moderate ornithologist may easily detect. — *Charles Waterton.*

The Passenger Pigeon. — "Towards the approach of day, the noise in some measure subsided; long before objects were distinguishable, the pigeons began to move off in a direction quite different from that in which they had arrived the evening before; and, at sunrise, all that were able to fly had disappeared. The howlings of the wolves now reached our ears, and the foxes, lynxes, cougars, bears, raccoons, opossums and polecats were seen sneaking off." (*Biography of Birds, by Audubon,* p. 325.)

"Variarum monstra ferarum!" VIRGIL.
A prodigious variety of wild beasts.

Mr. Audubon may boast of a sight never before seen by mortal eyes under similar circumstances. Great indeed must have been the yearning for pigeon flesh, to have caused such a variety of wild animals to assemble there; and irresistible the flavour which induced them to tarry so long beyond their wonted time of prowling. Their very nature seems to have been changed. Their remaining at the pigeon-slaughter till the time of sunrise is a most wonderful circumstance, which demands investigation on the part of naturalists; for, hitherto, all these wild beasts which Mr. Audubon has introduced into his description have only been known as animals of nocturnal movements, and of very skulking and suspecting habits. In general, the flash of a gun, the crackling of a flame, or the shout of a huntsman, will scare any one of them, even when concealed in the lonely retreat; but, on this ever-memorable occasion, the nerves of the animals, both large and small, were strung up to an astonishing degree of intensity. The day had already dawned unheeded by them; and it was only at sunrise that they seemed aware of being in dangerous company, and found that it was high time to sneak off from a

place where, Mr. Audubon tells us, "there was little underwood;" where "the uproar continued the whole of the night;" where men had assembled "with iron pots containing sulphur;" and "with torches of pine-knots, with poles and with guns;" where "fires were lighted, and a magnificent as well as wonderful and almost terrifying sight presented itself;" where, in fine, the auditory faculties of Mr. Audubon himself became so completely useless, on account of the stunning noise, that, absolutely, he was "only aware of the firing by seeing the shooters reloading." "O judgment! thou art fled to brutish beasts, and men have lost their reason," if they can bring themselves to believe that into this sulphureous, torch-lighted, detonating, yelling, roaring, and terrific attack on the passenger pigeons, there came up a motley herd of wolves, foxes, cougars, lynxes, bears, raccoons, opossums, and polecats, to share the plunder, and actually tarried there till the rising of the sun;" at which time, Mr. Audubon informs us, they were seen sneaking off. He himself saw what he relates.

But let us pass on. "The pigeons," continues Mr. Audubon, "arriving by thousands, alighted everywhere, one above another, until solid masses as large as hogsheads were formed on the branches all around." Solid masses! Our European pigeons, in a similar situation, would have been all smothered in less than three minutes. Mr. Audubon informs us, towards the end of his narrative, that the feathers of this pigeon "fall off at the least touch." From this, we may infer to a certainty that every pigeon which was unlucky enough to be undermost in the solid masses would lose every feather from its uppermost parts, through the pressure of the feet of those above it. Now, I would fain believe that instinct taught these pigeons to resort to a certain part of the forest, solely for the purpose of repose, and not to undergo a process of inevitable suffocation; and, at the same time, to have their backs deprived of every feather, while they were voluntarily submitting to this self-inflicted method of ending their days.

"Many trees," says Mr. Audubon, "two feet in diameter, I observed, were broken off at no great distance from the ground; and the branches of many of the largest and tallest had given way, as if the forest had been swept by a tornado. Every thing proved to me that the number of birds resorting to this part of the forest must be immense beyond conception." I know that the force of a tornado will break the trunk of a tree two feet in diameter, because its force acts horizontally against the upright stem; but how is it possible that a multitude of pigeons, alighting upon a tree, could cause its upright bole, two feet in diameter, to break off at no great distance from

the ground? The branches of the tree, which took their lead diagonally from the bole, might possibly have given way under a heavy pressure, because they were inclined more or less from their perpendicular; but the upright bole itself would stand uninjured, and defy for ever any weight that could be brought to bear upon it from above.

I now leave the assemblage of wild beasts, the solid masses of pigeons as large as hogsheads, and the broken trunk of the tree two feet in diameter, to the consideration of those British naturalists who have volunteered to support a foreigner in his exertions to teach Mr. Bull ornithology in the nineteenth century.

The passages upon which I have just commented form part of "*the facts*" on which R. B., in Vol. VI. of this Magazine, [p. 371.] tells us that the value of Mr. Audubon's *Biography of Birds solely* rests. No wonder that, *ruit alto a culmine.* By the way, I observe, at the end of that *Biography*, a most laudatory notice by Mr. Swainson. He tells us that Audubon contemplated Nature as she really is, not as she is represented in books; he sought her in her sanctuaries. Well, be it so; I do not dispute his word: still I suspect, that, during the search and contemplation, either the dame herself was in liquor, or her wooer in hallucination. — *Charles Waterton. Walton Hall, Jan.* 19. 1834.

The British Species of Eel, their Mode of Propagation (V. 313. 744.), *and their Habits.* — In the just-published Second Series of Jesse's *Gleanings in Natural History*, Mr. Yarrell, Dr. William Roots, and Mr. Jesse have supplied thirty-eight pages of information on the economy of eels. Mr. Yarrell has there given a synopsis of all that had been, and now is, known on this subject, and into this synopsis has digested the result of all the facts which the research of Dr. Roots, of Mr. Jesse, and of himself has acquired; and he has referred with commendation to the discoveries of Mr. Couch registered in our V. 313., and to those of W. B. in V. 744. This treatise on the economy of eels is, therefore, the most perfect one which has appeared.

The Goldfish with a double Tail Fin. (159.) — Dr. Hancock has conjectured (*Quart. Journ. of Science*, No. xvi. 290.) that, as the bones composing the rays are, in this, as in other fishes, double, the lusus of a double fin may arise from some casual defect of the cohesive substance and investing membrane of the rays, whence it may be that the bones probably diverge, and constitute the double fin. — *James Fennell.*

REVIEWS.

ART. I. *Catalogue of Works on Natural History, lately published, with some Notice of those considered the most interesting to British Naturalists.*

JESSE, Edward, Surveyor of his Majesty's Parks, Palaces, &c.: Gleanings in Natural History. Second Series. To which are added some extracts from the unpublished MSS. of the late Mr. White of Selborne. 8vo, 321 pages. Murray, London, 1834.

"I am completely ignorant of the scientific part of natural history. Filling, as I do, an arduous and responsible situation, I have only the means of making very cursory observations in my favourite amusement. These observations have, indeed, been made during my various rides in His Majesty's parks, in the fulfilment of official duties; and my chief relaxation has been in the tranquil and agreeable occupation of writing down in the evening whatever [had] interested me in the course of the day." (*Preface.*) The subjects treated of in the volume are rather many, and each is rendered, by a delectable habit of amiable feeling, with which the author is gifted, the centre of a circle of sweet associations. We would instance the observations and reflections in Richmond Park, with which the volume is begun; the "economy of nature," in p. 127.; and an "autumnal evening," in p. 211. There is a chapter on "the sagacity of dogs," which is rich in illustrative anecdotes; and there are fifty pages of "miscellaneous observations selected from the manuscripts of the late Gilbert White of Selborne." An important contribution to the science of natural history is supplied in a treatise on eels, of which we have spoken in p. 283.

Mudie, Robert: The Feathered Tribes of the British Islands. 2 vols. 8vo. Nearly 800 pages, and about 60 figures of birds and parts of birds; those of the birds coloured. London, 1834. 1*l.* 8*s.*

Indispensable to every studier and every lover of the birds of Britain. This, like the rest of Mr. Mudie's works, is characterised by evidences of much original observation; of a combinative habit of reflection on things observed; of clearness of narration; and of a capacity for discursive exciting

speculation. There is much of the poet in him. All that is spirit-stirring must proceed from the last two faculties of mind: but, perhaps, in no branch of human knowledge is there more need that they be strongly reined than in natural history. The fault of Mr. Mudie's present work may be, that he therein has not reined them sufficiently. A profound ornithologist has advised that the author certainly has not, in his remarks on the wind-resisting powers of the plumage of the mountain eagle.

Pritchard, Andrew, Author of the "Microscopic Cabinet:" The Natural History of Animalcules, containing descriptions of all the known species of Infusoria; with instructions for procuring and viewing them, &c. Illustrated by upwards of 300 magnified figures on steel. 8vo, 196 pages. London, 1834. 8*s.* 6*d.*

We are very glad to see this work. It is, or at least we presume that it is, a clear indication of the latest state of the knowledge of animalcules which has been attained in Britain. There are six plates crowded with figures of these creatures, whose forms are very varied, and those of some of them are very extraordinary. The exhibited species, and many more besides, are described generically and specifically, and "in good set terms," in the text of the book; where their systematic affinities, correlations of structure, &c., are treated of. The classifications followed in the general arrangement are derived from those by Müller and Ehrenberg. The last-named author's arrangement of the Phytozòa is given, distinctly, towards the end of the book; and to it are appended some remarks by Mr. Pritchard, who observes, at the close, that, "In a supplementary treatise, it is purposed to give a more enlarged systematic arrangement of the Phytozòa, according to their organisation, together with the result of such further observations as the author shall make or be favoured with." A plate, exhibiting Pritchard's achromatic microscope in different modes of adjustment, is prefixed to the volume.

Royle, J. F., F.L.S., &c.; late Superintendent of the East India Company's Botanic Garden at Saharunpore, &c.: Illustrations of the Botany and other Branches of the Natural History of the Himalayan Mountains, and of the Flora of Cashmere. 4to. In 10 parts, 1*l.* each. London, 1834.

An interesting and superior work, richly deserving the patronage of wealthy naturalists. Its foremost features are botanical; but with them are associated those of the geology,

geography, meteorology, and zoology of the range of country treated of. So limited and partial have been our knowledge and means of knowledge of this range of country, that an authentic and almost official book, in express contribution to an extension of our information, must be welcome, must be valued, must be taken into possession.

Parts i. and ii. are published. Part i. contains 40 pages of "Observations respecting the geographical description of the Flora of Northern India," and 10 lithographs, which bear coloured figures of the animal Lagòmys alpìnus *Desm.*, and of 15 species of plants. Part ii. contains coloured figures of 19 species of plants; a plate of geological sections; descriptive and general notices of numerous Himalayan plants of the orders *R*anunculàceæ, Dilleniàceæ, Magnoliàceæ, *Anonàceæ*, Menispermàceæ, *Berberídeæ*, Podophýlleæ, *N*ymphæàceæ, *P*apaveràceæ, *F*umariàceæ, and Crucíferæ. In some general observations prefixed to the descriptions, it is stated, that "the great diversity of soil and climate to be found in the British possessions in India is capable of supporting almost all the natural productions of every region of the globe.... Many, also, of the useful and ornamental productions of the hill provinces may, no doubt, be introduced into England and the rest of Europe: the principal of these will be pointed out."

Hooker, W. J., LL.D., &c.: The Journal of Botany, being a Second Series of the Botanical Miscellany. In quarterly 8vo parts, containing 96 pages, and several plates, some of them coloured. 7*s.* 6*d.* each part.

The two parts published contain papers of equal interest and merit with those which used to gratify us in the *Botanical Miscellany;* and we hope that the less price of the *Journal* will enlarge its sphere of service (for the kind of its service is valuable) in the republic of botany.

Ainsworth, William, M.R.S.L., Member of the Royal Geographical Society, &c. An Account of the Caves of Ballybunian, in the County of Kerry, with some Mineralogical Details. 8vo, 96 pages, with several woodcuts. Dublin, Curry and Co. 1834.

To many English readers it may be necessary to state that Ballybunian is so named from an old castle on the coast of the county of Kerry, north of the junction of the river Cashin with the embouchure of the Shannon.

Our information respecting the geology and mineralogy of Ireland has remained so defective, that we gladly hail any endeavours to make us better acquainted with particular parts

of that island; and we should have been much pleased to find, in the present volume, such a clear description of the district in which the caves are situated, as might be intelligible to the general reader; and the scientific details in accordance with the present state of geology. That our author has failed in these respects is, we think, rather owing to the want of proper arrangement, than of ability. There appears a desire of display, by a parade of new names, "to amaze the unlearned, and make the learned stare;" while the exploded terms "geognosy," and "geognostic," are still retained, and the reader left in doubt whether he is among strata equivalent to the lias and alum slate of England, or to slates and limestones of the transition series, or whether the older and newer strata are here in juxtaposition. Only one fossil is named to elucidate the subject. From the form in which the book is published, and the woodcuts that accompany it, the author evidently intended the work to be popular. To have insured this, the physical structure and scenery should have been under one head; the geology under another; and the mineralogy and natural history under a third: in place of which arrangement, the parts are so intermixed as to prevent the reader from obtaining a clear connected notion either of the parts or of the whole.

The caves of Ballybunian are excavations in the cliffs, formed by the action of water impelled by winds and tides into fissures, or excavating softer portions of strata in the cliffs. These caves, arches, and excavations are not of great magnitude, when compared with those in Scotland and the Hebrides, but they present many grotesque forms, and are well represented in the woodcuts in the present small volume. From the nearly horizontal form of the stratification, as represented in the cuts, and the description of the alum slate, and from its spontaneous combustion, we should rather have inferred that the strata belong to the lias group, than to the soft slates of the transition series; but the mineral characters of the limestones identify them with the mountain limestone so extensively spread over many of the Irish counties. The principal metallic substances are iron pyrites and copper pyrites. The latter mineral is, however, so much intermixed with extraneous matter as to offer little prospect of its being advantageously worked. Our author says that "the richness of the ore at Ballybunian, the abundance of the veins, and the facilities of working them, from their geognostic position and association, do not hold out any sanguine hopes of their ever being turned to very lucrative purposes." From the former part of this sentence, the reader would have in-

ferred a different conclusion; the author evidently means from the *poorness* of the ore, and the *want* of facilities of working the veins; the sentence would then be intelligible to English readers.

We have given a fuller account of this small volume, and offered our remarks more freely, than we should have done, had not the author informed us that he is engaged in more important researches on the mineralogy of Ireland. Should he publish the result of his labours, we hope he will not, as in the present volume, disguise every well-known mineral under the pedantic names given to them by some Continental mineralogists. This absurd jargon is justly falling into contempt among the best informed geologists and mineralogists of South Britain. The writer who would be a successful author, in any science, should recollect that his object ought not to be to make a parade of his own learning, but to convey information in a form which shall be the most generally intelligible.

ART. II. *Literary Notices.*

A SERIES of *Lives of celebrated Naturalists* is in preparation for the *Edinburgh Cabinet Library.* The series is to be in the order of time, and to embrace the promoters of all branches of natural history; and is to estimate the relative effects of the influence of each naturalist on the science.

A Prodromus of the Characters of the Plants of the Peninsula of India is in preparation by Dr. Wight and Mr. Arnott. The work will be written in English.

L'Institut; Journal Général des Sociétés et Travaux Scientifiques de la France et de l'Etranger. — From No. 41., sent to us, published at Paris on Feb. 22. 1834, we learn that *L'Institut* is published every Saturday; and is designed to include, in its eight pages quarto, notices of the titles and gist of papers read at all institutions, in France and out of France, on subjects of science; together with notices of newly published works on science. Messrs. Richter and Co., and M. Baillière, are the London agents for this work.

A Popular Introduction to the Modern Classification of Insects is in preparation, by J. O. Westwood, F.L.S., &c. It is to serve also as a sequel to the *Introduction to Entomology* of the Rev. W. Kirby and W. Spence Esq., and to comprise an account of the habits and transformations of the different families; and a synopsis of the British, and a notice of the more remarkable exotic, genera; and is to be illustrated with several hundred figures, some of them coloured.

THE MAGAZINE

OF

NATURAL HISTORY.

JULY, 1834.

ORIGINAL COMMUNICATIONS.

ART. I. *On certain recent Meteoric Phenomena, Vicissitudes in the Seasons, prevalent Disorders, &c., contemporaneous, and in supposed connection, with Volcanic Emanations.* No. 3. By the Rev. W. B. CLARKE, A.M. F.G.S. &c.

" Quid sit, unde sit, quare sit. . . . . quod ipsum explorare et eruere sine universitatis inquisitione non possumus, cum ita cohærentia, connexa, concatenata sint."—M. MINUTIUS FELIX, xvii.

METEORIC phenomena have been exhibited, during the last few years, on a scale of unusual magnitude, and more frequently than at many previous epochs. We will endeavour, in the present Number, to exhibit some prominent examples, and to trace their connection with corresponding derangements of the earth ; illustrating their occurrences by reference to more ancient events of similar complexion and character, and in conjunction, at the same time, with the other subjects which these papers [VI. 289., VII. 193.] profess to discuss.

The most extraordinary instance, perhaps, on record is that given in Silliman's *American Journal of Science and Arts*, xxv. 354—411. From the statements there published, of more than fifty credible observers, it appears that the whole of that part of the United States which is comprehended between the latitudes of 23° and 43° N., and the longitudes of 61° and 94° W., was visited by a most extraordinary display of falling and shooting stars, for nine hours (from 9 P.M. to daylight), on the night of November 12–13. 1833. The phenomenon was also visible to the passengers on board the Hilah from Liverpool, then on St. George's Bank, 300 miles from the coast. (p. 388.) It is impossible to compress into a reasonable bulk analyses of the separate accounts : I shall,

therefore, merely give the general description as collected from them all, the parallel cases, and the accompanying phenomena.

Nothing will express the remarkable appearance displayed, so well as comparing it to the most brilliant exhibition of rockets and fireworks. One observer calculates (*Amer. Jour.*, p. 389.) that at least 207,840 meteors were seen at Boston! They varied in size from that of the full moon (p. 379.) to that of a teacup (p. 384.), and even a point (p. 389.). Some of them were followed by a train of pale or bluish and reddish light, which, in one particular case, seemed acted upon by the wind. Phosphoric lines also marked the display. In some cases an explosion was heard * ; and a gelatinous substance was found, in three instances, where balls had struck the earth. (p. 396.) The height of these phenomena varied from a short distance from the surface of the earth to a considerable elevation (as calculated by the editor) above the atmosphere: in one case, clouds obscured the cause, though the light was seen through. But the immense arcs traversed, the parallaxes, and the perspective, proved that the height must have been immense, where they first appeared; though, in descending through the atmosphere, they exploded, in some few instances, within 10 ft. of the earth; and, in others, struck it.

The weather, it seems, throughout the whole extent of the region visited, was *suddenly* changed, immediately before the display, from *warm* to *cold*, accompanied by extraordinary transparency of the atmosphere. Calmness and frosts succeeded to storms and intense heat. (p. 386.) The wind had changed from S.E. to N.W., and, during the display, to N.E.; upon which the meteors increased in brightness and number. (p. 384.) The direction was generally to the west; but they appeared, to different observers, differently directed. "They fell," says one, "*in every direction, resembling a fall of snow.*" (p. 394.) The air was excessively electric during the display: clothes, hair, &c., were visibly affected. The declination of the needle is also, on good authority, supposed to have been increased. (p. 397.) The aurora borealis preceded, accompanied, and succeeded the meteors, as seen in different localities. (p. 397.) All the observers seem to agree in one fact, that the *radiant*

* One observer, Mr. Palmer (Newhaven), mentions a peculiar odour, which was compared by the whole company to a *smell* of *sulphur* or *onions*. (p. 384.) Mr. Trevelyan states, that, during the display of the aurora in the Island of Faroe, he has observed the peculiar odour present during electrical discharges from the earth. (*Encyc. Brit.*, viii. 623., 7th ed.) This, again, serves to connect these phenomena.

point was in the constellation of Leo; and that it agreed *exactly with the point to which the magnetic "needle would point when left free to move both vertically and horizontally.*" (p. 356.) * From this and other circumstances, it is concluded that this phenomenon was of similar character to that of the aurora borealis.† The "*concurrent phenomena*" are, the sinking down of an acre and a half of wood at Hudson, New York, full 30 ft. below the surface; the occurrence of a *trembling of the earth*, previously observed there, at Lynchburg; *a fall of rain*, on Nov. 13., A.M., at Harvard, when *not a cloud was to be seen* [and a luminous appearance, like the zodiacal light, on Dec. 3., at Newhaven]; and terrible gales of wind, on Nov. 13., between lat. 40° and 50°, and long. 30° and 50° W.

These are the principal particulars of the statements in Silliman's *Journal*. The authors mention, that it is their intention to consider, in a future number, previous examples of like phenomena; and to collect farther information, from distant parts of the west, before coming to any distinct conclusion. They dwell, however, on the fact of the appearances corresponding with the aurora, and on the light seen in the west on Dec. 3.; which, they state, was again visible on Dec. 29.‡

A similar phenomenon is also quoted (that of Nov. 12. 1799), seen by Humboldt and Bonpland, in Cumana; the particulars of which agree in all respects with those above mentioned. This was ascertained to have been observed through 60° of latitude and 91° of longitude (p. 369.); and the wind, as in 1833, *changed its direction*, and the weather became *suddenly cold*, a well-known condition of the aurora. (p. 360.) § It is also mentioned, that a similar occurrence took place about eighty years since; when *so many falling*

* Maskelyne states the same fact of the aurora of Oct. 24. 1769; and Humboldt of the meteor of 1799. The aurora of Sept., 1828, corresponded in this and in all the above-mentioned particulars.

† This opinion has been held by some, and disputed by others. Hof, Celsius, and Gisler are for the connection; but Bergman, Bernstoff, and Blagden are not inclined to admit it.

‡ "That the other luminous phenomena of the atmosphere have their origin in its electricity, cannot be doubted. . . . . Falling and shooting stars are only the same phenomena on a smaller scale; they appear at all seasons, but most frequently during the prevalence of the northern lights, and generally in the lower regions of the atmosphere." (*Encyc. Brit.*, viii. 623., 7th ed.)

§ That the aurora itself gives out *heat*, in high latitudes, is equally concluded from facts. It raises the thermometer, and affects the magnetic needle. (See *Q. R.*, xvi. 171.) Cold may be produced by the restoration of the equilibrium, though the heat must be electric.

stars appeared over the volcano of Gayambo, in Quito, that that mountain was supposed to be in flames. (p. 368.) The great *earthquake* of Cumana, in 1766, was also preceded by similar phenomena. (p. 368.)

Thus far I have followed the *American Journal;* nor can we dispute the apparent resemblance to the aurora which these meteors assumed. There are some facts which would still more strengthen that idea. The light spoken of on Dec. 3. 1833, and again on Dec. 29., was, perhaps, the aurora itself, as that meteor was seen *here* on the latter day. On Nov. 13., at 4 morning, during the display of meteors in America, occurred an earthquake at Chichester in Sussex.* Vesuvius was in eruption on the 24th; and, a short time before the 13th (the date I do not exactly know), Arica and Tecno, in South America, had been destroyed by an earthquake of great intensity. These facts, taken in connection with the stated *sinking* and *trembling* of the earth, and with the *fall of rain* at Harvard, may, perhaps, be allowed to bear considerably on the point at issue. I would also add, that, with reference to the meteors of Nov. 12. 1799, Humboldt has stated (ii. 512.) that the sky at Cumana was covered, from Oct. 10. to Nov. 3., with a reddish vapour, through which the stars shone. The heat was excessive before the meteors, though the thermometer was not higher than 26°. The usual breeze did not spring up, the air burnt, the earth cracked; on Nov. 4.,

* I add here a memorandum relating to this earthquake, which may be of use elsewhere:—

The 12th of November was (in this place) a very clear bright day: rain had fallen in the early part of the morning, but the afternoon was particularly brilliant. About 4½ P.M., I happened to go up to Wimborne on the London mail. About that time, I observed a fog, of singular character for the season, rapidly rising, and forming in clouds along the surface of the country; and its progress was evidently from the east to the west, i. e. the fog *rose* continually later to the west: it was not a sea fog, nor was it in motion from any wind. It rose exactly as steam rises from linen held before a fire; as I have occasionally seen mists formed among mountains, after rain, in very hot weather. By the time we reached Wimborne (not more than an hour), the fog was so intense that one could scarcely see; and it continued so till about 8 A.M. on the 13th, when it completely dispersed. I observed, at the time, that it seemed as if *the ground had been suddenly heated;* and *others coincided in the remark.* We heard, a few days afterwards, that the earthquake had occurred at Chichester at 4 A.M. on the 13th: and I could not refrain from connecting the two occurrences, as a similar thick fog preceded the earthquakes at Lisbon, on June 6. 1807, and on Feb. 1. and 2. 1816. [On Nov. 18. 1833, a thick fog extended all over France.]

It may be as well to subjoin, that the earthquakes which occurred at Chichester, on Sept. 18. 1833, and on Jan. 23. 1834, were felt in this place. I have already communicated the contents of this note to the Chichester Philosophical Society.

thick black clouds extended to the zenith; at 4 P.M., loud thunder was heard; and, a few minutes after, *in the midst of the loudest thunder, two shocks of earthquake* occurred; the direction of which, from north to south, was *unusual* for that country. Add to this, also, the occurrences of 1766, and those of 1753 or 1754, in Quito, and a connexion is apparent between the meteors and the earth.* It is somewhat singular, that, on Nov. 14. 1832, a phenomenon of like character with that of 1833 was witnessed in this country. A short time after midnight, on that occasion, a similar display of meteors, resembling the most brilliant fireworks, was seen all over the south of England, and in many parts of the Continent; and much alarm was occasioned in this neighbourhood in consequence. At that time occurred the earthquake at Bermuda, the eruption of Etna, and, closely afterwards, that of Vesuvius. (VI. 302, 303.) At Brunck, in the Tyrol, the meteors were preceded by the appearance of an intense light in the sky, which, about 6 A.M., descended from the sky, and was then drawn up into a globular mass; it then expanded, and from it issued *numerous meteoric stones.* The sky was *clear*, not ruddy. (*Austrian Journal.*) A letter from Brunn, in Moravia, dated at the beginning of Jan. 1834, states that, just before, an extraordinary meteor was seen there. Immediately after nightfall, a very vivid streak of light was suddenly seen, giving the idea of houses on fire. A noise as loud as thunder was heard, and the heavens appeared in a blaze. A round body of fire was seen at Poscowitsch, Austerlitz, Raitz, and many other places. Gradually it attained the size and appearance of the moon, increasing till it was as big as a house: it created great alarm. Rays of light, as bright as the sun, came from it; so that the naked eye could not endure it. There were no meteoric stones seen there; but Dr. Reichenbach found some, a few days after, near Blansko. (*French Journal.*) There was an earthquake in Baden about this time;

* Hecker has recorded the occurrence of extraordinary meteors in many places, as at Avignon, Paris, and in the East; where, Mezeray states, a globe of fire destroyed the vegetation [like that, I suppose, which, in the year 1737, fell on the Guaytecas Islands]: and these meteors were contemporary with the frightful earthquakes and universal fogs which carried such terror all over Europe and the East. (*Black Death*, p. 35. 40.)

During the earthquakes in Scotland, on Aug. 13. 1816, at the time of the shock at Dunkeld, a *meteor* was seen from east to west; *contrary* to the shock, which was from south-west to north-east. At Aberdeen, also, after the second shock, a thin white vapour settled on the mountains, though the air was clear.

The year 1764 offers several grounds for conjecture respecting this connexion: its phenomena were, frequent meteors, thunder storms, inundations, hurricanes, and earthquakes.

and, on Jan. 1., all the wells at Bienne threw out a quantity of silvery matter with a foaming torrent, that made the streets like milk. (*Gazette Universelle de Suisse.*) It was just the same during the earthquake at Lisbon, in 1755. (See *Ebel*, ii. 20.) Vesuvius was in eruption in January, also.

It is observable, that the shocks of earthquake * in Cumana, in 1799, were coincident in direction with that of the meteors; and, as a parallel case, I quote another: — While the coast of Chile was being elevated by earthquakes, on Nov. 20. 1822, meteors were observed *running along in the same direction as the shocks*, viz., from north-east to south-west; the preceding day (19th) being remarkable for the extreme rarefaction of the air. (*A. R.*) During the same month and year (on the 7th), luminous balls of fire were seen at Bourges, in France, of the size of the moon; followed by earthquakes at Heidelberg, Stutgard, &c., from the 25th to the 29th. The aurora was seen, on the night of the 7th, by Captain Parry. (*Second Voyage*, p. 381.)

That the aurora is connected with shooting stars, I had evidence, on the evening of Sept. 17. 1833; when, about the time that the beam of light appeared (9 P.M.) in the clear sky, several stars shot off from it to the southwards, continuing in sight, and leaving a slight train, for several seconds. Rain followed next day from the south, with wind. On the same day occurred a fall of snow at Caithness, with unusual cold; and, on the 18th, an earthquake was felt at Chichester, at 10 A.M.; the aurora and the zodiacal light being both visible in the evening of that day. On the 26th, Professor Farish observed, at Cambridge, a large meteor, tra-

* The years 1716, 1717, and 1718 are remarkable for meteoric phenomena. In 1716, on March 6., occurred an aurora of extreme brilliance; which was seen from Iceland to the east of Poland, and all over the north of Europe, from 50° lat. (*Gall. Nature*, iv. 394.); and, at that time, Grimvatn in Iceland broke out into eruption (*Scrope*, p. 248.). On Aug. 18. 1716, meteors were seen all over Europe, from 8 P.M. to 3 A.M. On Jan. 4. 1717, there was a shower of fire at Quesnoy. On March 17. there was an appearance of imperfect lightning; attributed to the aurora, but considered of the same character as that of 1737. (VI. 296.) On June 6., Vesuvius erupted, and continued in activity till 1718. Eyafilla Yokul was also in eruption this year. On March 6. and 7. 1718, occurred an eruption and a tremendous earthquake at St. Vincent. The mountain, whence issued clouds of dust, &c., disappeared, attended by a hurricane. (*Scrope*, quoting Moreau de Jonnes, p. 163, 164., and p. 255.) On March 19. 1718, an extraordinary blazing meteor was seen all over England and France. The account of it, by Dr. Halley, in *Phil. Trans.*, 1719, will bear comparison with that of the American meteors in Silliman's *Journal*. El Pico was also in eruption in 1718. On April 6. 1719, a shower of ashes fell in the Atlantic for 18 hours, so that volcanic action was continued.

versing the sky to the *magnetic north*, as large as the moon; though, in the horizon, it was no bigger than a thread.

On July 21. 1833, also, while an aurora illuminated the north, I saw a brilliant meteor travelling from east to west, as the moon was setting. Clouds were seen in the south; whence, next day, came wind and rain.

On Feb. 20. 1834, occurred a fourth shock of earthquake at Chichester, at a quarter before 2 A.M., attended by a rumbling noise ending in slight explosion; and, at one hour after noon of the same day, the aurora borealis was seen at Kendal in Westmoreland. It was described, in the journal whence I extracted the observation, as consisting of three pale stripes of light, which rose from a cluster of fleecy clouds a few degrees above the horizon, one point east of north, shooting to the zenith, still in contact with the clouds; one cloud in mid-heaven, the rest to the eastward. At $1\frac{1}{2}$ P.M., a beautiful stream of pale light was seen, extending in width as it shot upwards, like a plume of feathers: its progress to the zenith was rapid; but, as it passed this point, it melted in ether. (*Westmoreland Gazette.*) On Aug. 18. 1783, a great meteor passed all over England (*Phil. Tr.* abd. vol. xv.); and, on the same night, Vesuvius was in eruption, as well as a volcano in Greenland. Another meteor appeared on Oct. 4., at 3 A.M.; and, again, a third on the same day, at $6\frac{1}{2}$ P.M. (*P. T.* 1784.) On March 21. and 26., and April 12. and 26., there were also great displays of the aurora borealis. (*P. T.* abd. 1790.) Now, from March 20. to 26., there were earthquakes at Zante, Cephalonia, and Santa Maura [probably including the sea]. (*Lyell*, i. 414.)

It is also well known, that there were earthquakes all over the globe in 1783; and, from Feb. 5. to the end of 1786, Calabria was shaken. The volcanoes of Iceland were also in action at the period of some of these meteors. Thunder storms were also frequent, and hurricanes. On March 17., a thunder storm destroyed the castle of Montaignac, in France; on April 11., there was a hurricane at Venice; and, on May 13., the city of Kremnitz in Hungary was destroyed by lightning: and, on July 2., a dreadful thunder storm visited the whole of England; while, on Aug. 3., a similar storm destroyed twenty parishes in Orleans, France.

The meteor of Aug. 18. 1783 was observed to come from the north; and was actually seen by different observers, between the Orkney Islands and Rome, throughout its course. It might be debated, whether or not this meteor was generated by electrical forces, traversing a certain line, connecting Vesuvius, then in action, with other volcanic agents at the

extremities of the earth. Such a supposition might account for the velocity and force of attraction of these bodies; and would receive encouragement from what is known of magnetic curves surrounding the earth, and from the researches of M. de Bylandt. (VII. 83—88.)

In all probability, the great meteor which Krusenstern (*Reise um die Welt*) saw, in Oct. 1803, in lat. 37° 40′ N. and long. 14° 5′ E., was of similar character. It took the shape of a fireball; and left a luminous belt in the heavens for an hour, a quarter of a degree wide through its whole track; it was 15° high. (*Q. R.*, vi. 362.) On April 26. of that year, a fall of aerolites took place at L'Aigle, in Normandy*; and the celebrated hurricane at Lucknow occurred on May 31. On May 21. 1834, a large meteor, leaving a train, and exploding, passed over Hanley, in Worcestershire, at 1½ A.M., in a clear sky, in the direction of the wind, viz., N.E. It travelled with great velocity, and was very high. (*Wolverhampton Chronicle.*) On May 18., a tremendous hail storm, covering eight miles by three, occurred in Tyrone: not melted till next day. On the 25th, a heavy gale from N.E. did great damage at Dublin. During March and April earthquakes have been universal.

Captain Parry has stated that, on Dec. 14. 1824, he saw several very bright meteors, between 5 and 6 o'clock, P.M., "at which time the wind freshened from the N.W. by W., in a very remarkable manner.† On this occasion," he says, "as on the 12th of December, there appeared to be an evident connexion between the occurrence of the meteors and the changes of the weather at the time." (*Third Voyage*, p. 66.) This is exactly confirmed by the following extract from Silliman's *Journal* (p. 402.), where the writer says, "It is hardly possible to persuade ourselves that two concurrent phenomena, both as remarkable as the change of weather and the falling stars, were *independent of each other*; but it may prove a difficult point to decide what was the *nature of their connexion*: whether, as some have hinted, in observations already before the public, the meteors were occasioned by the change

* The analysis of these aerolites, as given by Vauquelin and Fourcroy, is as follows (*Phil. Mag.*, xvi. 302.):— Silica, 54; oxide of iron, 36; magnesia, 9; oxide of nickel, 3; sulphur, 2; lime 1: in all, 105.

† Captain Parry is borne out in this by what is related in the *Acta Litteraria Sueciæ*, 1734, p. 78.; and by Chladni, in the *Gothaisches Magazin*, xi. 712.; and by Forster, who observed that a violent wind succeeded each fireball which he saw. And Sir W. Hamilton observed that the smoke from Vesuvius, in the year 1764, was uniformly increased at the time of "bad weather." (*P. T.*, 1767.) The same freshening of the wind attended and increased the aurora on September 25. 1827.

of weather, in consequence of the highly electrical state of the atmosphere, which frequently follows such a change; or whether higher portions of the atmosphere descended, bringing the meteors along with them; or whether the meteors themselves, by disturbing the equilibrium of the atmosphere, caused air from colder regions to flow into the parts where they prevailed; or, finally, whether *some common and remote cause* is *to be sought* for, *that gave origin to both the change of weather and the meteors.*" The present undertaking may, perhaps, elucidate and explain this more probable solution of the difficulty. Two particulars are mentioned in Silliman's *Journal*, on which stress is there laid, viz., the *occurrence* of *tremendous gales of wind* between the lat. of 40° and 50° N., at the time of the meteors, and the sudden change of the air from *warm to cold.* I shall illustrate the former by powerful examples of violent winds in the course of these researches; but, for the present, shall only attempt to show that *cold* is a common effect of *meteors*, and also of *volcanic action.* I must, however, first prove that the *aurora* is almost always succeeded by a change in the direction and intensity of the wind, and of the atmosphere.

On the 12th October, 1833, a most brilliant aurora illumined the atmosphere (see Mr. Fielding's paper, VII. 50.), which Professor Airey has computed to have been from 50 to 60 miles above the surface of the earth. (*Camb. Phil. Trans.*) Mr. Fielding has registered the remarkable changes in the weather which followed this meteor, especially the *sudden decrease of temperature.* (VII. 51.) On the same day occurred a furious gale at Madeira, and all along the coast of British America. On the 13th and 14th we had, in England, a very heavy gale attended with rain. Being called up about 3 A.M., on the 14th, to go into Poole for a medical attendant, I had the opportunity of witnessing another display of auroral light, of a most interesting character. The moon was but one day old, and consequently did not shine; and the sky was covered with thick masses of clouds, which rushed rapidly across from the S.W. to N.E. But these clouds (which would have occasioned pitchy darkness) were illuminated by bright flashes of light, which traversed them in the direction of the magnetic meridian, communicating a general brightness equal to that of a clouded full moon. The night was, during this display, very warm, and a soft misty rain was falling; which was, however, during the darkness which preceded, and all the next day, extremely violent. Captain Parry (*Third Voyage*, p. 172.) mentions a similar phenomenon seen by him in crossing the Atlantic, and names Oct. 5. 1825,

when, he says, "the weather was dark and gloomy, but the sky, at times, so brightly illuminated, almost in an instant, as to give quite as much light as the full moon similarly clouded," &c. On Oct. 15. 1833, Brighton Chain Pier was struck by lightning; and on that day, also, there fell, most unexpectedly, a tremendous rain in the *Val di Noto*, on Etna, during eighteen hours, occasioning such a torrent, that the river Acellaro destroyed several houses, bridges, palaces, &c., drowning 100 persons.* (*Sicilian Journal.*) Either on the 12th or 13th (the date is lost) there was an earthquake at Antigua. The height of the aurora, on this occasion, tallies with the wide extent, including the localities of the gales, rain, and earthquake.†

Mr. Scoresby, in his *Account of the Arctic Regions* (i. 417.), considers the aurora, "under certain circumstances, as portentous," and says, "one of the most tremendous storms I was ever exposed to, succeeded a splendid exhibition of the northern lights." He has also mentioned the following dates of the aurora succeeded by storms, *variable in proportion to the intensity* of the meteor: viz. April 15. 1807; April 4. 1810; March 28. 1811; April 7. 1815; April 8. 1818; April 22. and 23. 1818. The foregoing examples are sufficient to connect the occurrences of the American meteors with the

* This rain, like that at Harvard (Silliman's *Journ.*), seems to have been the effect of some developement of electricity. The Italian papers call it *unexpected.*

† The ancient authors who speak of the destruction of Helice and Bura, cities of Greece (B. C. 372 or 373), mention *a column of fire*, which ascended very high into the air, during the time of the earthquake at Delos which preceded the ruin of the cities; but it is impossible to say whether this was or was not a *meteoric* phenomenon. (Seneca, *Nat. Quæst.*, vi. 26.)

In St. Isidore's *History of the Goths*, we find the following prognostics of the approach of Attila: — "Multa eodem tempore cœli et terræ signa præcesserunt, quorum prodigiis tam crudele bellum significaretur. Nam *assiduis terræ motibus* factis, à parte orientis luna fuscata est, à solis occasu stellæ cometes apparuit, atque ingenti magnitudine aliquandiu fulsit. Ab *Aquilonis* plaga *cælum rubens, sicut ignis aut sanguis*, effectus est, permistis perigneum ruborem linteis clarioribus *in speciem hastarum* rutilantium deformatis." Here we have the aurora concurrent with the earthquakes in the fifth century. It is curious to observe the expression "*speciem hastarum*" as descriptive of the same phenomenon which Pliny alludes to under "armorum crepitus;" and Gemma (A. D. 1575) under "*spears* and cities and waves, of clouds and battles." As an exception to the general character which the aurora bears in the minds of the uninformed, we are told by Malte-Brun, quoting Stein's *Geography*, that, in the first quarter of 1817, 12,000 persons emigrated from Wurtemberg, and that religious ideas influenced a great number; while the *aurora*, which appeared on Feb. 9., *was regarded by many as a sign that their emigration was favoured by heaven.*" (Liv. 141. tom. iv. p. 127., Brux. ed.) This aurora was seen in England, and was followed by deluges of rain.

aurora, if not with earthquakes, which certainly seem to correspond with appearances of both. Even the change from *warmth* to *cold*, which I will now allude to, evidences the same; as *cold* is produced by volcanic action, as well as by atmospheric phenomena. A writer in the *New York Advertiser*, who was riding in the stage, in St. Lawrence County, New England, informs us that he encountered a *snow storm* during the exhibition of the meteors of Nov. 1833; and that frequent flashes of light were seen, which were mistaken for lightning, but the meteors they did not see otherwise. (Silliman's *Journal*, p. 386.) This solitary exception to the general features of the phenomena is very valuable: and the following facts will bear out the narrator. During a *snow storm* at Trèves, on Feb. 29. 1817, St. Paul's Church, in that town, was struck by lightning, accompanied by loud thunder. The year 1823 was commenced with a frost of unusual intensity and duration*; yet, even up to the end of Dec. 1822, the volcanic operations of that remarkable year were continued; and while the frost lasted, and during falls of snow, an earthquake, on Jan. 30., shook the Island of Oeland and other places; and these convulsions succeeded those at Aleppo, which lasted till the 13th of that month. In Hungary, on August 4. 1833, a globe of fire, as large as a carriage wheel, broke against the mountains with a tremendous explosion. The atmosphere immediately became *cold*, and on the 6th the Alps were covered with *snow*; (*Courier*, Sept. 5. 1833); while, on the 11th of August, there was a considerable fall at Rottenberg, near Nuremberg. After the hurricane of Aug. 31. 1833 (of which hereafter), the thermometer, on Sept. 3., fell at Macon, in France, to zero, and snow fell on the neighbouring hills; on the 6th, the snow fell fast at Mortagne, in Charente Inférieure; and, on the hills near Dijon, was 2 in. deep. (The snow at Caithness, a few days later, I have mentioned in p. 294.) Hail fell in England on the 28th Jan. 1834, immediately before the sudden change of the long prevalent and violent s. w. gales to the north. This, like the rains which fell so abundantly during the last winter, as well as the *snow*† in France, Germany, and Scotland, in 1833, was, no doubt, electrical. But *volcanic action* has produced similar effects. Mr Kelsall, who was an eye-witness of the great eruption of Etna in 1809, writes thus:—"At 15 minutes past 9 A. M., April 1., a quantity

* The water-pipes under Cornhill, London, were found frozen, 3 ft. below the surface of the pavement. (*A. R.*)

† Some Englishmen on Etna, in 1814, and Dr. Hooker on Ben Nevis, in July, 1825, were affected by electricity very sensibly, during snow storms without thunder. (*Encyc. Brit.*, viii. 620., 7th ed.)

of dense smoke proceeded from the two rents specified above [in his account], which, raised to a considerable height in the atmosphere, before serene, was dilated, and formed a black cloud above 2000 paces in diameter, which presently discharged a copious shower of *large hailstones* upon the red-hot lava." The noise occasioned by the contact is described to have been "as violent as that from the discharge of a cannon of large calibre;" and an English officer, stationed at La Scaletta, 30 miles from Etna, "compared it there to a brisk fire from numerous batteries." (Notes to the First Part of *Two last Pleadings of Cicero against Verres*, p. 143, 144.)

During the eruption of Scaptaar Yokul in Iceland, in 1793, not only did rain fall in torrents, but also *hail* in showers, and *snow* in great abundance. Sir W. Hamilton informs us, "that during the earthquakes at Naples, on July 19. 1794, *cold* was sensibly felt, and ascribed to the electrical phenomena in activity. His servant, he tells us, felt an exceeding *cold wind* issue from a fissure very near the *hot fumaroli*; "but it did not surprise me, as before, on Mount Vesuvius, on the mountain of Somma, on Mount Etna, and in the Island of Ischia, I had met with, in particular spots, the like currents of *extremely cold* air issuing from beneath the ancient lavas; and, which, being constant to those spots, are known by the name of *ventaroli*." (*Phil. Trans.*, 1795.)

It is not now my intention to pursue the enquiry respecting *cold*, suddenly or permanently produced, on a *large* scale; as I intend to consider, in the next Number, together with hurricanes, some remarkable cases of *unseasonable* cold in certain years, with a view of showing that the terrestrial heat, affecting the ice of the polar regions, indirectly produces cold, as in the years 1816 to 1818 [see *Q. R.*]: but I shall state here, on the authority of Malte-Brun (liv. 107.), that in 1797, on Feb. 4., the whole province of Quito was overthrown by earthquakes, since which time, earthquakes have been continual, the sky is dull and heavy, the *temperature altogether altered*, and the *cold excessive*.

I have now to state some other cases of meteoric phenomena equally interesting with those of Nov. 12. 1833.

The year 1750 is celebrated for shocks of earthquakes throughout the earth. The Rev. Mr. Sedden of Warrington has recorded that, at the moment of the shock there (April 2.), he saw an infinite number of *rays of light, proceeding from all parts of the sky, to one point near the zenith.* The rays were at first yellow, afterwards blood-red, and were visible for twenty minutes. Dr. Doddridge of Northampton relates that, at 4 A.M. of Sept. 30 (the day of the shock at that place),

a ball of fire was reported to have been seen; that on the following night the sky was red as blood, and on the night after appeared the finest aurora he ever saw. (*P. T.*, vol. xlvi.) Several days before the shock at London (March 2.), there were reddish bows in the air, which *took the same direction as the shock.* (*Ibid.*) The aurora also accompanied the earthquake of Aug. 23. at Spalding. (*Ibid.*) Sir W. Hamilton mentions that for many hours after the eruption of Vesuvius, in 1799, the air "*was filled with meteors*, such as are vulgarly called *falling stars:* they shot generally in a horizontal direction, leaving a luminous trace behind them, but which quickly disappeared. The night was remarkably fine, starlight, and without a cloud." Ashes fell that night at Manfredonia, 100 miles from Vesuvius, two hours after the eruption. (*P. T.*, 1780.) The volcanic lightning and electrical phenomena, on that occasion, are mentioned as truly astonishing. Mr. Poulett Scrope has a similar remark respecting the eruption of 1822. (*Considerations on Volcanoes*, p. 81.) During the eruption of 1794, it is stated that "out of these gigantic and volcanic clouds, besides the lightning, both during this eruption and that of 1779, I have, says Sir W. Hamilton, with many others, seen balls of fire issue, and some of a considerable magnitude, which, bursting in the air, produced nearly the same effect as that from the air-balloons in fireworks, the electric fire that came out having the appearance of the serpents with which those firework balloons are filled." (*P. T.*, 1795.) Sir D. Brewster witnessed an aurora in combination with a thunder storm at Belleville, Inverness-shire, on Aug. 29. 1821, 9½ P.M. (*Encyc. Brit.*, viii. 623., 7th ed.)

On July 13. 1833, occurred an earthquake at Sutton Ashfield, Staffordshire, and it was followed on the 14th by one of the most frightful thunder storms ever known there. That electrical phenomena are connected with earthquakes may be supposed from the fact that, on July 19. 1785, there happened a thunder storm without lightning at Coldstream, which killed a man and some horses; being followed, on August 11., by a severe shock of earthquake. (*P. T.*, 1787.) Count Hippolito has recorded (see *Phil. Trans.*, vol. lxxiii.) that, on March 28. 1783, at the time of the earthquake in Calabria, flames rose from the ground, and, after the great concussion, towards the east a whitish flame rose, in a slanting direction, and had the appearance of *electric* fire. It was seen for two hours.

Hitherto, we have not considered the case of *meteorites*, but by almost all writers they are considered to have the same origin as meteors. The coincidences are the same in both cases. In 1812, on April 26., a meteor, accom-

panied by a fireball, and from 2000 to 3000 meteoric stones, fell in Normandy. On the 27th, St. Vincent's was in eruption, and on March 26. occurred the earthquake at Caraccas. M. Biot says that "the direction which the meteor must have followed *is exactly that of the magnetic meridian;* which is a remarkable result." (Nicholson's *Journal.*)

Professor Santi of Pisa, who at that time resided at Pienza, related to Mrs. Starke (*Information for Travellers*, 6th edit. p. 310. note x), that, on the 16th of June, 1794, just before the destruction of Torre del Greco, a "dark and dense cloud, at a great height, was seen from S. E., coming in the direction of Vesuvius, which is about 200 miles horizontally from Pienza. At this height, the cloud was heard to discharge noises like the sound of several batteries of cannon; it then burst into flames; at which moment fell a shower of stones for seven or eight miles round, when the cloud gradually vanished. These stones are volcanic, being composed of grey lava, resembling what is found on Vesuvius; and Professor Santi, who took infinite pains to investigate this phenomenon, felt confident that the cloud rose from Vesuvius, which was at that moment disgorging fires, whose force and effects cannot be calculated," &c. The Earl of Bristol (Bishop of Derry) also wrote to Sir W. Hamilton, that on July 12. 1794, just eighteen hours after the eruption, stones fell at Sienna, 250 miles off, in the midst of a violent thunder storm. (*P. T.*, 1795.) See VI. 297.

On August 29. 1833, the whole province of Nepal, and neighbouring parts of India, were desolated by continued shocks of earthquakes. Monghyr, Patna, Lucknow, Purneah, Katmandoo, &c., suffered dreadfully; 10,000 houses being overturned, and from 600 to 800 lives lost. A few days after, there occurred a fall of aerolites at Candahar, which broke in the windows, roofs, walls, &c., killing a child, and attended by lightning and meteors, and followed by a *fog* for six days.* The earth at this time was shaken throughout:

* It is stated, that, during the earthquake at Lisbon, in Nov. 1755, London, and, in fact, the greater part of England, was visited by one of the greatest fogs ever known. (*A. R.*, 1813.) The occurrence of *fogs* on these occasions is an additional link in my argument. M. Falda has stated that, on July 13. 1797, at 9½ P.M., he witnessed a meteor in the south-west, of the form of a globe, almost as large as the moon at full; its course being marked by a perpendicular streak of dazzling white light. The weather was hot. The thermometer varied from 18° to 20° Reaumur; and, between 4 and 5 P.M., there had been a storm in the same quarter of the heavens. At the time of this phenomenon, the earth was overspread by a pale mist, through which no stars could be perceived; and which, the following night, became a thick fog. (*Polehampton*, iv. 461.) During

for on Aug. 13. Vesuvius was in eruption; 23d, there was an earthquake at Hulst, and on the Axel in Holland; 27th there were earthquakes in Maryland, Virginia, doing great damage; and besides those in India on 29th, Jamaica was also shaken at the end of the month. I shall adduce these hereafter, as the cause of the dreadful hurricanes of August in general, especially of that of August 30. and 31. Drought and the cholera attended these earthquakes as they occurred. That the air must have been exceedingly electrical at this time may be inferred from a striking fact, that on September 1., in the midst of a long and afterwards protracted drought at Antigua, rain suddenly fell for twenty-four hours in that island; and I can only attribute it to the same cause which had produced the hurricane of the two preceding days in Europe.

On July 19. 1816, during the storms, inundations, and hurricanes of that month and the next, there fell at Sternenberg, near Bonn, a number of aerolites, one of which weighed 100 lbs., others from 20 to 40 lbs.: their specific gravity was that of marble, and their appearance was like iron scoriæ. The analysis I know not. On August 7. Vesuvius was in eruption, and on the 13th all Scotland was shaken by earthquakes. On February 1. and 2. there were earthquakes at Lisbon; on March 27. the midland parts of England were shaken. On September 24. there was a rare exhibition of the aurora in the N. W., attended by an arch of light in the east.

A singular circumstance occurred on October 20. 1824, when hail, enclosing mineral stones (*der mineralische kerne*), which Chladni took for sulphur, but which were discovered to be a new meteorite, fell at Sterlitamanck, government of Orenburg, in Russia. (See Eversmann, in *Kastner's Archiv*, v. 2. 196.; Chladni, in *Poggendorf's Annalen*, vi. 1. 30.; fully treated of in *Bulletin de la Société des Naturalistes de Moscou* for 1832, v. 45.*)

At the end of March, 1832 (*Moscow Russian Gazette*, April 11. 1832), there fell, with snow at the same time, in the plain of Kirianova, 13 versts from Wolokolansk, an inflammable yellowish matter like snow or wool, over an extent of 80 to 100 square rothen (600 or 700 feet), and from 1 in. to 2 in. deep.†

fogs, the air is most electric. The air is, however, represented as particularly clear during the occurrence of various meteors alluded to in this paper.

* The same journal records that there was an earthquake at Sympheropol, on Jan. 17. (29.) 1832, at 11½ A.M., also at Sevastopol (60 versts off), which did great damage. Barometer fell all day. Thermometer, 3½ Reaumur; wind s.w.; sky covered with light clouds. (Cons. Steven, in *Bulletin de Moscou*, iv. 207.)

† On March 14. 1813, there fell in a heavy snow storm, at 4 P.M., a

This substance was analysed by M. V. Mariawieff of Astaschava, near Wolokolansk; and it appears that the matter in question contains a new meteoric substance, which Dr. Hermann calls uranelain; from *ouranos*, heaven, and *elaion*, oil. Dr. Hermann asks how it came in the air, and suggests that it must be resolvable from the elements of the atmosphere, since it could not come from storm or electrical attraction, as there is none on the earth's surface. He also notices the coincidence of this phenomenon with the outbreak of the cholera at Paris; "die die Cholera in der Hauptstadt Frankreichs anrichtete, die Aufmarksamkeit der Naturforscher in arhöhten Grade auf Erscheinungen hinzulenken geignet sind, die auf Veründerungen in dem gewohnlichen Mischangs-Verhältnisse der Atmosphäre deuten." (*Bulletin de la Société des Naturalistes de Moscou*, v. 45.)

An occurrence similar to that of October 20. 1824, took place on July 4. 1833, when a cloud from the west passed over Nakratchine in Tobolsk, at about 3½ P. M., discharging at the same time *cubical aerolites* and *hailstones* as large as a goose's egg.* The windows of the village were broken, and vegetation destroyed. (*Petersburgh Journal.*)

---

red powder, at Idria in Carniola, which coloured the snow for several hours, after which the usual tint remained; but, a few hours afterwards, the powder, which was in a stratum from 1 to 2 in. thick, was obtained by melting the snow. This powder was extremely fine, and of a reddish yellow: it contained some specks like mica. Boiling water separated a yellow vegetable gummy matter. By calcination it became black, and lost 0·20 of its weight; it was dissoluble by muriatic acid, and contained silica 0·3675, alumine 0·1175, carbonate of lime 0·1750, oxide of iron 0·00125, oxide of titanium 0·0875, organic matter 0·2400 = 1·0000. The extraordinary part of this is the occurrence of titanium, a very rare metal at the surface of the earth. (*Annales des Mines*, v. 282.)

While writing the above, my attention was drawn to the following extract of a letter from Rodelheim, near Frankfort, dated May 3. 1834:—"We had, yesterday and to-day, a most extraordinary phenomenon of nature. During very heavy showers of rain, which fell, yesterday from half-past eleven till twelve, and to-day between twelve and one o'clock, the water contained so great a mixture of sulphur, that, as it ran down the streets, it was covered with a yellow crust, and quantities of sulphur might be scraped off the pavement." (*St. James's Chron.*, May 15. 1834.)

The only solution of this is, that sulphuric fumes, from some volcano in action, were condensed and mingled with the steam, which probably ascended at the same time. Sulphur, however, is carried up frequently in storms, as proved by Fusinieri, by its deposit by lightning on a house at Vicenza, in 1829; as well as iron, in 1827, and 1831, at Vicenza and Padua. (*Encyc. Brit.*, viii. 620, 621., 7th ed.)

* Three days previous (July 1.), hail storms of unusual fury desolated the whole province of Liège, doing incalculable damage, and ruining the crops. (*Journal de la Belgique.*) See the account of the hail storm at Tussi, July 24. 1832 (which, by the way, was contemporaneous with volcanic action), in *Encyc. Brit.*, viii. 622., 7th ed.

Dr. Hermann relates that, in May, 1728, a stone fell in the presence of General Prince Peter Gortschakoff at Tscheroy, between Kraiovo and Widdin, accompanied with hail and a furious hurricane. Dr. Hermann analysed a specimen of it, given him by M. A. V. Bachmetieff, which was received by him from the prince. The result was, that it was found to contain *sulphate of lime*, with traces of *common salt*, *water*, and an inflammable substance; consequently it was muriacite or anhydrite.* Hermann says it was surprising to see a by no means common mineral as anhydrite, fall from the air at Widdin, the nearest locality of that mineral being at the salt mines of Wieliczka in Poland. The storm, therefore, he thinks, must have brought it from Wieliczka.† The author justly remarks, that this circumstance may elucidate the formation of meteoric stones, especially as there are other examples, of which he quotes the meteorite of Juvenas, which corresponds with the dolerite of Meissner, or lava from Vesuvius, and Stromeyer's discovery of nickel in the olivine of the Vogelsgebirge, which is verified as the olivine of Vesuvius.‡ He says also, that, though no one can properly say that iron is a regular compound of meteoric stones, yet it may be introduced by electric polarity, through the friction of the falling and projected stone. He quotes a volcanic bomb from Vesuvius in 1830, which very readily attracted the needle from its meridian, when 40 grains of it were mingled with one third part of hydrogen gas and sulphuric acid, the bomb containing traces of fused iron. (*Bulletin de la Soc. des Natur. de Moscou*, vol. v. p. 59—63.) The title of Dr. Hermann's paper in the Bulletin is, "Untersuchungen verschiedener in Russland gefallener meteorischer Substanzen von R. Hermann." In addition to those here recorded, we may mention that an aerolite fell at Bjelostock, in Russia, on Oct. 8. 1827, at 9–10 A. M. (*Gaz. Géog.*, p. 238.) In the same year fell a meteorite at Drake's Creek, 18 miles from Nashville, Tennessee.

The views of Dr. Hermann are borne out by the analysis of an aerolite which fell near Richmond, in Virginia, on June 4. 1828. Both microscopic and chemical examination proved it to be composed of mineral substances well known. It contained the chrysolite, feldspar, phosphate of lime, me-

* "Dass es auss schwefelsauren Kalke mit Spuren von Kochsalz, Wasser und einer brennbaren Substanz bestand, mithin dichter Muriazit oder Anhydrit war." Phillips gives Klaproth's analysis:—lime 42, sulphuric acid 56·5, muriate of soda 0·25.

† The height of Wieliczka above the sea is 102 feet. (Gruithuisen.)

‡ Olivine was found in the meteorite of Krasno-ougol, together with oxidulated iron, and native iron. (See VI. 301., Sept. 9. 1829.)

teoric iron, and protosulphuret of iron, in distinct crystals. The two former substances made up the greater part of the mass. Every thing gave reason to suppose that this stone was *volcanic.* (*Amer. Jour.*, xvi. 194.) *

It now remains for me to offer a few remarks respecting the origin of the extraordinary phenomena which have been the subject of my present observations. Various hypotheses have been brought forward to solve the difficulty. Some have contended that meteors are independent bodies, revolving like comets, and occasionally brought within the earth's atmosphere. Others, with the celebrated Halley at their head, considered them to be combustible vapours suddenly ignited on the verge of our atmosphere. Dr. Blagden (*Phil. Trans.*, 1784.) regarded them as electrical. M. Izarn and others believed them to be volcanic materials projected in eruptions. Chladni considers them as unconnected substances afloat in free space, suddenly inflamed. Olbers and the editors of the *Phil. Trans. abridged* have regarded them as projectiles from the moon. This, however, is giving to the man in the moon a skill in rifle-shooting which we have no authority for. Surely Dr. Herschel, who has brought the volcanoes of the moon within forty miles of Hounslow, would have seen an eruption before now, if they be so frequent † as these supposed selenitic bodies would infer, in that hypothesis. The latest notions on the subject are, those of Mrs. Somerville (*Connection of the Physical Sciences*), whose hypothesis is that of Olbers; and that of Dr. Brewster, quoting the experiments, &c., of Fusinieri (in the *Encyclopædia Britannica*, vol. viii. p. 585. 7th ed.; which latter has engaged the notice of the *Edinburgh Review*, April, 1834, p. 170. The opinions of Fusinieri are entitled to the highest consideration.‡ He shows that, in electrical experiments, and

* The meteoric iron of Louisiana, and of Santa Rosa, in South America, each contain the same proportions; namely, iron, 90·02 parts; nickel, 9·674. Mr. Sheppard considers them portions of one aerolite, which traversed the atmosphere in a direction parallel to the extent of America. (Silliman's *Journal*, xvi. 217.) Berzelius has given the analysis of a meteorite which fell in Macedonia (date unknown), which is principally composed of nickel, iron, magnetic pyrites, and olivine. (*Archiv Kastner.*, xvii. 228.)

† "The fall of meteoric stones is much more frequent than is generally believed; hardly a year passes without some instances occurring," &c. (*Somerville*, p. 401.)

‡ In justice to him, as well as to my own reasonings, I must here quote a passage from the article on Electricity, in the *Encyc. Brit.*: —

"M. Fusinieri has collected and detailed many interesting observations respecting the substances deposited by lightning upon the various parts of houses which have been struck by it; but we regret that our limits will not permit us to pursue any farther this most important subject. These and

in thunder storms, mineral substances are evaporated by the heat evolved, and that portions of metals, &c., are actually carried off by the electric action, and deposited upon other bodies, by precipitation, in a state of ignition and fusion. Now, allowing this to be the case, and the evidence adduced in this paper strengthens the idea, we need not, I think, go beyond the earth for a solution of the enigma. The whole mass of testimony, without an exception, involves the notion of intense heat, and the developement of electric force.

We have seen, in what has gone before, that meteors and meteorites must have a similar origin; that they are connected with electric phenomena; that they produce or are followed by electrical changes in the atmosphere; that snow, rain, hail, lightning, the aurora borealis, shooting stars, and aerolites are frequently contemporaneous and connected with each other, and with earthquakes and volcanic emanations and explosions; that, about the time when the earth is in particular excitement from the latter phenomena, the former are more numerous and most intense; and that very frequently direct evidence has been afforded of a volcanic origin. Analysis has proved that there is no substance in meteorites not found in the earth, except in one or two particular cases, as in that of Sterlitamanck and Kirianova; that nickel, long supposed to be a meteoric metal, is found in mineral masses of terrestrial origin; and that there are frequently traces of

---

many other facts seem to prove that iron exists in the air and in clouds, and it is well known that the same metal mixed with manganese, nitrous salts, and organic substances, is found in rain water. M. Fusinieri is of opinion, that the iron has been drawn from the earth, and chiefly from mountains, where the mines are most frequented, and where storms commonly begin to form. [This by the way agrees perfectly with the idea of Dr. Hermann.] The colouring matter of snow and rain, and the existence of meteoric stones, prove the existence in *our atmosphere* of dry and ferruginous vapours, the molecules of which are more or less rarefied or condensed, according to the causes which may generate them. The fact that meteoric stones fall during the prevalence of storms and other electric phenomena, and especially the fact that hailstones have sometimes a nucleus of small pieces of sulphuret of iron, appear to M. Fusinieri to afford the true origin of these remarkable bodies. It has been already proved that electricity does transport matter; and when we consider, as Ampère has shown, that magnetic currents surround our globe, that matter in an extreme state of subdivision spontaneously expands itself, and that radiating heat, like electricity, transports ponderable substances, we may obtain a very simple explanation of the origin of meteoric stones. As the temperature of the *surface* of the globe is not high enough to detach from it the material bodies which exist in the atmosphere, M. Fusinieri concludes that we ought to attribute this action to *other* causes, which are yet to be discovered, rather than deny a fact *so completely demonstrated.*" (p. 621.) May not my illustrations in this paper justify me in considering a sufficient cause already discovered?

positive volcanic matter in stones that have fallen at a time when no volcano has been in the immediate vicinity. We know, also, that volcanic ejections have been carried even from Vesuvius and Etna as far as Constantinople; and that there must be thousands of earthquakes and volcanic eruptions, of which we can know neither the character nor the existence.

How volcanic agents are primarily called into action, I do not profess to understand: the object of these researches (if such they may be called) is not to speculate on the origin, but the supposed effects, of terrestrial derangement. That electricity is intimately connected with certain states of the earth, and that those states or those effects do modify the variations of the atmosphere, there is no question: but whether electricity be itself a first cause of earthquakes, or, like magnetism (to which it appears to be akin, if not identically the same thing under another form), merely a secondary cause, produced by volcanic action, itself reproducing corresponding phenomena, I do not intend to moot. It is sufficient for my purpose, to endeavour to show, as I think I have satisfactorily shown, that the meteors which have been such extraordinary objects of interest during the last few years, especially during 1832, 1833, 1834, are, as far as the produced examples warrant us in believing, more likely to have arisen in consequence of the increased action in the interior of the earth, as developed by earthquakes and volcanic emanations, than from any other cause with which we are acquainted. Should it ever happen that we actually ascertain every substance contained in the earth, the interior of which may be of different construction to its crust, which appears to be a huge galvanic and electrical apparatus, it will then be time to speculate on the moon or the planets, should a substance which the chemists of that day may not actually know, come within the reach of their crucibles and tests.

Stanley Green, May 16. 1834. W. B. Clarke.

Facts supplementary to Essay No. 2. p. 193. to 202.—*Locusts*, p. 195. By recent letters and the *Canton Register* it appears that locusts, in 1833, infested several provinces in China, especially the northern. In 1834, they appeared, of immense size and in vast hordes, and were exhibited in the shops at Canton. Hecker (p. 29, 30.) relates the same thing of the same provinces of China respecting the years 1336 and 1337, at the commencement of the Black Death.

Wasps and other Insects. A Subscriber, Vale of Alford, in p. 265., confirms my remarks on wasps, in p. 197. Perhaps Mr. Bree will allow me to make use of his observations, in p. 262., as illustrative of my position, although he may not be inclined to accept that as a solution of his enquiry.

A writer in the *Hereford Journal* (May, 1834) says that insects have wonderfully increased in that county this season. He mentions cockchafers especially; and says, that at Caldicott and Bullingham, two fields, with the gates, &c., were covered by a black caterpillar, with white spots on the side of the body. They were collected in heaps and burned. This corresponds with what is mentioned of the years 1762 and 1782, at p. 197. The *gout* in wheat is also very common at this time in Dorsetshire, a complaint known to be the effect of insects. — *W. B. C.*

[*Wasps.* (p. 265.) — I observed the same abundance to prevail, in the same season (the summer of 1833), in all places in the neighbourhood of London. — *James Fennell. Temple, May,* 1834.

Melolóntha vulgàris. (p. 247.) — In 1833 I observed only one, and could not help noting its general scarcity about London. — *Id.*

Locusts in France, in 1833. (p. 196.) — They have appeared in such swarms in some departments in the west of France, and have become so destructive to vegetation, that the council general of the Sarthe have assigned a sum of 6,000 francs for the destruction of them, at the rate of ten sous a bushel. (*Sun,* May 23. 1833.) — *Id.*]

ART. II. *Shakspeare a Naturalist.* By S. H.

"He was an exact surveyor of the inanimate world; his descriptions have always some peculiarities, gathered by contemplating things as they really exist."—JOHNSON'S *Preface to Shakspeare's Plays.*

IF it be possible to add a charm to the pursuit of natural history, I think it would be done by associating it with the study of poetry, to which it seems so strongly allied, that one might be surprised how it ever got separated, did one not consider how many men there are whose whole wish and endeavour seem to be to render knowledge unpopular and exclusive, and to make harsh and crabbed "what is musical as Apollo's lute." Every lover of nature, that is of the fields, the woods, the rocks, the mountains, and the things that are therein, must, necessarily, be of a poetical temperament, for in

all these objects is the soul of poetry contained, and it is to these the poet must look for inspiration; for in nature is the "only fund of great ideas." To such a one as this, the author whom I propose to illustrate must be a favourite, as being of a kindred spirit, and to him the instances I quote, and the illustrations I may make will be familiar; but there are many who read this great author who are not naturalists, but feel the greatest admiration of his writings from other sources; and, for these, I shall endeavour to open a new channel of gratification and, it may be, lead them to investigate more narrowly what they read so happily touched on.

Shakspeare, though, I suspect, little acquainted with books, and certainly not with systems, for in his day they did not exist, was an excellent *naturalist*; for he had studied, doubtless, where all who wish to become really and truly acquainted with nature must study, in the open air, in the fields, and in the woods. In the truant occupations of childhood, in bird-nesting, nutting, &c., we may fancy that his knowledge was attained; and, doubtless, it is in these wanderings that many of us acquire our first taste for the things of nature, and become acquainted with the habits of the beings that cross our path.* But in Shakspeare these truancies continued in manhood, and to these we owe, in particular, those many beautiful,

[* "*Shepherd.* Do you ken, Mr. North, that every thocht, every feeling, every image, every description, that it is possible for a poet to pour out frae within the sanctuary o' his spirit, seems to be brought frae a hidden store, that was gathered and girnell'd, and heaped up by himsell unconsciously during the heavenly era o' early life?

"*North.* True, James, true. O call not the little laddie idle that is strolling by some trotting burn's meander, all in aimless joy by his happy self — or angling, perhaps, as if angling were the sole end of life, and all the world a world of clear running waters — or bird-nesting by bank and brae, and hedge-row and forest-side, with more imaginative passion than ever impelled men of old to voyage to golden lands — or stringing blaeberries on a thread, far in the bosom of woods, where sometimes to his quaking heart and his startled eyes, the stems of the aged mossy trees seemed to glimmer like ghosts, and then in a sudden gust of the young emotion of beauty, that small wild fruitage blushed with deeper and deeper purple, as if indeed and verily gathered in Paradise — or pulling up by the roots, — that the sky-blue flowers might not droop their dewy clusters, when gently the stalk should be replanted in the rich mould of the nook of the garden, beside the murmuring hives, — the lovely Hare-bells, the Blue Bells of Scotland — or tearing a rainbow branch of broom from the Hesperides — or purer, softer, brighter far than any pearls ever dived for in Indian seas, with fingers trembling in eagerest passion, yet half-restrained by a reverential wonder of their surpassing loveliness, plucking from the mossy stones primroses and violets! And almost sick with the scent of their blended balm, faint, faint, faint as an odour in a dream — and with the sight of their blended beauty, the bright burnished yellow, — yes, at once both bright and pale, — and the dim celestial blue, — yes, at once both celestial and sullen, — unable to determine in the rapt spirit within him, whether primrose or violet be the most heavenly flower of the wilderness! ....."(*Blackwood's Magazine*, "Noctes Ambrosianæ," Nov. 1828.)]

and one pathetic, notices of the antlered race, whose habits he had studied in the park at Charlecote, near Stratford.

The object of the present paper will be, to show what a wonderful acquaintance Shakspeare possessed with the objects of nature, far beyond any dramatist or poetic writer of his age; how accurate and just his descriptions of the habits and appearance of these objects are; and to give an account of the fabulous animals, and fanciful suppositions regarding those that actually exist. By this latter division of the subject will be exhibited the popular notions upon natural history, of the days of our author; for, when he relates any of those superstitious ideas, we may rely, I think, upon their being those entertained by the people of his day, since his small acquaintance with the classical and other writings of Rome and Greece, precludes the chance of his having drawn them from those sources: nevertheless, he mentions many animals of this class, with which his school reading, and the translations of the writers of antiquity then existing, must have supplied him. To illustrate these divisions will be my aim, by passages confirmatory or explanatory, drawn from ancient and modern authors.

Before entering upon the more systematic part of this essay, it will not be uninteresting to observe with what comparisons he portrays the beauty, excellence, and general character of the fairest part of the creation, and of her lord and master. If his female is beautiful, he gives her "doves' eyes," and "roses in her cheeks," with lips like "kissing cherries," and face of "lily tincture." She is "straight as a *wand*;" her fingers are white as *milk*, and soft as *flowers*; her embraces like the encircling of *woodbine* and *honeysuckle*; and her superiority over her fellows is compared to a "snowy *dove* trooping with *crows*." Her voice is melodious,

> "More tunable, than lark to shepherd's ear
> When wheat is green, when hawthorn buds appear."

If she be angry, which I have heard the sex sometimes is, she is like a "fountain troubled;" if she be deceitful, her tears prove *crocodiles*. After all, when time and beauty is over, from her "fair and unpolluted flesh" the "violets spring."

If he describes the dignity of man, it is thus, in a passage which needs no comment:—"What a piece of work is man! how noble in reason! how infinite in faculties! in form and moving, how express and admirable! in action, how like an angel! in apprehension, how like a god! the beauty of the world! the paragon of animals!" If he describes him angry, he is like an "*empty eagle*," or a "*lion* wanting prey;" if still and imperturbable, his visage

> "Does cream and mantle like a *standing pool*;"

if a lover,

> " He may bestride the *gossamers*
> That idle in the wanton summer air,
> And yet not fall;"

if a villain with a smiling cheek, he compares him to " a goodly apple rotten at the heart;" and, when old, his arms are

> " Like to a wither'd pine
> That drops its sapless branches to the ground."

When Warwick dies, in what a fine strain of metaphor, drawn from natural objects, he makes him lament:

> " Thus yields the *cedar* to the axe's edge,
> Whose arms gave shelter to the princely *eagle*,
> Under whose shade the ramping *lion* slept;
> Whose top branch overpeer'd Jove's spreading tree,
> And kept low shrubs from winter's powerful wind.
> These eyes, that now are dimm'd with death's black veil,
> Have been as piercing as the mid-day sun,
> To search the secret treasons of the world."

When Wolsey falls from his high state, how beautifully he moralises; comparing man to a tree that puts forth leaves, blossoms, and then is killed by frost when its fruit is ripening. These lines are too well known to present them here. In another passage he likens his fall to " a bright exhalation in the evening," which passes swiftly away and is no more seen; another phenomenon of nature, equally well selected with the former, to express the suddenness with which worldly glory and prosperity frequently disappear.

There are a few more passages regarding man which must yet be noticed; such as the accurate description of the appearances presented by one who had been strangled, and the sensations of one poisoned. They both contain that which, if all the rest were wanting, would prove Shakspeare to have been a most accurate and intense observer of nature, whether human or external.

> " See! his face is black, and full of blood;
> His eye-balls further out than when he lived;
> Staring full ghastly like a *strangled man:*
> His hair uprear'd, his nostrils stretch'd with struggling,
> His hands abroad display'd, as one that grasp'd
> And tugg'd for life, and was by strength subdued."
>
> *Henry VI.*, Part ii., act 3. sc. 3.

> " Poison'd. . . . . .
> And none of you will bid the winter come
> To thrust his icy fingers in my maw;
> Nor let my kingdom's rivers take their course
> Through my burn'd bosom; nor entreat the North
> To make his bleak winds kiss my parched lips,
> And comfort me with cold." *King John*, act 5. sc. 7.

The next quotations I shall insert, show that the existence of the goitre, incident to mountaineers, was known in this country in Shakspeare's time; and that credit was given to the inventions of travellers, too fertile in that age, concerning the human race. From these inventions we must except the cannibals, or anthropophagi, which, to the infamy of our nature, did some few years ago exist in New Zealand. See Pliny's *Nat. Hist.*, lib. vii. cap. ii., for the fabulous varieties of the human race.

——— "When we were boys,
Who would believe that there were mountaineers,
Dewlap'd like bulls, whose throats had hanging at them
Wallets of flesh? or that there were such men,
Whose heads stood in their hearts." *Tempest*, act 3. sc. 3.

"The *cannibals* that each other eat,
The *anthropophagi*, and *men whose heads*
Do grow *beneath* their shoulders." *Othello*, act 1. sc. 3.

I now proceed with a more regular distribution of my subject. ["Unicorns" are the subject next treated of; but these we pass, and take that which succeeds them: the stag.]

STAG.

"The wretched animal [a stag] heaved forth such groans,
That their discharge did stretch his leathern coat
Almost to bursting; and the big round tears
Coursed one another down his innocent nose
In piteous chase." *As you like it*, act 2. sc. 1.

"Left and abandon'd of his velvet friends." *Ibid.*

"If we be English deer, be then in blood:
Not rascal-like to fall down with a pinch;
But *rather moody mad, and desperate stags*,
Turn on the bloody hounds with heads of steel,
And make the cowards stand aloof at bay."
Henry VI., Part i. act 4. sc. 2.

"Like the *stag* when snow the pasture sheets,
The barks of trees thou browsedst."
Antony and Cleopatra, act 1. sc. 4.

The tears of the wounded stag, so pathetically described above, I find thus mentioned by Sir Philip Sydney (*Arcadia*, b. 1.) Kalander, "with a crossbow, sent a death to the poor beast [a deer], *who with tears* showed the unkindness he took of man's cruelty:" and Herrick makes a part of Oberon's feast to consist of "slain stag's tears."

In Jesse's *Gleanings*, p. 187., the fact of a wounded stag being abandoned by the herd is thus confirmed. "It is well known, that, when a hard-pressed deer tries to rejoin his companions, they endeavour to avoid and get away from him as much as possible, or try to drive him away with their horns." And in the same author it is, I believe, mentioned, that deer

feed upon the barks of trees in severe winters, unless fodder is supplied them, as is usual at that season.

[*Received on Feb.* 26. 1834.]

[THE subjects of the remainder of our correspondent's long essay are the following, and are disposed in the following order: —

Lioness, mermaid, horse, bears, ass, weasel, ferret, monkey, Irish rat, squirrel, fox, dogs, mole, conies, mouse; phœnix, nightingale, wren, swan, swallow, starling, harpy, pigeon, kingfisher, cuckoo, barnacle, goose, osprey, quails, pelican, lapwing, raven, crow, parrot; basilisk, toad, dragon and griffin, eels, serpents, blindworm, viper, crocodile; bees, breezefly, glowworm, silkworm, locust, insect generation by the sun, flies, insect transformation, spider, beetle, wasps; pansy, cowslip, fairy rings, ivy, plantain, willow, yew, rosemary, oak, flowers of spring, flowers of summer, flag, pine, mandrake, fern seed; morning, evening, night.

The citations and remarks relative to the horse, the ass, the lioness, and the dog, we have taken the liberty to append in the form of notes, to the following communication by Dr. Turton upon these and kindred subjects, as its spirit is so congenial with that of our present correspondent's communication as to make the association, we think, congruous, and hope pardonable. To print, at once, the whole of the citations and remarks upon all the subjects named above would give us, in our own feeling, much pleasure; but the pressure of more technical matter forbids the doing of this at present, and may prevent our recurring to it. The portion given above, with the four notes, identified as our author's, to the communication placed after this, is an indication of his ingenious intentions, and a specimen, though scarcely a just one, of his plan of fulfilling them. His object and plan must be viewed with the welcome of sympathy by every student of natural history who is, at the same time, a lover of poetry; and who can there be, as our correspondent has, in effect, asked above, that, loving the one, loves not the other also? Of the lovers of nature, and these must be all who love their "intellectual being," those who are most intimate with the qualities and wonders discoverable in nature, will be those who will most concur in the delighting sentiment (delighting because true, and justly complimentary to the object of our pursuit), that "in nature is the 'only fund of great ideas;'" and we know not any subject nearer our heart than the one

which these words bespeak, or one which could form a fitter theme for the thoughts, and essay in proof, of every naturalist. It is one upon which we have long, ourselves, cherished hopes of attempting something, as we had purposed instancing on the present occasion; but we find ourselves precluded by the want of time, of space of page, and, more than all, by the want of the requisite power of comprehension to grasp such a subject. We have found ourselves quite in the case of Simonides, when he strove to answer the question of Hiero; and the two attempted objects are, truly may it be said, so similar as to be almost identical. We would, however, notwithstanding our own inability, cherish the hope that some accomplished correspondent will attempt it. In V. 114, 115, there are "samples and a taste" of the fruits of this land of promise.

In connection with our correspondent S. H.'s elucidation of Shakspeare's mentions of objects of nature and natural history, we may cite a reference to IV. 425, note †; and may add, for we have obtained permission to do so, that Mr. James Fennell, a correspondent of this Magazine, has been, as we had known, "for some time occupied in collecting and arranging all Shakspeare's dramatic and poetical mentions of objects in natural history, with a view to the publication of them [in a separate work], together with such explanatory and descriptive notes as" he may deem "requisite." Mr. Fennell has informed us that he purposes adding "an essay on Shakspeare's knowledge of science in general, including chemistry, medicine, phrenology, &c."; his object, like that of our correspondent S. H., "will not only be to explain and illustrate Shakspeare's allusions and mentions, but also to diffuse a taste for the study of natural history, and to show the importance and advantage of such study to poets, dramatists, and others who write from imagination."]

Art. III. *Origines Zoologicæ, or Zoological Recollections.* By William Turton, M.D. &c.

THE HORSE.

This majestic quadruped, whose prowess and might, familiarly known to us all, are poetically stated in the book of Job (xxxix. 19—25.), gives his name to many circumstances charged with more than common force and strength; as horse-radish, horse-chestnut, horse-play, horse-kiss, horse-laugh. His age is known by the teeth; whence the saying, as applied

to green old age, or elder gaiety, that he has still a colt's tooth in his head: and, of a present which may not exactly meet the wishes of the receiver, it is observed, that we must not look a gift horse in the mouth. The common term course, as the first course or match, second course, &c., may be taken from the sport of racing; and so the course, or bent of a man's studies, whence stud. Formerly, in horseraces, the prize was a gold or silver bell; whence we say of any successful adventurer, that he bears the bell; and of a haughty person, we observe, that he rides a high horse, or the fore horse. Small bells were, anciently, an essential part of the gaudy trappings of a horse, both from their musical jingle, and that notice might be given of his approach in narrow lanes. "A horse trapped with silver bells," says Stowe, "was given by the citizens of London to King Richard the Second, on his entrance into the city." At the coronation of one of the Edwards, five hundred horses were turned loose, as a largess to such as could catch them. The horseshoe was of old considered as the emblem of good luck, and as having power to avert witchcraft, and drive off evil spirits; and it is still sometimes seen on the threshold of the peasant, and nailed against the masts of vessels. To ride the wooden horse, or the horse that is foaled of an acorn, was once a severe mode of military punishment, called picketing; inflicted by placing the miserable culprit across some oaken planks, brought to a sharp edge or angle, with a carbine or heavy weight fastened to each foot, to render his seat more exquisitely painful: and from this circumstance may have originated the expression of horsing a boy in a public school.

Darius was chosen king by the neighing of his horse; and Caligula made his horse a senator. One of Hector's horses, called Xanthus, was a conjuror, whose prophecies are recorded in Homer; and Troy was taken by a horse. Pliny relates that the chariot of Nero was drawn by four hermaphroditical mares. In derision of conjugal pusillanimity, we say, that the grey mare is the better horse; and, as a joke upon preposterous mirth, it is said that a mare's nest is found.

The phrase of a man's hobbyhorse originates from the circumstance of boys riding upon sticks, or cock-horses.

By Aristotle, and the older writers on comparative anatomy, he is said, in common with all those quadrupeds which have solid hoofs, to have no gall. Accurate enquiry, nevertheless, will demonstrate that, although there will be found no distinct gall bladder, there is a thin membranous substance, under which is contained the gall, branching itself into the lobes of the liver, and diffusing itself into the intestines; and this

may reconcile a contradiction of words in Pliny, who in one place affirms that the horse has no gall, and in another, that the gall of a horse is poisonous, and forbidden to be touched by the priests in the sacrifices of horses at Rome.* Sportsmen formerly hid themselves behind a figure made to resemble a horse, and called a stalking-horse, to get unperceived near their prey; so to make another person entirely subservient to your own purposes, is said to make a stalking-horse of him. From the various methods of trimming and ornamenting the tails of horses, have arisen the expressions of cut and long tail, rag, tag, and bobtail.

Our Saxon ancestors venerated the horse; whence the figure of the white horse, in the vale of that name, in Berkshire; and near Calne in Wiltshire. From his Saxon origin, the king bears a white horse in his arms: and Hengist, or Hengst, the founder of the Saxon dynasty, means an entire horse. The white horse of death is an emblem of pure and

* Shakspeare has said, in his character of Hamlet,

> ———" I am pigeon-liver'd, and lack gall
> To make oppression bitter,"

and Mr. James Fennell was, some time ago, wishing to know, in relation to his projected notes on Shakspeare's mentions of natural objects, of which I have spoken in p. 315., whether the pigeon is devoid of gall, as the above lines intimate, or not? I referred the query, not long after receiving it, to Mr. Yarrell, who was so kind as to communicate the following

List of Animals which have not a gall-bladder. — " Sir, Your enquiry, What species, among Mammàlia and birds, have, or have not, a gall-bladder? will, at this late period of the month, only admit of, and must be my excuse for, a short and hastily written reply. Among Mammàlia, the Quadrùmana, Carnívora, and Marsupiàlia have a gall-bladder, I believe, universally. In the Rodéntia, there are some exceptions. Of the genus *Mús*, the black rat, the Norway rat, the common mouse, and some others, have no gall-bladder; but *Myóxus* and Arvícola, have gall-bladders; the porcupine is said to have a gall-bladder, but it is very small; and the American species, *Hystrix* dorsàta, has none. The sloths have no gall-bladder, but I am not aware of any other instances among the Edentàta. In the Pachydérmata there are several exceptions. The elephant, peccary, rhinoceros, *Hirax* capénsis, tapir, and all the species of the genus *Equus*, are without the gall-bladder. Among the Ruminántia, the camel, the giraffe, and the deer generally with solid deciduous horns, have no gall-bladder; but the hollow-horned ruminants, as sheep, goats, antelopes; and the species of the genus *Bós*, have a gall-bladder. In birds, the exceptions are much less frequent, considering the extent of the class. Those without the gall-bladder are, as far as I am aware, the toucans and parrots, pigeons, grouse, peafowl, and ostrich. In the gall-bladder the watery part of the bile is aborbed, it becomes thicker, and its powers probably more energetic. — *Wm. Yarrell. Dec.* 24. 1833.

As, however, the pigeon, and all the animals noticed above, as devoid of a gall-bladder, have, as I have understood from Mr. Yarrell, a biliary system, not one of them can be said to " lack gall." — *J. D.*

speedy transition from the corruptions of life to happy eternity.

After his death, the skin is made into a coarse and very tough leather, mostly used for collars and harness; rehearsing, as it were, in the trammels of his life, his future destinies after death. The hair of the mane makes wigs, and of the tail, the stuffing of mattresses, and the bottoms of sieves and chairs, clothes, and anglers' lines.*

THE ASS.

This patient and hardy quadruped seems to have been of late importation into these islands, as he was unknown in the time of Holinshed. His original destination, in this kingdom, appears to have been the carriage of ore from the mines, in mountainous countries, as being more firm and sure-footed

* Wigs from the hair of the mane. Query, from that of the tail? Horace Smith, in his pretty satire beginning with

> " Since mortals are all, both great and small,
> Created by their dresses;"

has these lines: —

> " For the judge's nob, may its wisdom rob
> From the tail of a four-legg'd mother;
> And the grandeur's germ of the human worm
> May spring from its silken brother."

We have been told that the long side curls of a judge's wig are derived from the terminal hairs of cows' tails; these hairs are of some length. We may exercise the spirit of the poet's satire without arraigning the judges. — *J. D.*

[The following mentions by Shakespeare, appertaining to the horse, are taken from the unpublished part of the communication by S. H., which precedes the present one by Dr. Turton.

> ——— " Then I beat my tabor,
> At which, like unback'd *colts*, they prick'd their ears,
> Advanced their eyelids, lifted up their noses,
> As they smelt music." *Tempest*, act 4. sc. 1.

> ——— " Their poor *jades*
> Lob down their heads, dropping the hide and hips:
> The gum down roping from their pale dead eyes;
> And in their pale dead mouths, the jymold bitt
> Lies foul with chaw'd grass, still and motionless."
> *Henry V.*, act 4. sc. 7.

> ——— " *Horses* hot at hand
> Make gallant show and promise of their mettle:
> But when they should endure the bloody spur,
> They fall their crests, and, like deceitful jades,
> Sink in the trial." *Julius Cæsar*, act 4. sc. 2.

Young colts disturb'd by music, worn-out hacks, and " bad-bottomed uns," as a Yorkshireman would say, are here admirably depicted. — *S. H.*]

than the horse. He is now much deteriorated, for want of care, since the introduction of canals and railroads.

Low as this useful animal may be held in estimation, by the natives of the colder regions of the north, where he is proverbial for his stupidity and obstinacy; yet, in the genial warmth of his native plains, where the horse is enfeebled, and unfit for laborious services, he is of large size, active, and vigorous. In Asia he is worshiped for his patience and humility; and, for these virtues, has a festival to his honour. The city of Jerusalem (Isaiah, xxxii. 14.), in its desolation, was compared, by the prophet, to a joy of wild asses. And in Job, xxxix. 5—8., his native and untameable wildness is beautifully described: — "Who hath sent out the wild ass free? or, who hath loosed the bands of the wild ass? whose house I have made the wilderness, and the barren land for his dwelling. He scorneth the multitude of the city, neither regardeth he the crying of the driver. The range of the mountains is his pasture, and he searcheth after every green thing." The wild ass of the mountains, here so exquisitely portrayed, may be, in all probability, the zebra.

The ass is said to be extremely curious in the selection of his food; whence an irresolute person is compared to the ass who perished for want between two pottles of hay, not having courage to determine which to fasten upon first.* As a domestic quadruped he is of early record; for Anak, the descendant of Esau, is said to have found the mules in the wilderness, as he fed the asses of Zebim, his father. Horace has said, that only the hoof of the mule could contain the waters of the Styx.

To this quadruped alone, of all those which are under the dominion of man, was once bestowed the powers of the human voice and reasoning, for the purpose of rebuking Balaam; who, not perceiving the angel which stood before and interrupted him in his passage, smote the ass in anger. The animal, who had seen the angel stand before him in a narrow pass, and had attempted to escape, appealed to the justice and feelings of his master as an excuse for his conduct:— "What have I done unto thee, that thou hast smitten me these three times? Am not I thine ass, upon which thou hast ridden, ever since I was thine, unto this day? and was I ever wont to do so unto thee?" (Numbers, xxii. 30.)

The ass was honoured by bearing upon his back the

* "Would the fountain of your mind were clear again, that I might water an *ass* at it." (*Troilus and Cressida*, act 3. sc. 5.)

The nicety of this animal, with regard to the water it drinks, is well known. It will refuse to touch what a horse would drink greedily.—*S. H.*

Son of God, in his entry into Jerusalem. With the jaw-bone of an ass Samson slew a thousand of the Philistines; from the hollow part of which a miraculous stream of water was made to flow, wherewith to quench his thirst. (Judges, xv. 15—19.) And when the prophet was returning from a feast, where he had been in disobedience to the commands of the Lord, he was slain by a lion; and his ass, on which he rode, was found standing, together with the lion, by the side of the carcass, uninjured and undismayed. (1 Kings, xiii.) He has, nevertheless, been considered as the emblem of stupidity and folly. Midas, of old, for his scurvy decree between Pan and Apollo, was rewarded with the ears of an ass. Falstaff, when his eyes were first opened to the tricks played upon him by the Merry Wives of Windsor, exclaims, "I do begin to perceive that I am made an ass." And honest Dogberry, in indignant vindication of his office, says, "O that he were here, to write me down an ass! But, masters, remember that I am an ass: though it be not written down, yet forget not that I am an ass."

The milk of the ass is much esteemed, and is of valued efficacy, in cases of pulmonary affection. In the days of Augustus, the flesh of young asses was considered as the greatest delicacy of the table, more especially the shoulder. The first-born of man, and those animals which were pronounced to be clean, or fit for food, were ordered to be dedicated to the Lord: but the ass, as unclean, was directed to be redeemed with a lamb; and in default of such redemption, his neck was ordered to be broken. The skin is manufactured into a thick and polished material, used principally for tablets.

THE LION.

The emblem of courage and majesty: bold as a lion. In heraldry, the symbol of nobleness of birth, valour, and generosity; and borne on the banners of the tribe of Judah. He is said to sleep with the eyes open, probably because they are furnished with a nictitant membrane, or covering, distinct from the lids; and, like most beasts of prey, as dogs and cats, the female brings forth the young blind. The kings of Persia, at this day, punish criminals with death, by casting the victims into the dens of lions; and have a pair chained at the entrance to the palace for the purposes of state. So we read in the Chronicles, that the entrance to the audience chamber of King Solomon was guarded by two lions; and the six steps to his throne, by twelve golden lions, one on each side to each step. In the legends of romance, this noble animal was thought to be able to distinguish a true maiden,

especially of the blood royal, to crouch at her feet, and defend her from the assaults of ravishers and giants. Formerly, he was supposed to be cowed by the crowing of a cock only; and Pliny says, that whosoever is anointed with cock-broth, especially if garlick be boiled with it, no lion nor panther will touch him.

In the carcass of the young lion which Samson slew in his journey to Timnath, he found upon his return a swarm of bees and their honey; and upon this circumstance founded the riddle with which he challenged the Egyptians: — "Out of the eater came forth meat, and out of the strong came forth sweetness!" (Judges, xiv. 14.)

The lion was a peculiar object of veneration and regard among the Egyptians: for, when the sun enters the astronomical sign of Leo, the river Nile begins to flow, and promises its fertilising waters to the dry and parched plains of the Delta: hence we see in ancient structures imitative of the architecture of the East, as in many of the public buildings at Oxford, the water-spouts are ornamented with the heads of lions, dogs, and other figurative and fantastic semblances.

This noble animal has hitherto been considered as of the cat genus, *Fèlis Lèo*, but is certainly worthy of generic distinction; not merely as containing several species of its own family, but as possessing characters peculiar to itself. It has no collar bones, and therefore cannot, like the cat and the tiger, climb nor strike its prey with a sidelong blow, but brings it down by a straight-forward pawing. From the dog it differs in having a nictitant membrane; and in its inward pur of pleasure and confidence.*

DOG.

It is remarkable that from this faithful animal, the companion of man, and the guardian of his person and property, should originate all the terms of vile reproach and low comparison; as, you dog, you cur, you hound, you whelp, you puppy: so, dog's trick, dog cheap, dog trot, dog sick, dog weary, doggrel rhymes, to lead the life of a dog, or to use like a dog; and Homer represents Jupiter, in his anger,

[* ——— "A *lioness*
Lay crouching, head on ground, with catlike watch,
When that the sleeping man should stir; for 'tis
The royal disposition of that beast,
To prey on nothing that doth seem as dead."
As you like it, act 4. sc. 3.

The correctness of the attitude of the feline tribe needs no comment. The latter observation, I believe, also correct, though, I fear, not to be referred to any "*royal* disposition" in that tribe." — *S. H.* See p. 5. 139.]

calling his wife a brazen-faced b——, *kuōn adees.* This may have originated in the East, where the dog is held in abhorrence, as the common scavenger of the streets. " Him that dieth in the city, the dogs shall eat; and him that dieth in the fields, shall the fowls of the air eat;" was said of Jeroboam and his family (1 Kings, xiv. 11.), of Baasha, (1 Kings xvi. 4.), a people about to be punished for their offences by famine and pestilence. A ravenous desire for food is called a canine appetite: and of a foul and gluttonous feeder it is said, that hungry dogs will eat dirty pudding. By the Israelites he was accounted so abominable, that, in the Levitical law, the price of a dog was forbidden to be offered in sacrifice. He has also been ever the miserable victim of most cruel experiments, by the anatomist and the philosopher: and when a tax was laid on his head, a general massacre of the species took place. By the Egyptians he was an object of adoration, as the representative of one of the celestial signs; and by the Indians, as one of the sacred forms of their deities.

> " The Egyptians worshipp'd dogs, and for
> Their faith made internecine war." *Hudibras.*

The canicular or dog days are so called, not because dogs are at that season apt to run mad, but from the heliacal rising of Sirius, or the dogstar, as typical of the season of greatest heat, or wane of the summer.

In moonlight nights dogs, as the emblems of vigilance, are said to be more than usually watchful, and to " bay the moon;" and are supposed to have a sense of the odour of mortal dissolution, and to howl before the death of one of the family. They perspire by the tongue; and in hot countries, as in Africa, die if they be suddenly plunged into cold water. The young, or whelps, of the dog, as is the case with all quadrupeds which bring forth litters, and have the feet divided into many segments or toes, are born blind, and so continue for ten or twelve days; and at this time are probably deaf, as the valves of the ears are closed till the eyes are opened.

Among other useful purposes, he is harnessed, and draws a peculiar kind of carriage, called a sledge, over the snow in the colder regions of the north. In Holland he is fastened in pairs to a small waggon [in Canada to carts, see VI. 511.], and draws vegetables and other light substances to the market. In Amsterdam there are regular dog ordinaries, where, as soon as he is unharnessed after his journey, he receives a small coin from his master, which he takes in his mouth to a well known establishment of this kind, and in exchange for his money is provided with a certain portion of meat. And

in many country places he is taught to turn the spit and roast the meat, by continued exercise in a kind of tread wheel.

> " But as a dog that turns the spit
> Bestirs himself, and plies his feet
> To climb the wheel; but all in vain,
> His own weight brings him back again,
> And still he 's in the self-same place
> Where, at his setting out, he was." *Hudibras.*

According to Horace, the sight of a bitch with young was considered as an unlucky omen; and of a sullen discontented person we say, that the black dog has walked over him. A certain German empiric, when his patient was surfeited by eating too much hare, directed him, upon the principles of antipathy and contrast, to take greyhound broth. And at the time when the place of resort for recreation to the citizens of London was at the sign of the Dog and Duck, a learned traveller, in portraying the manners of the British capital, relates that the inhabitants flocked to a certain place of entertainment to feed on dog and duck.

Although in China and Tartary his flesh is used for food, and a living dog is said to be better than a dead lion, in Europe, his carcass is considered so utterly worthless, that even his skin is now of little value. The skins, however, of young puppies were formerly tanned, and formed a soft kind of leather which was manufactured into gloves. The hair of a dog, when burnt, was formerly prescribed as an antidote against the effects of intoxication: hence a man too much excited by drink at night, is recommended to take a hair of the same dog the next morning, as a means of gradually counteracting his state of debility.

The greyhound is so called, not from any allusion to colour, but because he came originally from Greece, *Canis Graius*, and therefore should be written graihound.

[For anecdotes on the sagacity of dogs, see the second series of Jesse's *Gleanings in Natural History;* and in the *Field Naturalist's Magazine*, I. 485., there is an interesting communication " on the Fidelity and Attachment of Dogs to their Masters," by Miss Hunter.*]

* [" My *hounds* are bred out of the Spartan kind,
So flew'd, so sanded; and their heads are hung
With ears that sweep away the morning dew;
Crook-knee'd and dew-lap'd like Thessalian bulls;
Slow in pursuit, but match'd in mouth like bells,
Each under each." *Midsummer Night's Dream*, act 4. sc. 1.

" *Spaniel*-like, the more she spurns my love,
The more it grows and fawneth on her still."
Two Gentlemen of Verona, act 4. sc. 2.

WOLF.

Ravenous, and of insatiable voracity; the most abject poverty is represented by him who has nothing to keep the wolf from the door. So inauspicious was his appearance considered, that he, upon whom a wolf first fixed his eyes, was said to lose his voice suddenly: and, upon any abrupt pause in a discourse, it was said there was a wolf in the story, *lupus est in fabula.* This originated from one Lycus, which in the Greek language means a wolf; of whom, during his absence, many extravagant tales were related, which, by his sudden appearance, were immediately refuted and put to silence.

So utterly worthless was this animal considered, that a price was always set upon his head: and, in the ancient law, an excommunicated person was said *caput gerere lupinum;* and it was thought meritorious to destroy him, as a wretch thrust from the most common offices of social benevolence and humanity.

One who has a ravenous or canine appetite is said to have a wolf in his belly. And a furious kind of insanity, in which the unhappy object went howling about, and believed himself, and was believed by others, to be turned into a wolf, or some other beast, was called lycanthropy. This might give occasion to that bold assertion of Pliny, "That some men

---

"That island of England breeds very valiant creatures, their *mastiffs* are of unmatchable courage." (*Henry V.*, act 3. sc. 9.)

"A *dog*, and bay the moon." *Julius Cæsar*, act 4. sc. 3.

"*Oft have I seen a hot o'erweening cur*
Run back and bite, because he was withheld;
Who being suffer'd with the bear's fell paw,
Hath clapp'd his tail between his legs, and cried."
Henry VI., Part ii., act 5. sc. 1.

The above description of the hound is highly picturesque. The obsequiousness of the spaniel is proverbial. For the following observation upon the British mastiff's celebrity, I am indebted to Dr. Fleming, *Brit. An.*, p. 11. "The Roman emperors held the British dogs of this kind in high estimation for combats in the amphitheatre, and, according to Strabo, they were trained by the Gauls for battle." Every one who ever possessed a dog, knows that they "bay the moon," and that most piteously, sitting upon their haunches when the moon shines clear and frosty. To the former part of the last quotation, Ben Jonson has some lines of similar purport, which may confirm the truth of the remark: —

"The eager, but the generous greyhound,
Who ne'er so little from his game withheld,
Turns head, and leaps up at his holder's throat."
Every Man in his Humour.

The conflict of dogs with bears, Shakespeare may have seen at the Paris Garden, and frequently, I dare say, the very occurrence he here so graphically notices. — *S. H.*] [I have known a dog, and not a young one, that standing, in moonlight nights, on the shadow side of trees in an orchard, would bark at their stems for a long time together. — *J. D.*]

were turned into wolves in his time, and from wolves to men again;" and to that fable of Pausanias, of a man that was ten years a wolf, and afterwards turned to his former shape; or to the tale of Ovid, who describes Lycaon as taking the shape of a wolf. And some commentators on the Bible have considered Nebuchadnezzar's punishment as this kind of madness. (Daniel, iv. 33.) Hippocrates, in his treatise on insanity, supposes that the daughters of king Priætus, who thought themselves heifers, were afflicted with this malady.

That Romulus and Remus were suckled by a wolf, was a figurative fiction, from the circumstance of the name of their nurse, who was called Lupa. We learn also from Horace, that a part of the incantations of disappointed women consisted in secretly burying at night the beard, or probably the mane, of a wolf, and the teeth of a serpent.

> " Lupi barbam, variæ cum dente colubræ
> Abdiderint furtim terris."

In Puck's delightful imagery of midnight, at the end of *Midsummer Night's Dream*, all the printed editions represent the wolf as looking on the moon: —

> " Now the hungry lion roars,
> And the wolf *beholds* the moon."

This is probably an error, and might be easily corrected —

> " And the wolf *behowls* the moon,"

as Shakespeare in another place expresses the same idea.

CAT.

Originally came from Persia, and was unknown to Pliny and the Roman writers; whence the term puss, probably a corruption of Pers. Soon after her introduction into these islands, she was considered of such value, that by the laws of Howel Dha, whosoever killed the king's cat, for his fine and atonement was to hold her up by the tip of the tail, so that her nose touched the ground, and heap up wheat till the body, to the tail's tip, was covered.

The cat is a fixed and settled domestic animal, attached to the premises, and unwilling to remove; while the dog follows the master: and such is the natural antipathy and discordance between these two animals, that, of persons living in no very social harmony, it is said, they lead the life of cat and dog. She has a more voluminous and expressive vocabulary than any other known brute: the short twitter of complacency and affection to her kittens; the pur of tranquillity and pleasure, when seated on the knee of her master; the spit of defiance; the mew of distress; the growl of anger:

and the horrible wailings of pain or fighting, which give name to the noisy and discordant instrument of disapprobation, the catcall.

She is the emblem of the moon, from the great changeableness of the pupil of the eye, which in the daytime is a mere narrow line, dilatable in the dark to a luminous globe; and she can, for this reason, like most animals of prey, see best by night.

It was formerly the trick of the countrymen to substitute a cat for a sucking pig, and bring it to market in a bag: so that he who, without careful examination, made a hasty bargain, was said to buy a pig in a poke, and might get a cat in a bag; and a discovery of this cheat gave origin to the expression of letting the cat out of the bag, as a premature and unlucky disclosure.

The fur of the cat was formerly used in the ornamental trimming of coats and cloaks: and in allusion to the unfitness of her flesh for food, it is said of any thing confined to one purpose only, What can you have of a cat but her skin? The catgut used by ladies, and for rackets, and also the finer strings for violins, are made from the dried intestines of the cat; and a smaller kind of fiddle is called a kit: the larger strings are from the intestines of sheep and lambs. Her claws are retractile, and can be protruded with great violence in anger. Her scratch is supposed to be venomous, because a lacerated wound is more apt to fester than a definite cut with a sharp instrument. The tenacity of her hold gave origin to many metaphorical expressions and appellations; as the cat, or tackle, for drawing up the anchor of a ship; and a cat-o'-nine tails, or scourge, so called from the scratches it leaves on the skin like the clawings of a cat. A domestic implement for holding a plate before the fire, with six spokes or radii, three of which rest on the ground in whatever position it is placed, is called a cat, from the belief that, however a cat may be thrown, she always falls on her legs. From her great powers of resistance, she is said to have nine lives. "'Tis a pity you had not ten lives, a cat's and your own," says Ben Jonson, in *Every Man in his Humour*. The well-known tale of the monkey seizing hold of the paw of the cat, to get the roasted chestnuts from the hot embers, gave origin to the proverb, "to make a cat's paw of one," or to make another subservient to one's own purposes.*

* This expression is of greater antiquity than many suppose; for we find the story of the cat and the monkey thus related, as an original anecdote, in the *Voyage round the World*, by Dr. John Francis Gemilli Careri, in 1695. The Doctor, treating of the kingdom of Canara, in Hindostan, after reciting

The cat is very subject to vomitings: and every one too much addicted to excess of wine knows what is meant by shooting a cat. She has been supposed to be particularly fond of fish, giving rise to the poetical simile,—

> " What female heart can gold despise?
> What cat's averse to fish?"
>
> GRAY, *Ode on the Death of a favourite Cat.*

But this is not a probable fact: for if a plate of fish, and a plate of meat, either raw or dressed, be placed before her, she will generally prefer the meat. And it would be a propensity not very natural, as she abhors water, and can in a great measure live without it; and is extremely cautious of wetting her feet. [For well-authenticated instances of cats voluntarily entering water to catch fish, see IV. 430.; V. 471. 716., and the *Field Naturalist's Magazine*, I. 511.] It is equally erroneous that she is subject to fleas: the small insect which infests the half-grown kitten being a totally different animal, exceedingly swift in running, but not salient, or leaping, like the flea. She is, however, especially the black kind, highly charged with electricity, visible in the dark, when irritated.

Her attitudes and motions are all of great elegance, in consequence of her being furnished with collar bones; she can, therefore, convey food to her mouth by the paw*, like the monkey, can climb and clasp, strike sidewise, toss her prey upwards, and seat herself on an eminence of very confined and narrow surface, as the arm of an elbow chair, or her favourite position, the knee of her master. She is

---

three anecdotes of monkeys, not distinguished for their delicacy, proceeds as follows: — " D. Antony Machado de Brito, admiral of the Portuguese fleet in India, told me, that one of these creatures continually troubling him, and breaking all it found in the kitchen, he once, to be even with it, ordered a cocoa nut to be put upon the fire, which sort of fruit the monkeys are most greedy of, and hid himself to see how that beast would take it without burning his paws. The cunning creature, coming at the usual hour, and finding its beloved food on the fire, looked about, and seeing a cat by the chimney, held her head in his mouth, and made use of her paws to take off the cocoa-nut, and, then cooling it in water, eat it; the Portuguese laughing to see the cat mewing about all day with the pain it had been put to." (*Gem. Hindostan*, b. ii. chap. 1.) An ancient Latin author, in allusion to this, says: — " Simia quam similis turpissima bestia nobis."— *W. T.*

* A cat once kept by my father would jump upon one of his shoulders, pass behind his head, and along the arm on the other side, extended, with the milk jug dangling between the finger and thumb, into which puss, standing upon the hand, would dip his paw, get it suffused with milk, and then lick it for his pains.—*J. D.*

fond of looking out of a window, and gazing with complacency on the passers by; whence the child's puzzle of, what is most like a cat looking out of a window? but a cat looking in.

The favourite and most usual transformation of witches was into a cat: and as all old or deformed women, particularly single or solitary ones, were suspected for witches, old maids are still called cats or tabbies.

(*To be continued.*)

ART. IV. *A Description of the Habits of the Ringdove.* By CHARLES WATERTON, Esq.

THE supposed purity of the dove is a common topic with many writers; and their readers are apt to imagine that this bird has been more favoured by nature than the rest of the feathered tribe. What may be allowed to romantic and sentimental composers cannot by any means be conceded to writers on natural history. Genuine ornithology would be offended at the attempt to introduce unwarrantable matter into her pages; while her true votaries would always grieve on seeing it admitted into them.

All wild birds which go in pairs are invariably attached to each other by Nature's strongest ties; and they can experience no feelings of what may be called mistrust or suspicions of unfaithfulness: otherwise we should witness scenes of ornithological assault and battery in every hedge and wood, during the entire process of their incubation. The soot-black crow is just as chaste, affectionate, and constant as the snow-white dove itself. The movements of both these birds, at a certain time of the year, tend exactly to the same mark. They are inherent and unalterable in them, and, of course, are not to be repressed or changed. At the interesting period of incubation, Nature knows no distinction betwixt the cooing of the dove and the cackling of the goose. Both sounds express the same emotions, and are perfectly understood by the parties. They have only one plain and obvious meaning. Audubon's description of his lovesick turtle-dove, which listened with delight to her mate's "assurances of devoted affection," and was "still coy and undetermined, and seemed fearful of the truth of her lover," and, "virgin-like, resolved to put his sincerity to the test," is lovesome nonsense, as far as regards the feathered tribe; and is a burlesque upon the

undeviating tenor of Nature's course. Those who approve of such absurd aberrations from the line of instinct allotted to birds, would do well to confine their studies to the romances on their drawing-room tables. Let us hope that better days are in store for ornithology; and that when the ardent novice shall turn over the pages which may be really intended for his improvement in this fascinating study, he will find their contents in unison with what he will observe afterwards in Nature's boundless range.

If size and beauty give a claim to priority, the ringdove will hold the first place in the scanty catalogue of the wild pigeons of Europe. It stays with us in Yorkshire the whole of the year; and, in the winter months, it resorts chiefly to the turnip fields for sustenance, where it feeds voraciously on the leaves, and not on the body, of the turnip. The leaves are said to impart a rank and disagreeable taste to the flesh of the bird; but this is easily prevented by cutting open the crop, as soon as the pigeon is killed, and discharging the contents. White of Selborne recommends this process. Towards evening the form of the ringdove becomes considerably changed. Having fed on the turnip tops during the course of the day, its crop gets so distended with food, that it gives to the fore part of the pigeon's body a very full appearance; and this is easily discerned as the bird passes over your head to its evening retreat. The contents of the stomach having been digested during the night, we observe that the body has regained its ordinary proportions at the break of day.

There has been a great increase of ringdoves during the winter season, in this part of the country, since the farmers have paid so much attention to the cultivation of turnips. On seeing the congregated numbers of these birds, one is led to imagine that there must be an annual influx of them, at the close of autumn, from some far distant part. As the ringdove is an unprotected bird, and much sought after on account of the delicacy of its flesh, I have strong doubts whether our breeding season can produce a sufficient supply to make up the flocks which are seen here in winter. At all events, in this quarter of Yorkshire very few young ringdoves are allowed to escape. Farmers and gamekeepers are ever on the look-out to transfer them from the nest to the kitchen. These marauders are so perpetually upon the watch that it has never yet been my lot to find a ringdove's nest in our neighbouring woods with full-fledged young ones in it; although I am continually in the habit of straying into them, and looking for the nests with a careful and unwearied eye.

Wherefore, I conclude that our winter flocks receive migratory individuals from distant regions.

The ringdove, by not feeding on insects, renders no service to man while visiting his fields. On the contrary, it is known to injure him considerably in his crop of rising clover. As soon as this plant begins, under the influence of the vernal sun, to expand its leaves, the ringdove attacks the heart-shoot with fatal severity; and much address is required on the part of the farmer to scare the birds from their favourite food. Leaving, however, the sons of Ceres to fight their own battles, I will merely add, that this handsome bird is protected here. I love to listen to its soothing murmurs, and take intense pleasure in observing its habits during the breeding season, when it becomes fully as tame as the domestic pigeon. The housekeeper often hints to me that a couple of them would look extremely well on the table; and the farmer calls them devouring vermin. I receive the opinions of these respectable personages with perfect indifference; and I sometimes soothe them by observing that where the ringdove has one friend, it has a thousand enemies, ready to prepare it for the spit, or to prevent for ever its return to the clover field.

The ringdove lays two snow-white eggs on a nest which may be termed a platform of sticks, so sparingly put together, that the eggs are easily seen through it by an eye habituated to look for them. On inspecting this apparent commencement or remnant of a nest, one is led to surmise, at the first glance, that the young are necessarily exposed to many a cold and bitter blast during the spring of this ever-changing climate. "But God tempers the wind," said Maria, "to the shorn lamb;" and, in the case before us, instinct teaches the parent bird to sit upon its offspring for a longer period after they are hatched than, perhaps, any other of the feathered tribe. In the meantime, the droppings of the young, which the old birds of some species carefully convey away, are allowed to remain in the nest of the ringdove. They soon form a kind of plaster strong and scentless. This adds consistency to the nest, producing, at the same time, a defence against the cold. The ornithologist, while going his autumnal beats, in quest of knowledge, on seeing this, will know immediately that the nest has contained young: should this be wanting, he may conclude that the nest has been abandoned at an early period. As he will find but very few nests with this species of plaster in them, he may conclude, to a certainty, that the ringdove has a host of enemies in this country, and that it is seldom fortunate enough to rear its young to

that state in which the faculty of flying saves them from destruction.

No bird in the British dominions seems to resort to so many different trees and shrubs for the purpose of incubation as the ringdove. Not a tree, from the towering pine to the lowly thorn, ever comes amiss to it. There is something, too, peculiarly singular in the locality of some of the nests. While one is seen placed nearly on the topmost branches of the lofty sycamore, another may be found within four feet of the ground, in the humble shelter of the hedge-row bush. Last year, I found a ringdove sitting on one egg, in a magpie's nest of the year gone by; and I observed another ringdove, rearing two young ones, in a spruce fir tree, below that of a magpie, out of which I had taken seven eggs, and substituted five of a jackdaw in their place. It was interesting to see these two species of birds, one so calm and gentle, the other so pert and roguish, thus close to each other, at so critical a juncture. While I was observing them, I felt convinced that there are certain times in which birds are not so bent on plunder as we would fain suppose they are; and, moreover, that they can frequent each other's company in perfect peace and quiet. In this instance it appears that instinct showed the ringdove how to preserve her eggs from being plundered by her crafty neighbour, who, according to our own short-sighted view of ornithological economy, would have been apt to make free with them at the earliest call of hunger. The ringdove had settled there with her eyes open to her supposed danger; for the magpie was the first to get possession of the tree.

I had but a faint idea of the habits of the ringdove until I had offered it an undisturbed asylum in this "valley free." Its movements are remarkably periodical. In mild winters, or more properly speaking, in winters of short continuance, it makes its first appearance on the island where my house stands, early in February. This year it came, for the first time, on the second of the month, and cooed in full note. From this period, it may be seen here, every day till October, either in the sycamore trees, or in the ivy on the old ruined tower, or on the lawn, picking up the tender sprouts of grass. Provided you approach with "cautious step and slow," you may get within seven yards of different pairs of these birds; and when the window-sash is down, they will come within a few paces of the place where you are standing, and allow you to gaze at them for any length of time. After the first week in October, they take their final leave of my island for the winter; and never, by any chance, pay us even

one single solitary visit till February sets in; though they may be seen every day in congregated numbers in other parts of the park, where they roost in the elm and fir trees. During the winter months, they are exceedingly shy and timorous, seeking for safety in lofty flight, the moment they see you approach. They become quite silent towards the last week in October, and their notes are reduced to half their number for some days before they cease to coo entirely. At this period they discontinue those graceful risings and sinkings in the air, in which they appear to so much advantage during the whole of the breeding season.

Thus we have a bird which, during the course of the year, at one time approaches the haunts of man with wonderful assurance, and at another shuns them with a timidity equally astonishing. I speak only of its diurnal movements; for, at the close of day, both in winter and in summer, when not molested, this bird will come near to our out-buildings, and seek a roosting-place in the trees which surround them. This peculiarity of the ringdove in approaching so near to our mansions during the day in the breeding season, and then losing all confidence in us, as soon as incubation ceases, is not a mere accidental trait of one or two particular birds, whose usual habits may have been changed, either by want of food, or by protection offered; but it is inherent in the whole species, when the bird is allowed by man to follow Nature's unerring mandates.

I know of no British bird which has the colour of its plumage so constant as is that of the ringdove. I have never yet seen it vary; and the white spot or segment of a circle on the back of its neck, from which it takes its name, is always of the same size.

Ringdoves are exceedingly numerous here during summer; and when winter sets in, many thousands come every evening to take up their quarters for the night. They retire early to roost, and never leave the trees till all the other birds are on the stir.

As yet, all attempts to reclaim this pigeon have been of no avail. I should suppose that it is not in the power of man to make it breed within the walls of a dovecot. For my own part, I am not exactly aware that its reduction to domestication would be productive of much advantage to us. Let others offer it the same protection it enjoys with me, and there would always be an ample supply of ringdoves to fill their groves with softest murmurs, and furnish their tables with a delicious repast. Connoisseurs tell us that the flesh of the ringdove, in winter, has the flavour of moor game: I

have fed on pigeons in many countries, but cannot say that I ever found them vary in taste from the pigeon which inhabits our common dovecots. Much, perhaps, depends upon the cooking. The culinary art, no doubt, with other important sciences, has derived much benefit from the march of intellect. In London they will serve you up a ram cat for a Martlemas rabbit; and we are told that in Paris a pair of old hunting boots can be stewed down into a very excellent and wholesome soup.

> " Nil equidem durare diu sub imagine eâdem
> Crediderim."
>
> These cooks will suffer nothing to remain
> In pristine flavour, or its shape retain.

Walton Hall, May 21. 1834. CHARLES WATERTON.

ART. V. *Sketches of the Natural History of my Neighbourhood.* No. 2., *Fragments of Ornithology.* By C. CONWAY, Esq., of Pontnewydd Works, Monmouthshire.

WHAT I have to say respecting the birds of my neighbourhood may be very insignificant, and beneath the notice of the ornithologist: I am sorry for it. I am no ornithologist; yet, when I run after butterflies [VI. 224. 541.], or ramble about the country to gather flowers, I cannot shut my eyes when a bird flits by me, nor stop my ears when he chooses to cheer me with his song. Observations gathered under such circumstances are what I have now to offer. Some classification, however, appeared to be necessary; but, as I do not profess to be a scientific ornithologist, that which was most accessible appeared to be the best suited to my purpose, and I have therefore made use of that furnished in Stark's *Elements of Natural History:* and now for our gossip.

I. RAPA'CES. — *Fálco Æ'salon* (*Merlin*), *F. Tinnúnculus* (*Kestrel*), *F. Nìsus* (*Sparrowhawk*), *F. Mílvus* (*Kite*), *F. Bùteo* (*Common Buzzard*), *F. rùfus* (*Moor Buzzard*), *F. cyàneus* (*Henharrier*). — I believe that this list contains all the falcons of my neighbourhood; and these are, perhaps, quite enough for one small locality. The merlin is, probably, the scarcest of them.

Is it a Fact that Hawks have such Power of Sight as is generally presumed? — I recollect seeing a sparrowhawk once in pursuit of a redbreast, and almost in the act of capturing him; but the redbreast turning short round the angle of a building, the hawk flew directly against it, and absolutely

dashed out his brains! I have also known a hawk to pounce upon a bird hung up in a cage by a window; when he, missing his mark, dashed in through the glass, and was captured. Is this owing to any defect of sight? or is the attention so taken up with one object that another is not perceived?

The Tenacity with which the Falcons grasp their Prey has frequently excited my admiration; for I have seen them disturbed in every possible way, and yet making off with the prize: nay, I have even seen them killed, and yet retain their prey in their grasp. As an instance, perhaps the following will be sufficient: — A neighbour of mine, a keen sportsman, was one day sitting by his kitchen-fire, when he heard a great clattering in his poultry-yard. Well knowing the meaning of such an uproar, he immediately started up, and, seizing his gun, determined to be revenged upon the aggressor. When he reached the yard, he observed a moor buzzard just clearing the top of one of his barleyricks, with a chicken in its claws. The buzzard was immediately fired at and struck severely, but escaped from sight. The following day, its carcass was found at some distance, and the chicken running about the same field uninjured. I have known instances in which the captive has been totally unable to release himself; and the sportsman has been absolutely obliged to open the claws of the dead bird in order to set the prey at liberty.*

The Kestrel pays me a visit almost daily; hovering for a considerable time in the air, then taking a rapid sweep to another part of the field, and there, again, hovering for another long space of time, apparently in the utmost enjoyment. What name can better describe the habits of such a bird than the wind-hover?

That fine Bird the Kite, though, I believe, a very local

* [See p. 150. On the fact there quoted from the *Field Naturalist*, Mr. Bree has since remarked as follows: — The combat between the hawk and magpie, mentioned in p. 150., reminds me of

A Method of catching Magpies [*and other Species of Birds*], which, I have been told, has been practised with success. A live magpie is fastened down to the ground on its back. In this situation, the noise which the bird makes, together with its exertions to release itself, attracts the attention of other magpies, who come to its assistance. The first unfortunate bird which ventures within reach is so firmly grasped in the claws of the captive, that it may be taken up by the hand and secured, in order to be tied down in like manner to ensnare others: and thus the magpies are made to inveigle their own kind. This is no new method of entrapping birds: if I remember right, an exact representation of it is given in one of the curious prints of hunting pieces by Anthony Tempesta, who flourished between 1555 and 1630. In the same set of prints are representations of some other very curious methods of catching birds and other wild animals, as well as of the diversion of riding a crocodile. — *W. T. Bree. Allesley Rectory, April* 16. 1834.]

bird, is plentiful in this neighbourhood, our extensive woods furnishing him with a secure retreat. The great size and brilliant markings of this bird render it an object of no inconsiderable beauty when dead; but its calm and easy and circuitous flight, as it wheels aloft in endless mazes until it vanishes from sight, and making the air resound with its ceaseless mewings, on a bright summer's day, renders it a sure source of interest when alive. The power of flight in this bird is amazing: I frequently watch him wheeling round and round and round, until my eye is completely fatigued, and yet not a feather appears to be in motion except the forked tail. How does he propel himself forward in such instances?

The Dispute respecting the Identity of the Henharrier and the Ringtail is, I presume, sufficiently settled; and I need not, therefore, make any further allusion to it. I have now before me a fine specimen of this bird, shot close by, in which the plumage of the ringtail is still visible on the breast and the crown of the head, while all the other parts of the body are covered with the plumage of the henharrier.

Strix Otus (*Eared Owl*), S. *strídula* (*Brown Owl*), S. *flámmea* (*Barn Owl*). —The brown owl and barn owl are common here, though the object of the inveterate persecution of the gamekeepers; whether for any just reason or not, I cannot say: but, just or unjust, I certainly must say that I regret it; for the brown owl's note (whether uttered in B flat, as stated by White, or not, I am not musician enough to distinguish) is a "rural sound" which I always hear with pleasure, however uncouth it may sound in "ears polite." Of the eared owl I had never a specimen until February last; when I had a fine pair sent me, which were killed, in a fir plantation on the side of one of our mountains, by the gamekeeper of B. Hall, Esq. M.P. They are the only pair, I believe, that have ever been seen in this neighbourhood. Perhaps I may as well make a few remarks in this place respecting

Eggs of Anomalous Structure. — "We shall here instance imperfect eggs sometimes produced, such as want the vitellus, and others containing two yolks." (Montagu, on "Eggs of Birds," in Rennie's edition of the *Dict.*, p. 166.) "When, from the same cause, the growth of the vitellus in the ovarium is too luxuriant, two yolks pass the oviduct together; which, being surrounded with the usual quantity of albumen, are brought forth in the form of a single egg of extraordinary magnitude." (*Ibid.*, p. 167.) This irregularity in the state of the egg is not of common occurrence amongst birds in their native state, but is much more frequent amongst domestic poultry; I

have, however, the egg of a crow, of very diminutive size and uncouth shape; but it had been kept so long before I knew of its existence, that its contents were dried up, and, consequently, I cannot speak of its internal formation. I have also the eggs of the queest [ringdove or wood pigeon], of very small size. The nest was taken on the 18th of April; and, from the small size of the egg, I presumed it was that of a turtle-dove, although I had never known this bird to visit us so early in the season: however, in extracting the contents of the eggs, I found that neither of them contained any yolk. But, the most irregular egg that I have at all met with is that of a domestic hen. It weighed 1425 grs., and is as uncouth in shape as it was extraordinary in size. The shell is divided into three compartments or swellings, and contained three yolks; a case not recorded by Montagu in the article from which I have already quoted.* [See, in II. 289., a statement of the anomalous conditions of a pheasant's egg; and, in III. 472., one on those of "an egg within an egg," produced by a goose: the instances, in VI. 184., of remarkably spotted eggs of the common fowl may just be pinned to the present subject.]

[*Facts and Considerations on the Conditions which appertain to Birds in the producing of their Eggs.*] — Whether birds have or have not a power to retain or expel their eggs at pleasure, appears to be almost as unsettled a matter as the cause of their song. "Those who suppose a bird capable of producing eggs at will, are certainly mistaken. It will . . . . lay the number allotted by nature, which is determined before the first egg is produced. If it is prevented from incubation by any means whatever, it may begin again to lay in five or six days; but there is always an interval of a few days, and sometimes as many weeks, which must wholly depend on the

* Mr. Conway had, in a communication dated May 24. 1833, favoured us with a drawing of the anomalous egg of the fowl, and one of that of the crow. The drawings are stated to be of the natural size, and exhibit the following dimensions and figures: — The drawing of the fowl's egg is 3 in. and a tenth and a half in length, and 1 in. and 8 tenths in breadth; the outline is that of an ellipsis, as the two ends are similar in form and dimension, but has its curve slightly interrupted in three or four places by a just perceptible protrusion, exhibiting, of course, slight prominences in these places in the egg itself. The drawing of the crow's egg is in outline a prolate spheroid, or nearly so; and its longer diameter is scarcely 9 tenths of an inch, and shorter one full 7 tenths. This extraordinary example seems an apposite, and, we suppose, is an extreme, illustration of the accuracy of the remark of Mr. Waterton in VI. 209.; namely, the eggs of the carrion crow are "wonderfully irregular in size and shape and colour." Mr. Waterton has also remarked, in VII. 105., that the eggs of the rook vary much in colour, shape, and size. — *J. D.*

age and vigour of the bird." If a nest be robbed, "the female stimulates to love again; and soon brings forward, by that stimulus, aided by the male fecundity, a new lot of eggs: never more than the former, and usually less." (*Ibid.*, p. 161, 162.) "After the first egg [in any of the courses of laying, Montagu must have meant] is laid, the others must successively follow, one after the other, each in twenty-four hours." (*Ibid.*, p. 119.) [Montagu has added, "with a few exceptions in the larger undomesticated birds;" and has assumed the cuckoo to be another exception, and deemed it possible that this bird has the power to retain its mature egg until it has found a nest to receive it.] "Another wonderful fact," says Jesse (*Gleanings in Natural History*, series i. p. 193—195.), "respecting eggs is, that some birds have the property of either retaining their egg after it has arrived at maturity, or of suppressing altogether the further progress of those eggs which had arrived at a certain size in the ovarium;" and he instances the fact in the case of a domestic hen, which, on being removed from one location to another, ceased laying, although she had already commenced depositing her eggs; and also in another, that had had her leg accidentally broken. "If the peewit is deprived of only one egg after she has completed her number, she immediately forsakes the nest: if, however, she has but one other to lay, and all but one of her eggs are removed, she will continue to lay for ten or twelve days or more. The same has been observed of the blackbird, lark, and long-tailed titmouse: the latter has gone on to lay as many as thirty eggs before she began to sit." (*Jesse*, p. 191.) To these facts I must now add my own observations. Requiring the eggs of the brown owl, I desired a neighbouring farmer to procure them for me; but, before they reached me, they were destroyed. In about three weeks afterwards, the same owl had laid two other eggs in the same nest. A thrush's nest was discovered, on a Saturday, with one egg in it; and, on Sunday, it was robbed and destroyed. On Monday, a new nest was constructed, but very imperfectly, and one egg laid in it. During the whole of Tuesday there was no additional egg; but, on Wednesday evening, there were three. These facts do not appear to accord [Do not those on the brown owl quite accord?] with Montagu's statements as to the number of eggs in the second laying, nor as to the time in which a bird is forced to bring forth her eggs in succession. A friend of mine has some pheasants in captivity; and two hens laid, in one season, ninety-two eggs. Again: a wren, under my own observation, built her nest three several times in the same hole, in a bank; but no sooner was it constructed

than it was destroyed. [See, in No. 41., the details of the case of a wryneck (*Yúnx Torquílla*), whose nest was five times disturbed, and the bird thereby excited to produce twenty-two eggs.] Now, I argue that she [the wren] would not have prepared her nest at all before it was required; and, consequently, must have been ready to deposit her eggs as soon as it was finished. If this supposition be correct, it will then follow, if we do not allow the bird the power of retaining her eggs at pleasure, that she must have dropped her eggs while the second nest was constructing; but, if this was the case, for what purpose was the third nest built? I should, reasoning from analogy, certainly feel inclined to say that the exclusion or retention of the egg is no more under the will or control of a bird than the exclusion or retention of the fœtus is subject to the will of a viviparous animal: yet, how are we to reconcile this with the facts recorded? *

ART. VI. *Notes on the Arrival of the British Summer Birds of Passage in* 1834, *with incidental Remarks on some of the Species.* By Mr. EDWARD BLYTH.

THE following notes have principally been taken in the neighbourhood of Tooting, Surrey, in the course of long rambles before breakfast; the country around being greatly diversified, and exceedingly well adapted for observations of this kind.

The number of our feathered migrants, this season, appears to me greatly to exceed the usual average, at least in the

* What are we to say to the following remark?—"The eggs of the rook, magpie, and lapwing are nearly similar in size and appearance." (*Jesse*, p. 193.) Is it possible that Mr. Jesse had ever seen the egg of the lapwing before he made this remark? Mr. Knapp, however, appears to be of somewhat the same opinion; for he tells us (*Journal of a Naturalist*, 2d ed., p. 262.) "the eggs of the rook, though bearing little resemblance to those of the plover (lapwing), are, in some places, not uncommonly taken and sold conjointly with them in the London market." Surely, it must be an easy matter to impose upon a cockney.—*C. C.* [Hewitson's *British Oology* will effectually tend to prevent the recurrence of similar errors. In promotion of its useful service, we give again (we have noticed the work in IV. 428, 429., VI. 509.) its title in full:—*British Oology; being Illustrations of the Eggs of British Birds, with Figures of* [*those of*] *each Species;* as far as practicable, drawn and coloured from Nature: accompanied by Descriptions of the Materials and Situation of the Nests, &c. By W. C. Hewitson. Currie, Newcastle; Edwards, London. Seventeen numbers are published. We hope that Mr. Hewitson will not omit to give, before his work is completed, a dissertation on the structure of eggs, and especially on the anomalies in structure which have been observed in them. The conditions of anomalous formations are, in every class of natural objects, highly instructive. See in VI. 430., and in Mr. Conway's communication above.

above-mentioned vicinity. Many species which are always common, as the blackcap and the tree pipit, are now more than usually abundant; whilst others, which in general are here comparatively rare, as the redstart, and the grasshopper warbler, are this season far from being so. Perhaps this may be in some degree attributable to the long continuance of fine weather, during the period of migration; which is assuming that, in general, many perish by the way; but, unfortunately for this explanation, there is also a considerable increase of several of our resident birds, especially of buntings (*M*iliària), green grosbeaks, and common linnets. Owing to the unusual mildness of last winter, very few goldcrests arrived from the north; and these little birds, only, I think, are now not quite so abundant here as they were last summer.

The first of the migratory species which made its appearance here this season was the blackcap (*C*urrùca Atricapílla), three or four of which were seen about some privet bushes on the 23d of March, and on several following days, subsisting on the berries, and pouring forth their lively melody from amid a clump of shrubs, then every morning thickly incrusted with hoar frost. They did not become common till April 2. or 3.* April 11. A blackcap was, this morning, seen carrying in its bill materials for nidification.

March 29th. On this day a meadow crake (or landrail, *C*réx praténsis) alighted on board the Farquharson, East Indiaman (as I was informed by a relation, one of the passengers), as she was nearing the English coast. These birds are not common in this neighbourhood, and I did not hear their cry until the 13th of April. I heard them again on the 16th.

April 2d. I was informed by a birdcatcher, on whom I think I can depend, that he had just seen a redstart. Though I frequently examined their haunts, I did not myself notice one for some time afterwards. Could this have been *P*hœnicùrus *T*ìthys?

Wheatears are, here, rather rare, and the first I saw was on the 3d of April. They were, doubtless, in the country at least a fortnight before.

4th. This morning a solitary swallow (*H*irúndo rústica) was seen, and bank martins (*H.* ripària) were plentiful about the river Wandle. These last had been over some days.†

[* The summer birds are now arriving. The blackcap has been warbling sweetly to-day. — *J. G. Lexden, near Colchester,* 3d of 4th mo. [April 3.], 1834.]

[† Sand martins appeared on March 15., at Dorking, Surrey; and at

Tree pipits (*A*nthus arbòreus), also, arrived on April 4., being the same day on which I have first noticed them for three successive years. The following day they were abundant. Speaking of the genus *A*nthus, Mr. Selby observes, that the species "appear subject to a trifling change of plumage in the spring, confined principally to the region of the head and throat." From observations which I have made on these birds, both in confinement and in the wild state, I find that the members of this genus, and also of Bùdytes and *M*otacílla, undergo in the spring a complete change of plumage, with the exception of the quill and tail feathers. Even the wing coverts and the scapulars are all changed.

6th. I heard a wryneck (*Y*únx Torquílla), on Clapham Common: on the 7th these were very plentiful. [In 1833, the wryneck was heard at Bury St. Edmunds on April 7.]

7th. A single chimney swallow was seen, being probably the same individual that was noticed on April 4. Observed several willow wrens (Sýlvia *T*róchilus), and chiffchaffs (S. lòquax). These last have generally been described to come over in the middle of March; but I rather question whether those that have migrated are ever heard before the first week in April. Two chiffchaffs remained throughout last winter in Earl Spencer's park at Wimbledon. In the *Field Naturalist's Magazine* for last April, p. 217., a correspondent from Penzance mentions that a few willow wrens remain in that neighbourhood throughout the year; and as, in a previous communication, he makes mention of the chiffchaff, he is doubtless correct with regard to the species.

10th. Heard, for the first time, this morning the long

Taunton, March 29. Swallows appeared, on April 7., at Dorchester; and at Stanley Green, on April 19. There were, on May 1., martins hatched, and full fledged, at Spalding, Lincolnshire; and martins were building at Stanley Green on May 2. The Rev. W. O. Bartlett, Vicar of Great Canford, near Wimborne, Dorsetshire, saw twelve swallows in that parish on Oct. 29. 1833. The last swallows seen here, in the parish of Longfleet, were two seen by Mr. A. Kemp, on Nov. 15. A brood of martins, the produce of a second hatch, had taken flight two days before. After various rehearsals, which were very interesting to observe, the young birds departed with a number of old ones which had assisted in teaching their young wings, as well as ideas, "to shoot" through the air. Very few birds return, I think, from their migration. I notice two martins which frequently visit the old nest where the brood I have named was reared, but there is not, at present, any attempt to rebuild it: their acts seem more like a reminiscential inspection. This nest was in an apple loft; their egress and regress was, last year, through a window then open; but, observing that, on their arrival this spring, they dashed themselves against the glass, I removed a pane, and now two birds frequently fly in and out; but only two. — *W. B. Clarke, in a communication dated Stanley Green* [*Dorsetshire*], *May* 19. 1834.]

trill of the grasshopper warbler (Salicària Locustélla), or, as it is better named by the peasantry in these parts, "the cricket bird," or the "rattlesnake bird;" the former, of course, from the similarity of its cry to that of the mole cricket (Gryllotálpa), and the latter (by which term it is here most generally known) from the equally close resemblance which it bears to the rattle of the Crótalus [rattlesnake]; though it is difficult to imagine how this should be sufficiently well known [in England] to give rise to a provincial name. April 10. was also the day on which I heard it for the first time last year. I did not this season again notice it till the 17th, about which time they appeared in considerable numbers. On the first arrival of this curious species, it sedulously hides in the very densest furze or bramble coverts, rarely emits its strange sibilous rattle, and even then its voice hardly ever seems to proceed from the true direction. This ventriloquising faculty (as it is absurdly called) is well known. The bird can, at pleasure, send forth (as it were) its voice to the distance of two or three yards; so that, by merely turning round its head, the sound often appears to be shifted to double that distance. The same effect is produced also in the common meadow crake, and in precisely the same manner, by a mere turn of the head. As soon as the cricket birds, however, have fixed their abode, and the females begin to arrive, the males cease for a time to exercise this faculty, and for a very obvious reason; otherwise, were five or six of them to be emulously trilling in a furze brake, as is frequently the case, the female would often be sent in a wrong direction, and might, it is not unlikely, introduce herself to one of the rivals: but this the males take care to prevent, not only by ceasing to ventriloquise, but by sitting exposed on the topmost twigs of the bushes, and rattling so loudly that they may be heard at a very great distance. They are then so bold, that, even if shot at and missed, they fly only for two or three yards, and then recommence immediately, as if nothing had happened. No sooner, however, are they paired, than their habit of close concealment returns, and also their deceptive mode of uttering their cry. Having lately procured a considerable number of these birds for different friends, I have observed that they vary somewhat in plumage, some being much spotted on the breast, while others are spotless, and the colour of the upper parts also varying a little in different individuals; but there is no fixed difference between the plumage of the sexes. I have often been surprised at the great strength of the muscles of the leg in this species, which are partly ossified, as in gallinaceous birds.

13th. A cuckoo was heard.*

14th. Yellow field wagtails (Bùdytes flàva, or better, perhaps, flavíssima) were seen, and the next morning these were very plentiful. I once had the gratification of seeing a small flock of these birds arrive from the sea, early one morning in September, while shooting seafowl in the Isle of Jersey. They were of this species, and not the nearly allied one lately detected by Mr. Gould, and had probably crossed from the south-western coast of England.†

15th. House martins and chimney swallows were skimming over the meadows by the river Wandle. A redstart was heard.

16th. Redstarts plentiful.

17th. Several cuckoos were about; and the nightingale was heard here for the first time in the season, being the same day on which I first noticed it last year.

18th. Whinchats arrived; a reed warbler (*S*alicària arundinàcea) was shot; and I was told that a garden fauvette (*C*urrùca horténsis) had been heard. Redwings and fieldfares were still abundant, but from this time their numbers rapidly decreased.

19th. Several whitethroats made their appearance, and on the following day these were very plentiful.

20th. I saw a grey flycatcher (Muscícapa *Grísola*): this being about ten days before the usual period of its first appearance.

* [The cuckoo was first heard at Parkstone, near Poole [Dorsetshire], on April 18. 1834: it came on the same day in 1833; and I am told by persons who are observant, that it always returns, and is first heard at Parkstone, about that day. One cuckoo, last year, which haunted my garden, was known by its voice: it was cracked; and the bird, during its twelve weeks' stay, never recovered its hoarseness; it could only cry, cuck, cuck. I have ascertained that this bird has not returned, or else has made good use of its winter holidays in learning to speak plain. The cuckoo left us last year on July 8. Which way does this bird retreat? I have heard its note very often between Bruges and Ghent, so late as the *end* of July: especially, also, near Ostend. — *W. B. Clarke, May* 19. 1834.

One of the patrol in Kensington Gardens has told me that the cuckoo was heard in these gardens on April 21.; I saw one there on April 27. — *J. D.*]

[† Wagtails arrived at Stanley Green [Dorsetshire] on March 6. These birds built last year in a small brick island, covered with shrubs, in a fishpond in my orchard. At least ten pairs left us in October; two only have returned. They have not built there this spring, as the gardener has cleared away the weeds, &c.; and the birds seem alarmed. *W. B. Clarke. May* 19. 1834.— We have appended this observation, because, although Mr. Clarke has not stated the species, it would seem to be not the common resident one; and because it is so clear an illustration of the remark by Mr. Waterton, in VI. 312.; namely, the means of "food, and a quiet retreat, are the two best offers that man can make to the feathered race, to induce them to take up their abode on his domain."]

21st. Sedge warblers tolerably plentiful.

23d. Common swifts (*Cýpselus murànius*) arrived. Also the white-breasted fauvette, or lesser whitethroat (*Currùca gárrula*). This species is rather irregular in its appearance, and Montagu extends the period of its arrival "from April 21. to May 10." In the spring of 1831, its nest, containing four eggs, was brought to me on the 23d of April. Last year I did not observe it till the beginning of May. Here it is very abundant; and I may avail myself of the present opportunity to offer a few remarks on the species.

It is certainly strange, that so common a bird as this is, an inhabitant of gardens and orchards, and roadsides, in the immediate vicinity of houses, and conspicuous from its restless activity, and its perpetual reiteration of a loud and peculiar note, should be so little known to naturalists as very generally to be considered rare; and be described, by all our writers on ornithology, to inhabit only the thickest underwood; yet such is the case: and, even in the late edition of Mr. Selby's work, it is said to inhabit "the thickest hedges, in which it conceals itself with great adroitness; and the intricacies of which it threads with the rapidity of a mouse; on which account, specimens are only to be obtained with difficulty, and by patient watching." And, again: — "Its retired habits, and the impatience of observation which it so constantly exhibits, in always ensconcing itself amidst the thickest entanglements of hedges or underwood," &c. The words, also, of Mr. Mudie, in his *Feathered Tribes*, are to the same purport, representing it to keep much closer to the hedges than the common whitethroat. Much of this is, however, erroneous; for the haunts of this bird are not much in the hedgerow nor in the tangled underwood, but more upon the trees than those of the whitethroat, and not unfrequently on the tops of the highest elms: whence its shrill and monotonous concluding note (which much resembles the song of the cirl bunting, or the sound *jee*, or *gheei*, repeated several times in quick succession) may be heard at a considerable distance. I have noticed it to be particularly partial to elms; so much so, that, when rambling through different parts of the country, I have approached a spot where a few elms have grown out of the hedge, and especially if a ditch were at their feet, I have often, as a matter of course, looked out for this active little bird, and scarcely remember an instance of failing to see it in such situations. It may almost always be observed, also, about little cottage gardens; and, when the cherries begin to ripen, no species is more eager in its attacks upon them; nor are its habits so retired, nor its impatience of observation so

great, but that it will allow of a tolerably near approach; nearer, indeed, than any of its British congeners. It sometimes places its nest 10 ft. or 12 ft. from the ground; but more commonly in low bushes, and not unfrequently among nettles or other coarse herbage: whence, in these parts, this bird (and not the whitethroat) has acquired the provincial name of "nettle creeper;" by which term it is mostly known to the peasantry.

The lesser whitethroat differs remarkably, in confinement, from all its British congeners, in the extreme quarrelsomeness of its disposition; resembling, in this respect, the willow wren and chiffchaff. I have noticed this, in a greater or lesser degree, in upwards of a dozen individuals; and, in general, they must not, on this account, be kept with other birds, or they will fairly worry them to death, even if double or triple their own size, as I have reason to know from experience. Its manners in the cage (though not its attitudes) bear a very near resemblance to those of the furze wren, or Dartford warbler (Melizóphilus provinciàlis). Both these little birds have, in confinement, a remarkable habit of often throwing back the head; and they frequently climb along the wires, which none of our other warblers ever do. They farther assimilate in being puffy and thick of feathers about the neck and throat; and in sometimes uttering a kind of rattling note, peculiar to themselves. In other respects, however, the furze wren approximates more to the whitethroat than it does to this species; and, in confinement, is as fond of fruit as either of these. Its general habits, in the wild state, are quite those of the whitethroat; and its manner of singing on the wing precisely the same; its bill, also, is very similar to that of the whitethroat: yet I now incline to the opinion that the furze wren forms a distinct natural genus from these, taking the blackcap for the standard of *C*urrùca; and consider our two whitethroats as species in some degree intermediate, these differing, however, considerably from each other. The furze wren, in its mode of nidification and eggs, very closely resembles the whitethroat and other fauvettes; and not the Malùri, to which genus it, in some other respects, also very nearly approximates.

The lesser whitethroat is never observed to mount singing into the air, like the common species; but pours forth its pretty chirping song generally from amid the branches of a tree, though sometimes from a bush. This is soft and melodious, but weak; and may be easily recognised by the frequent recurrence of a note like *sip, sip, sip*. Like the other fauvettes (*C*urrùca), it raises its voice as it proceeds, and ends generally with the monotonous and loud shrill note mentioned

at the commencement of this account; which is analogous to the clear and lively whistle with which the blackcap usually concludes. This note is also sometimes repeated, as it flies, in a vacillating manner, from tree to tree.

In the young of this species the colour of the iris is very dark, appearing at first sight black; the following spring it becomes hazel, with a tinge of reddish; the next year it is pale olive brown; gradually becoming lighter and lighter, till at length it is of the purest white. In this state I have kept in confinement a fine male, and have since seen another individual, a female, in which the irides were perfectly colourless. They are seldom thus met with, because so many years must elapse before the colour entirely disappears; and in all birds there is always a great preponderance of young individuals. Montagu's description must have been taken from one three years old; as the irides are said to be "yellowish, with a tinge of pearl colour." In the males of the common whitethroat, the iris does not acquire its rich yellow until the second or third year. [I have, this morning, shot one with white irides. (*Mr. Blyth*, in a letter dated May 30.)]

I hope this long digression will be pardoned. I have been thus diffuse, because the lesser whitethroat seems but very partially known, judging from most of the descriptions of it which I have hitherto seen. Of these, that in Professor Rennie's edition of Montagu's *Dictionary* is decidedly the best, the editor being well acquainted with the bird.

26th. Heard the sibilous pettychaps (or wood wren, Sýlvia sibilàtrix) for the first time.

30th. On this day I was informed, that, among the numerous swifts playing around the Garrat copper mills, on the Wandle, was one individual of a larger size, and rather paler than the rest, with a white line along the belly. This I immediately recognised to be *C*ýpselus alpìnus [described in VI. 286, 287.], so took my gun, and went direct in search of it; but, ere I arrived at the place, all the swifts had disappeared.

May 3d. Did not hear the garden fauvette (*C*urrùca horténsis) until now. In an excursion, on May 8., over Penge Woods, near Sydenham, I observed this species to be more abundant than I had ever known it before. For miles, the whole neighbourhood was vocal with their deep and mellow warblings. They did not here become common till about this time. Grey flycatchers were now plentiful.

5th. The common flusher (*C*ollùrio vulgàris) made its appearance; and the turtle dove was first heard. A finished dove's nest was found on the 18th. Though the turtle dove

is common in Dulwich woods, and in several other places near the metropolis, it is here of rather rare occurrence; and I have not, therefore, perhaps, been able to note down the exact time of its arrival.

I had now for some days been rather anxious to procure an alpine swift, for as many as three or four were one day seen sailing in company with the common species. I went several times to the place, and once I certainly saw them, but they were sailing high in the air, far out of the reach of gunshot. It was a calm still evening, and the spectacle afforded by the swallow tribes was truly beautiful, and would interest any lover of natural history. *H*irúndo rupéstris excepted, all the European *H*irundínidæ (or *C*ypsélidæ, should they not rather be called?) were sailing around. With pinions wide-extended, the two swifts (*C*ýpselus murárius and alpìnus) glided rapidly along in bold and sweeping curves, now buoyantly floating on the breeze, now darting with the speed of thought in pursuit of each other; those of the common species screaming in their course. The swallows (*H.* rústica) skimmed the surface of the water, at times excursively ranging over the adjoining meadows, and uttering, as they passed, their well-known "peet-weet," so exactly imitated by the little sedge bird. The house martins (*H.* úrbica) sailed gracefully in easy curves, with wings extended, twittering forth in the air their brisk and cheerful song; and showing in beautiful contrast, as they neared the ground, their purest snow-white plumage above the tail. Lastly, though far more numerous than all the rest together, the little sand martins, (*H.* ripària), with flight more vacillating than the others, literally peopled the air with their numbers, and, in colour widely differing from the rest, displayed their brown vestures to advantage, as they passed before a clump of trees, then everywhere budding forth into leaf.

It was impossible not to gaze with admiration on this animated scene. Their numbers seemed to lessen; and presently hardly one could be discerned, where a minute before they so abounded: but soon, in the distance, a few moving specks were visible, and in another minute the air was peopled as before. Again they disappeared, and the scene again was everywhere enlivened by their presence; but not in such numbers as at first. The sun was fast sinking below the horizon, and in every direction the refulgent sky glowed with his setting beams. The swifts had disappeared: a few swallows and house martins were still sailing around, their numbers fast decreasing: the bank martins gradually, almost imperceptibly, mounted higher and higher into the air, rising somewhat at

every sweep; and, slowly congregating in their ascent, continued thickening in numbers and lessening in the distance, till at length, "*parvis componere magna*" [to compare great things to small], they assumed exactly the appearance of a swarm of flies. At last they vanished to the westward; but whither they pursued their route I cannot tell, though I suppose that they retired straight to roost among the osier beds beside the Thames.

Mr. Selby observes of the bank martin, that he is not aware whether they ever congregate in the autumn, like the other species, previous to their migration. They certainly do congregate, and in tens of thousands, the flocks sometimes alighting on the ground; and generally passing the night in large beds of reeds or osiers.

Last of all the summer birds of passage, arrived the night-jar (Nychtichelìdon europæ`us), the loud *burre* of which was first heard here on May 15. This is early; but they may possibly have arrived a little before, as they are not common in this immediate neighbourhood, though a few always make their appearance. They are plentiful in the Coombe district; and I have seen them in Dulwich woods, and upon Penge Common, within five miles of London.*

To conclude: I did not, this season, observe any ring ousels, nor pied flycatchers † (M. luctuòsa). The former usually make their appearance here about the middle of April; the latter in the early part of that month, being one of the first summer birds of passage. *Query*, Should this species, and albicóllis, range in the same minimum division as M. *Grìsola?*

The noting down the arrivals of our small summer visitants has become a subject rather destitute of novelty; but it is still interesting to compare observations made in different parts of the kingdom; and, with this view, I have been induced to offer the present communication.

Tooting, Surrey, May 21. 1834. EDWARD BLYTH.

* [The nightjar was heard at Stanley Green on May 15.: it had probably just arrived. It has no regular habitat here, as far as I am informed. The bird arrived seems to be a solitary individual; at least I have not seen its mate. It made a fearful clatter on the 15th and 17th, from 7 o'clock in the evening until midnight. It was silent on the 16th, in the evening of which day it was hovering about the garden. (*W. B. Clarke, in a communication dated Stanley Green, May* 19. 1834.) See, in p. 156, other facts from Mr. Clarke, on the habits and time of migration of the fern owl.]

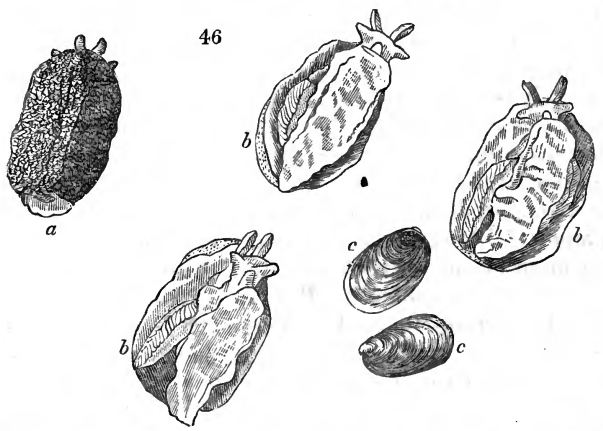
† Since writing the above, a field flycatcher's nest has been discovered in the identical hole (of a large ivied poplar), in which three successive nests of this bird were destroyed last year: see the *Field Naturalist's Magazine* for March 1834, p. 117. This is a most remarkable instance of persevering attachment to a particular location, for I have no doubt whatever that these nests were all built by the same pair. — *E. B. May* 30. 1834.

In Taylor's *London and Edinburgh Philosophical Magazine and Journal of Science*, the Number for May, 1834, there is published an interesting communication, entitled "Notice of the arrival of twenty-six summer birds of passage in the neighbourhood of Carlisle, during the spring of 1833." — *J. D.*

A Cuckoo pursued by a Meadow Pipit. — Happening to hear, when passing over Mitcham Common, a few days since, the full melodious note which the cuckoo often utters on the wing, I looked around, and soon perceived a meadow pipit (*Anthus* praténsis) chasing a cuckoo through the air, at a considerable height from the ground; following it at least a couple of hundred yards, and attacking it repeatedly, with wonderful spirit, till at length it seemed no longer able to keep up. On returning to its nest, it probably found a new object for its affections. — *E. Blyth.*

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

21. PLEUROBRA'NCHUS PLU'MULA (*fig.* 46.)



a, A view of the back, when the animal is in progression. *b b b*, Three views of the ventral surface *c c*, Two views of the shell. All of the natural size.

Synonymes. — Búlla plùmula Mont. Test. Brit. p. 214. t. 15. f. 9. (the shell), Turt. Br. Faun. p. 168., Turt. Conch. Dict. p. 25.; Pleurobránchus plùmula Flem. Brit. Anim. p. 291.; Berthélla porósa Blainv. Malacolog. p. 470. t. 43. f. 1.

DESCRIPTION. — Body oval, convex dorsally, of a uniform cream-yellow colour. Cloak smooth, reticulated with minute clear spots, so as to appear almost porous, like a piece of fine

sponge; the margin thickish, plain, undulate, free, and sufficiently broad to conceal the foot when at rest. Tentacula arising between the cloak and veil, superior, two, cylindrical, short, formed of a membrane folded into a tube slit along one side. Eyes two, small, black; one at the superior base of each tentaculum. Veil above the mouth broad, somewhat triangular, produced at the upper and outer angles, which are folded. Mouth shortly proboscidiform. Space between the cloak and foot smooth, deep. Orifice of the generative organs on the right side, placed very forward, tubercle-like. Branchia arising immediately behind it, single, naked, plume-like, and pectinated; the posterior half free. Foot oval, tapering posteriorly when in a state of extension, and projecting beyond the cloak; the margins undulate, plain. Shell concealed in the substance of the cloak, dorsal, ovate-oblong, depressed, with a minute spire at one end; brownish, thin, pellucid; strongly wrinkled concentrically, and marked with a slight fossa from the apex to the opposite angle. Length 6 lines, breadth 3½ lin.

I am unable to describe the internal organisation of this interesting mollusc; but it may be permitted me to direct the student's attention to the wonderful structure of its oral organs, which I could not (although not unfamiliar with analogous structures in congenerous species) view without a feeling of indescribable pleasure and amazement: and, to the lovers of the microscope, I am satisfied that no object can afford a more gratifying display. Within the soft parts of the mouth there lie two thin oval plates, one on each side, reticulated in an inconceivably minute and regular manner, after the fashion of the compound eyes of many insects; the meshes being diamond-shaped, and set with a small obtuse process at each angle. Between these plates (which, I presume, are a modification of the maxillæ or jaws) the tongue is situated: a broad membrane, folded at the sides, and armed with innumerable little spines or teeth, arranged in close-set transverse series, parting from a longitudinal medial line. The tongue is of a square shape, rounded at the lower end; to which is appended an inversely heart-shaped piece of similar structure and appearance: the whole fitted to rasp down the vegetable matter on which the animal feeds.

The cloak is fleshy, but not fibrous; and, in its composition, includes many small crystalline spicula of carbonate of lime, which are also to be found in the foot and branchia. These spicula are colourless, short, cylindrical, and rounded at both ends; and they seem to have no determinate arrangement. I have found similar spicula, but larger and more abundantly, in the tegumentary system of the Dòris.

Our figures exhibit the animal of its natural size; and were taken from specimens found, between tide-marks, in Berwick Bay. Like the land slug, it progresses by obscure undulatory motions of the foot; but it justly claims the "bad preeminence" of being superior in sluggishness and tardiness.

The specific name of Blainville is unjustifiable; and no authority can warrant our adoption of it. Montagu (the discoverer of the species) called it Búlla plùmula *; and, although the generic name must be altered to suit the progress of science, his specific name is sacred, and is beyond the changeful caprice of any systematist. Blainville has done some further wrong to Montagu, in ascribing even the discovery of the mollusc to Donovan; whose name, I may observe, is often substituted for that of the former naturalist by foreign authors, and by some careless translators in our own country. *Berwick upon Tweed, Jan.* 3. 1834.

ART. VIII. *Description of some nondescript and rare British Species of Shells.* By WILLIAM TURTON, Esq. M.D. &c.

CRENA'TULA TRAVI'SII [Turton]. (*fig.* 47.)

47

Testa rhombea, inferne rotundata, pellucida, albidâ vittis longitudinalibus interruptis pallide violaceis; margine antico incurvato.

Shell rhombic, rounded below, transparent, whitish, with pale, violet, longitudinal, interrupted stripes; the anterior margin incurved. Nearly an inch long, and full half an inch broad; extremely thin and brittle; obliquely truncate at the top, with a few pale violet spots below; hollowed out at the front margin in a slight crescent-shaped form.

This most interesting addition to our native stock was taken alive at Scarborough; and is in the cabinet of Mr. Bean, who obligingly sent the accurate drawing from which the figure was taken. He has given it the specific name of Travísii, after Mr. Travis, well known for his valuable communications to Pennant. In its outline, it differs from any of those figured by Sowerby, or described by Lamarck.

MY'TILUS STRIA'TULUS Linn. Mant. p. 548., *Schrœt. Einl.* iii. p. 449. t. 9. fig. 16., *Gmel.* p. 3358.

Testa subtrigona, striis longitudinalibus elevatis crenulatis.

Shell somewhat triangular, with raised, longitudinal, slightly crenate striæ.

Length three quarters of an inch, and hardly as much in breadth; semi-transparent, dark horn-colour, with a few paler zones; marked with nume-

---

* He subsequently constituted with it a new genus, which he called Lamellària, a name preoccupied in botany.

rous slight longitudinal ribs, which are crossed by transverse depressed lines, giving them a granulated surface: the front margin a little incurved; the hinge margin angular.

This beautiful species, which has long been a desideratum to the science, was taken in abundance, by Mr. Bean, on some floating wood at Scarborough, who kindly sent us some specimens. [See, in connection, the communication in p. 353.]

PLEURO'TOMA TREVELLIA'NUM [Turton].

Testa ovato-fusiforme; anfractibus 6—7, striis numerosissimis, apice deplanatis.

Shell oval-fusiform; with 6 or 7 volutions, very closely striate, and flattened at their tops.

This new and very distinct species was found, by Mr. Bean, abundantly at Scarborough. It is so extremely like the *M*ùrex turrícula of Montagu, as to be hardly distinguished, except by the following marks: — 1st, The outline is of a more inflated cast; 2dly, the striæ are twice as numerous; 3dly, and the distinct notch at the upper angle of the outer lip fixes its genus.

In this genus we have also the *M*ùrex grácilis, *M.* septangulàris, and *M.* lineàris of Montagu, and the *M.* Chórdula of our *Conchological Dictionary;* a pair of which, collected by ourselves, are now in the cabinet of Mr. Clark.

The *M.* purpùreus of Montagu has sometimes this pleurotomatic notch.

FU'SUS FENESTRA'TUS [*Turton*].

Testa oblongo-fusiformi, alba, costis numerosis longitudinalibus striis transversis reticulatis; anfractibus octo, tumidis; cauda producta, sinistrorsum curva; apice papillari; fauce albo lævigato.

Shell oblong-fusiform, white, with numerous longitudinal ribs, which are reticulate by transverse striæ; volutions eight, swollen; the tail produced, a little turned to the left; mouth white, smooth; the tip papillary.

Length, 1¼ in.; breadth, five eighths of an inch. In its outline it much resembles the Fùsus córneus; but the volutions are much more rounded and deeply divided, and the tail is not so much elongated; the reticulations are rather coarse, and slightly granular at the points of junction; the colour is also of a much clearer ivory white.

A pair of these were dredged up at Cork; one of which was sent to us by Mr. Humphries, and is now in the cabinet of Mr. Clark.

FU'SUS NORWEGICUS [*Turton*], Strómbus norwégicus *Chamn. Conch.* x. t. 157. fig. 197, 198.

Testa lævi, eburnea; anfractibus planiusculis; ultimo ventricoso; labro dilatato, intus lævigato.

Shell quite smooth, ivory white; volutions rather flat, the lower one ventricose; outer lip much dilated, and smooth on the inner margin.

Length 5 in., and about 2 in. broad; with six volutions, the last of which is much enlarged; of an ivory whiteness, with a slight ferruginous stain; aperture very large, twice as long as the rest of the shell, pure white

within; the outer lip much spread, with the margin sharp and slightly reflected; pillar smooth.

This fine shell was taken by the dredge, off Scarborough; and is in the cabinet of Mr. Bean, who obligingly sent it to us for examination and description.

TRI'TON CUTA'CEUS *L., Sowerby, Gen.* fig. 3.

Testa ovata, dorso tumido, subtus deplanata, cingulis transversis prominulis subnodosis, varicibus duabus, nodosis, alternis; columella umbilicata; labro intus serie duplici crenato.

Shell oval, tumid on the back and flat underneath, with transverse and rather prominent belts, which are slightly nodulous; varices two, knotty and alternate; pillar umbilicate, outer lip crenulate internally in a double row.

Length nearly 3 in., and half as much wide; yellowish white, pure white within; pillar with a small nodule near the upper end.

Three or four of these shells were cast on shore, after a violent gale, near Falmouth, in Cornwall; and we have taken them on the Guernsey coast. From their worn and much stained state, they appear to have come from very remote and deep water.

? IA'NTHINA EXI'GUA *Sowerby Gen.* fig. 2, 3.

Testa ovata, subfusiformi, bifariam striata, spira producta acuta.

Shell oval, a little swollen in the middle, striate in a double direction; the spire produced and pointed.

Length four tenths of an inch, three tenths broad; of a violet colour, and a more conical shape than I. frágilis, in consequence of the spire being more produced, and the volutions rounded and more distinctly defined; the mouth is also not so proportionately spread, by which it appears of a somewhat spindle-like form, the primary volution being swollen and slightly carinate in the middle; the striæ are very distinct and elegant, oblique, and turning at the subcarinate part in an obtusely angular direction.

In the small coves about the Land's End, in Cornwall, the ? Iánthina frágilis is occasionally wafted, by a gentle south-west wind, in prodigious fleets; all alive, and borne upon the water by their clusters of tough bubble-like vesicles. By the retreating waves, most of them are carried back into the ocean; so that it requires a fortunate combination of tide, wind, and wave to see them in all their splendour. This mostly happens about the months of July and August. The fishermen's wives call them bullhorns, which supposes a prior knowledge of their appearance. Among them are sometimes found a few of I. exígua; which, having been probably regarded as the young of I. frágilis, may have caused them to be overlooked.

BU'LLA ZONA'TA [*Turton*], Scaphánder *Leach.*

Testa ovata, solida, opaca, albo et fulvo alternatim zonata, lineis transversis elevato-punctulatis.

Shell oval, solid, opaque, with alternate zones of white and fulvous, and transverse lines of minute raised dots.

Length a quarter of an inch, breadth nearly as much.

This very elegant species in shape very much resembles a small B. lignària; but is of a more conic oval shape, with the volutions more loosely connected; the crown is umbilicated, and, together with the pillar, pure white. On the body are regular, rather broad, alternate, transverse bands of white and pale rufous brown; and round each of the white belts is a regular line of very minute raised granular dots.

Found near the Land's End. (*Mus. Clark.*)

BU'LLA HYA'LINA [*Turton*], Roxània *Leach.*

Testa ovata, hyalina, lævi; aperture basi dilatata; columella umbilicata; corona planata, canaliculata, umbonata.

Shell oval, transparent, smooth; apertura dilated at the base; pillar umbilicate; crown flattened, channelled, umbonate.

It something resembles the Búlla umbilicàta; but is shorter, and of a more oval shape, with the aperture more dilated, and is of a crystalline transparency. At the base of the inner margin there is a reflection of the pillar, forming a slight groove or umbilicus; and the central umbo on the crown is very distinct and prominent. The last two marks seem to fix it in the genus Cymba of Lamarck and Sowerby; but we have not remarked the sharp plaits on the pillar.

Found abundantly on the coast about Newcastle; whence it was sent us by Mr. Alder. We also discovered it near the Land's End, in Cornwall. (*Mus. Alder, Clark.*)

BULLÆ'A PUNCTA'TA [*Turton*], Búlla punctàta *Adams, Linn. Trans.* vi. t. i. fig. 6, 7, 8.

Testa ovata, hyalina, lineis transversis impresso-punctatis; corona canaliculata.

Shell oval, transparent, with transverse lines of distinct impressed dots.

The accurate observations of Mr. Clark, who favoured us with specimens, have fully distinguished this species from B. catèna of Montagu. The shell is something smaller, of a more oval shape, with the crown more flattened; and, instead of oval, raised, chainlike points, which form the lines in B. catèna, the lines in this species consist of distinct impressed dots.

Mr. Clark has also been able to ascertain, that, in B. catèna, the animal is of a yellowish white, and furnished with a gizzard; but that the animal of B. punctàta is of a blackish grey colour, and destitute of any trace of gizzard.

Found by Mr. Clark, near Exmouth.

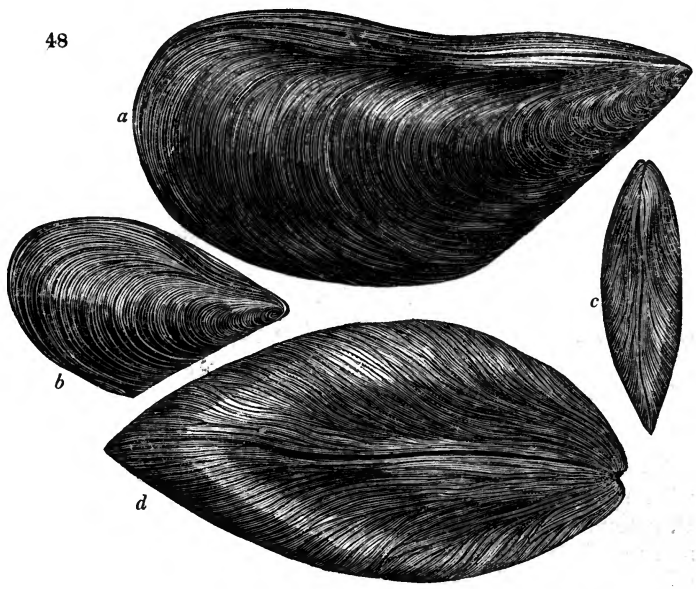
Bideford, Devon, May 1. 1834.

ART. IX. *A Notice of Localities, Habits, Characteristics, and Synonymes of a rare British Species of Mytilus.* By Mr. WILLIAM WILLIAMSON, Jun.

MY'TILUS *SUBSAXA'TILIS* [*Williamson*]. — A species of *Mytilus* has been occasionally found on various parts of the

eastern coasts of Yorkshire and Durham, and has been arranged under the different names of *M.* angulàtus and *M.* solitàrius. Nothing has, however, been known of its habits, in consequence of the specimens (which have been generally found attached to the roots of seaweeds) being so rare, and all of them young ones, until lately, when a habitat of this species was discovered a little to the north of Scarborough. The only other species to which it bears any resemblance are the *M.* edùlis and the *M.* incurvàtus, both of which are found in the neighbourhood. In the drawing (*fig.* 48), *a* is a

48



lateral representation of a full grown shell, and *d* is the anterior margin of the same. From the *M.* edùlis, to which it approaches in size, it differs in the greater thickness of the shell, which is strong and solid; the hinge-line is longer, and very straight, giving rather a rhomboidal form to the valves, sometimes even more so than in the figures; while in the *M.* edùlis it is curved; the anterior margin is broad, depressed, and a little convex, instead of being produced; the lines of growth are also comparatively stronger. In form, it bears a greater resemblance to the *M.* incurvàtus; but the latter wants the straight hinge-line, and is not of half the size. The young shells (*b* and *c*) have the character of the hinge even more striking, and are of a deep brown colour, instead of the dirty blue of the old ones. Still stronger

points of distinction between these three species are supplied by the differences in their habits. The *M.* edùlis is found thickly clustered on the large flat scars, and the *M.* incurvàtus fills the crevices and fissures of the rocks: the species which is the subject of my notice is invariably, except in the solitary instances to which I have above alluded, laid under water. It is found in the large pools left by the retiring tide, in groups of three or four together, firmly attached by their strong byssus to the under surfaces of the large stones with which the water is here and there studded; so that, to procure them, it is necessary to wade into the pools, and overturn these stones.

Mr. J. Alder of Newcastle has arranged it under the name of *Mytilus* angulàtus; and the Rev. W. Mark of Shields calls it *M.* solitàrius; but the largest individuals which these gentlemen have ever seen are less than the smaller figures (*b* and *c*); and as the shells of all muscles are more or less angular, and as this is not a species of a solitary habit, I would propose the name of *M.* subsaxátilis, as most characteristic of the situations in which it is found. The characters of its habitat, combined with its peculiar solid form, give it as good a title to be styled a distinct species as, if not a better one than, that of the transparent shell of the *M.* pellùcidus, or the small blunted form of the shell of the *M.* incurvàtus, does these species respectively.

Queen Street, Scarborough, June 10. 1834.

[For a notice of the localities of the *M.* polymórphus, see VI. 532.; and for a statement of the characteristics of the *M.* striátulus *Linn.*, see VII. 350.]

Art. X. *Observations on the Work of Maria Sibilla Merian on the Insects, &c., of Surinam.* By the late Rev. Lansdown Guilding, B.A. F.L.S. &c. *

Such of your readers as may possess a coloured copy of Madame Merian's work, may be glad to receive the

[* He died at St. Vincent in 1832, under 50 years of age.

"Yes! thou hast pass'd life's transient hour,
Yet oft shall fancy's witching power
Recall thy parted breath:
Still shall thy name in 'deeds' survive,
Still shall thy 'thought' in memory live,
Though thou art cold in death!"

In vol. xvii. of the *Linnæan Transactions*, part i. published May, 1834, there is an additional instance of the industry of this arduous-minded man:

remarks which I have been able to make on the value and interest of her figures, during my residence in a country similar to that in which her collections were formed.

We can never sufficiently admire the zeal of this female votary of the sciences, who, quitting the comforts of her home, sought for two years the gratification of her curiosity in a far distant land, under a burning sun, and in an unwholesome climate: her book, however, abounds with errors, against which the naturalist of Europe should be always upon his guard. At the period in which it was issued from the press, 1726 (according to Kirby, an edition seems to have been published as early as 1705), it was considered a splendid and valuable addition to the libraries of the learned; and it continues still to be admired, from the size of its showy plates, and the beauty of the subjects depicted, though the state of entomological engraving in 1726 was very imperfect; and the figures are sadly deficient in that minuteness of detail which is indispensable.

Its principal value seems to me to consist in the figures of larvæ and pupæ. Much fault is to be found with the absurd position of many of the figures, and the very great inaccuracy of others: indeed, it is difficult to imagine how they could have been prepared, unless they were sketched from memory. The grand defect of the work is the introduction of idle stories, related to her by strangers. The "paucis solum exceptis, quæ ex ore Indorum percepta junxi," go far to destroy that confidence which would naturally be given to a patient observer of nature. Linné, and some others of the older writers, have been led to give very inapplicable names to various species of Lepidóptera, taken from the plants on which they are falsely represented to have fed.

I shall pass on to notice the plates, which are 72 in number, and at the end of each note will say something as to the value of the figure of the plant introduced. The plates are preceded by one of those fanciful and useless frontispieces which were formerly thought indispensable in an illustrated work, and which occupied, to no purpose, the time and labour of the engraver. Here the fair author is

---

it is entitled, "Observations on Naticina and Dentalium, two Genera of Molluscous Animals," p. 29., and consists for the most part of technical descriptions and notices of systematic affinities; two Dentàlia are figured. This remark is given in the paper: "I have transmitted a drawing and description of the typical species of Naticina to my friend Mr. Swainson, who has promised to insert many of my drawings of West Indian shells in his beautiful work, entitled 'Zoological Illustrations.'"]

represented, in the foreground, before a basket of tropical fruits, with her attendants placing in cabinets chip boxes filled with extended insects; while the room is swarming with a host of butterflies and caterpillars that would have frightened Pharaoh in the land of Egypt. In the distance is a Surinam landscape swarming with frogs, in which we behold two old gentlemen, in bag wigs and broad-tailed coats, assisting the maid-servant to capture flies.

Plate 1. contains, on the right side, three rude and useless figures of *B*látta americàna *Gmelin, Lin.* 2042. At the bottom, the circular egg purse (*theca*) of a spider is mistaken for the inartificial egg cell (*loculus*) of the kakkerlac or cockroach, out of which a young one is represented as escaping. On the left are two useless figures of a second species, hardly mature. I have not observed that these creatures are particularly attached to the pine [Bromèl*ia Anànas* L., *Ananássa* satìva *Auct.*], though in the forests I have captured many interesting species among the vaginating leaves of the Tillánds*iæ* or wild pines, where they had evidently retired for shelter and concealment only. The bag, said to contain the young, was the egg cell, which is retained in the vagina for some time by the females of this genus, till it is indurated by atmospheric influence. It is then glued against some chosen spot, and covered for concealment in the dirt or any substance that may be at hand. The young pine [Bromèl*ia Anànas* L.] in a state of inflorescence, with the crown and basilar offsets just developed, is not badly executed.

Plate 2. The four upper figures represent the Coccinélla cácti *Gmel.* 1661., with the pupæ; and the two following, the cocoon and larva of a small moth?, said, without probability, to devour the Coccinélla. The four lower ones illustrate the *P*apílio Dìd*o* Fabric. 177. Gmel. 2324. They appear rudely done, with the exception of the largest larva. The pine is shown in its ripe state, and cut out of its cluster of serrated leaves, and ready for the table. I may once for all observe, that, when a lepidopterous insect is reversed, that portion of the *upper* wing which is exhibited is incorrectly coloured, and does not correspond with the accompanying figure of the upper surface of the insect.

Plate 3. Three figures of a giant species of *S*phín*x*, of the same group as *S.* carolìna, executed with more than ordinary care. Not known to Fabricius. The exuviæ and pupa are improperly attached to a branch; for all these insects descend towards the earth, and take their pupal slumber in a ball of prepared dirt, or in a slight cocoon. The pilose head of the imago, and the free tongue-case (*glossotheca*) of the pupa,

more than usually convoluted, are worthy of notice. The plant is a species of *Anòna* not found with us, which produces an unpalatable fruit.

Plate 4. contains the larva, empty puparium, and imago of *P*apílio jatrophæ *Fab.* 301. *Gmel.* 2308. With the lizard I am not acquainted, but disbelieve the improbable story of its acquiring the length of 10 or 12 feet. The plant is the flowerless head of the Játropha *Mánihot*, or cassada.

Plate 5. contains four tolerable figures of *S*phín*x* Tétrio *Fab.* 32.—See also *S.* rústica *Fab.* 33. *Gmel.* 2385. The larva is said to have been destructive to the fields of cassada plants. In St. Vincent I have found noble specimens, just developed, resting on the leeward or sheltered sides of the gru-gru palm (*Còcos* fusifórmis?). As they were all caught on the same tree, at distant intervals, it would appear probable that they had fed on its fronds, and had descended through the host of needles which beset the trunk, to seek a temporary rest, in the pupa state, at its foot. The gravid snake, with its eggs, is unknown to me. The unnoticed figure is the curious Membràcis foliàta *Fab.* 4. *C*icàda *Gmel.* 2092. The root of the cassada is badly represented, with its tubers; from which, after the evaporation of its *poisonous* juice, the granular *farine*, and the flat *cassava cakes* of the West Indians, are prepared. By the act of boiling *only*, this juice is (in the Demerara settlement) converted into the rich and dark sauce called cassaripe. The native Indians form of dark clay their pots which bear the name of this sauce, serving to season the hunter's daily meal; and the colonist has introduced the custom into his more luxurious dwelling. The plan is, to throw into the cassaripe pot, which is never cleaned or altogether emptied, the remains of meat and poultry, to add the sauce, and stir the compound preparation, which forms, as I can readily testify, a most delicious meal.

Plate 6. has two species of Satúrnia, with their curious larvæ and cocoons (*folliculi*), both undetermined. The under one approaches a species sent me from the Orinoco trees, on the banks of the great river of that name, which assumed the imago in my study in St. Vincent. The plant comes near to *S*olànum tórvum, the round berries of which were boiled and eaten here, during the partial famine caused by the stony showers of the volcano of Morne Soufrière, in 1812.

Plate 7. seems one of the most valuable in the work, and represents the *P*apílio Achílles Fab. 2534. Gmel. 2245., with the larva and oddly shaped pupa. This noble creature, soaring in the tropic sun in all its splendour and strength, is worthy to bear the name of the Grecian hero. The plant

seems to be the Malpíghi*a* glàbra *L.*, common in our gardens; the cherries of which, called here chereese, or cerise, from their acidity, are used only when preserved. They are delicious when encrusted with a coat of white sugar, laid on in the sun, by the help of the white of eggs.

Plate 8. has the curiously armed larva, the pupa and rude figures of *P*apílio Amphínom*e* Fab. 404. The plant is the Plumièr*ia* rùbra *L.*, whose sweetly scented flowers often cover the whole tree before the restoration of its leaves. The tree with white flowers is totally distinct, and is a common ornament of our leeward and rocky coast.

Plate 9. contains *P*apílio Nést*or* Fab. 266. Gmel. 2245. The puparium is rudely done, and the larva seems rather to belong to some *S*phín*x* or nocturnal moth, though it is said to have produced the butterfly before us. The plant is the pomegranate (*P*ùnica *G*ranàtum *L.*), with the fruit burst open, and showing the pale sweet coat which protects the seeds; and has all the glassy splendour of gems, so difficult to represent on paper.

Plate 10. Three rude figures of the larva, pupa, and imago of Hespèria (*P*apílio) Cupìd*o* Fabr. 1. Gmel. 2336.; a species remarkable for the spots of burnished silver, of the greatest brilliancy, on the inferior surface. The three lower figures illustrate a pale-coloured moth of the size of Cerùra vínula, not known to Fabricius. The cotton plant (*G*ossýpium barbadénse *L.* ?) is more than usually faithful.

Plate 11. The two figures of the sexes of *B*ómbyx (*P*halæ`na) erythrìnæ *Fabr.* 13. *Gmel.* 2403., are neatly engraved, with the pupa and exuviæ. If one can depend on the drawings of the larvæ, and the accompanying statements, we have here an extraordinary instance of the change which takes place during the developement of the larva. I have myself, as well as other observers, witnessed the disappearance of spots, the alteration of colour, and the variations in the clothing of caterpillars; but have never noticed so great changes as are here described. The yellow larva, at its first moulting, exchanges its transverse bands for lateral spots; at the second, the six strong spines which defended the body are laid aside, and the general colouring of the animal undergoes a change. The plant is a most beautiful species of Erythrìna, not cultivated by us.

Plate 12. We have the male, the larva, pupa, and cocoon of an undetermined species of Satúrni*a*, very nearly allied in many respects to a beautiful species which I have lately drawn in all its stages, for insertion in the costly zoological work of my correspondent, Mr. Wilson of Edinburgh, under

the name of A'ttacus Wilsòn*ii*. Indeed, I am not certain if it be not the very same. However, the coarse colouring and engraving will always render it impossible to determine this point. The flowers, with their strange subcoriaceous envelope, and the young fruit of the plantain (Mùs*a* paradisìaca *L.*), are tolerably well designed, though, even in a folio work, justice can hardly be done to these wonderful vegetable productions, which may well be thought worthy of paradise, and the names they bear [as paradisìaca, sapiéntum, ornàta, supérba]. I have commenced a Pomona on atlas sheets, whose size will enable me to depict the larger products of our gardens. Nine sheets I have devoted to the bread fruit (Artocárpus incìsa *L.*) alone, and its varieties, and yet I have not done it so completely as I have wished. How, then, shall we expect, in small-sized works, figures which can give to the European any tolerable idea of the more splendid gifts of Flora?

Plate 13. contains the larva, pupa, and two figures of an undescribed Hesperia? The larva is a remarkable object: instead of being spiny, as represented, I should rather think the back must have been clothed with fallen flowers; the appearance of the filaments and anthers is very clear. I have in spirits a lepidopterous larva, the processes of whose back are tipped with the yellow anthers on which it fed; a covering adapted for concealment, and not more wonderful than the stercoraceous coat worn by the cannibal larvæ of several orders, and by some small land testaceous Mollúsca, and which protects them from birds, by giving them the appearance of the dung of bats. The plant is rudely done, and infamously coloured: the fruit should have been yellow. Can it be the hog plum (*S*póndias Myrobálanus *L.*) of the Antilles? A useless plant.

Plate 14. The three central figures belong to a white and colourless unknown moth, sent me from Demerara. The three exterior ones represent an undetermined *S*phín*x*, very nearly approaching *S.* carolìna, but, without doubt, distinct, especially as far as regards the larva. A common and neglected, but delicious, West Indian fruit, the *Anòna* muricàta *L.*, or soursop, is very correctly drawn.

Plate 15. has three figures of the larva, cocoon, and imago of a black nocturnal moth, which does not seem to have occurred to other writers. The larva is remarkable for its quadrate bulky outline, and the hairy blunt processes of the extremities, and the slime said to accompany it. Our fair author is not the first entomologist who has been disappointed in the expectation of something splendid after the metamor-

phosis of insects. Larvæ of forbidding aspect sometimes shine, in their hour of perfection, in all the glorious tints of gems, and gold, and silver, and gaudy flowers, while those of more lovely hues produce in the end a garb of sober colours. The plant is the water melon (*Cucúrbita Citrúllus* L.). Though a cooling fruit, it becomes insipid here, and hardly merits the praises it has received in the warmer regions of the old world.

Plate 16. The central figures are useless, and, I think, confused. The white larva is of wonderful structure, and equals in interest any of those so beautifully depicted in the plates lately published by the indefatigable Dr. Horsfield. It is more probable that it produced the white cocoon and colourless moth so shamefully engraved. The banded larva has the aspect of those of many *Papiliònes*, and, with the pupa on the stalk, I should suppose, belongs to the butterfly here neatly drawn, which is the *Papílio* anacárdii *Fabr.* 567. It is the *P.* Pìera *Gmel.* 2257., and the *P.* anacárdii, 2258.! of this careless compiler. The upper part of the plate is a very fair representation of the leaves, flowers, and young fruit of the cashew (Anacárdium occidentàle); but the lower part of the engraving exhibits an unpardonable instance of the author's carelessness, and of the readiness with which she listened to the stories of those who sent her subjects for her pencil. The ripe fruit is reversed, and, by means of an imaginary peduncle, placed under the leaves, where it never grows. The yellow variety is most valued when sweet, and is often used to communicate a pleasant flavour to punch. They are seldom eaten except when preserved, from the vile indelible stains they communicate to our linen. The truly reniform external nuts, when deprived of their very caustic oil by hot coals, afford one of the most delicious of all kernels, which will keep for a long time. Bottles are sometimes tied under the young fruit, which is allowed to grow within till it is large and ripe, when it is preserved in spirits as a curiosity, and serves to exercise the ingenuity of children, who cannot account for the method of its introduction.

Plate 17. The larva, pupa, and two figures of *Papílio* Anchìses Gmel. 2230. The pretty larva is remarkable for those retractile cervical scent organs called by Kirby *osmateria*, which are found in some of its congeners, as *Papílio* Polýdamas Drury. The small figures are rude attempts to represent some of the Cóccidæ. The plant is the lime (*Citrus Lìma*) with its delicate odoriferous blossoms, abounding in our islands. The young lime forms one of the finest green preserves when emptied, and the fine acid of the ripe ones

is used with fish, turtle, and other dishes, and also makes delicious lemonade.

Plate 18. may serve for an entomological caricature exhibited on the branch of a guava tree [*Psídium*]. The large spiders are the well-known giant *Arànea aviculària Fabr.* 63. I disbelieve the existence of an egg-shaped cocoon-like *habitaculum*, into which they are said to retreat. The only web I have seen them weave in captivity is loose, of snowy whiteness and moderate strength. Doubtless this species is strong enough to overcome small birds, if it could seize them; for the prominent horny mandibles resemble in size and solidity the talons of a hawk.* The spider on the left is the *Arànea* venatòria *Fabr.* 7.; the Thomìsus venatòrius *Latr.* Madame Merian has given it credit for ingenuity which it does not possess. It spins no shrouds or ladders; and weaves nothing but the flat circular egg-purse (*theca*), which is carried under the breast, supported by the palpi only, and not agglutinated, as in some spiders, to the belly; or deserted, as by others. It runs about houses in the night-time, frequents the same spots, and murders the all-consuming [see V. 481.], bold, and buzzing cockroaches. It is never destroyed by the negroes; who say, if killed, it would cause them to break cups and glasses. Thus an absurd superstition serves to protect a useful creature; which, though of threatening aspect, is timid

[* The story of a spider which catches and devours birds had, Mr. MacLeay believes, its origin with Madame Merian. Oviedo, Labat, and Rochefort make no mention of any spider as possessing such habits, the two latter writers going no farther than the statement, that in the Bermudas there exists one which makes nets of so strong a construction as to entangle small birds. Madame Merian, however, went the length of asserting that one spider not only caught, but devoured, small birds; and figured the *Mygàle aviculària Walckenaer*, in the act of preying on a humming-bird. Now the *Mygàle* does not spin a net, but resides in tubes under ground, and in all its movements keeps close to the earth; while humming-birds never perch except on branches. The food of *Mygàle* consists of *Jùli*, Porcelliònes, subterranean *Achètæ*, and *Blàttæ*: a living humming-bird, and a small Anòlis, placed in one of its tubes, were not only not eaten by the spider, but the latter actually quitted its hole, which it left in possession of the intruders. The largest spider of the West Indies that spins a geometrical web is the Néphila clávipes *Leach;* and its net may, perhaps, occasionally, be strong enough to arrest the smaller among the humming-birds: but it is not likely that the spider would eat the birds. A small species of Sphæriodáctylus *Cuvier* [a lizard], introduced into one of these nets, was enveloped in the usual manner by the spider; but as soon as the operation was completed, the spider lost no time in cutting the line, and allowing her prisoner to fall to the ground. — Mr. MacLeay consequently disbelieves the existence of any bird-catching spider. (*From an abstract of a communication made by Mr. MacLeay to the Zoological Society, and read on Feb.* 11. 1834. *The abstract is published in Taylor's Phil. Mag. for June*, 1834. vol. iv. p. 460—462. *Third Series.*)]

and harmless, and only occupied in ridding us of loathsome and offensive vermin. The ants are the *F*ormìca cephalòtes *Fabr.* 52. *Gmel.* 2802. Even after the facts recorded as proceeding from the all-wonderful instinct of these Cossack and Arab plunderers, one can scarcely credit their bridge of bodies, more singular than the chain-bridges of our rivers. In my garden, I find that hymenopterous insects (after the manner of swarming bees) crowd together for sleep on the extremities of plants; and I have seen a large group of four species, though of different genera, and even distinct tribes, attached by the feet to the bodies of each other, and slumbering in peace and quietness. What an example for unsocial and jealous men! The custom of cutting off the leaves of trees calls to one's mind the parasol ant of Trinidad. There we may see marching legions of these beings, with a leaf elevated over their heads, like a London crowd, on a rainy day, following the lord mayor's show, with innumerable umbrellas; or rather, as they observe the order and decorum which the mob despise, they represent, on a Lilliputian scale, with their leafy screens, the enemies of Macbeth descending from "Birnam wood to Dunsinane." These leaves are, however, probably collected to cover in their nest, rather than to "shadow the numbers of their host." The bird is probably fancied; the nest is too much like a pot of clay; there should have been two instead of the four eggs, which look like peas cut out of chalk. The figure gives one no idea of the tiny well-proportioned nest, formed of the silken pappus of plants, collected before it floats into the atmosphere, and bound round some pensile twig with the fairy fastenings of stolen cobwebs.

Plate 19. The three small figures belong to one of those splendid metallic flies which buzz, and poise themselves like hawks, in the tropical landscape. She represents them to have sprung from the larger pupa naturally! but "*rariore metamorphosi:*" one cannot fix the species. The three left-hand figures represent the *P*apílio psídii *Fabr.* 525. *Gmel.* 2254. The others illustrate the beautiful and curious larva, folliculus, and imago of a large nocturnal moth, not inserted in the works of Fabricius. The red guava (*P*sídium pyríferum) is a fruit common on our higher pastures, and the skirts of woods.

Plate 20. We have here, considering the state of the arts in 1726, fine figures of the gigantic bat-like E'rebus (*N*óctua) *S*trix *Fabr.* 3. *Gmel.* 2529. The cocoon is of large size; and the larva, though subpilose, from its anal horn approaches the outline of those of the *S*phíng*idæ* It under-

goes, like some of those caterpillars, a change of colour when mature. The exudation like a bunch of eggs is one of those natural gums or resins which force their way from the overcharged vessels of many a tropical tree; and hang like opaque icicles, or ooze like streams of frozen tears, from accidental wounds.

Plate 21. The four figures first noticed are those of a small moth, and not a diurnal *P*apílio. The paler larva, with its curious habitaculum of cemented sticks, being evidently, like my genus Oikéticus of the *Linnæan Transactions* [vol. xv. tab. 6.], referable to the Lepidóptera, could never have produced the red bug (a Redùvius?) figured in the plate. The darker caterpillar and the cocoon are also those of a lepidopterous insect; though out of this, she asserts, she procured the specimen of Petálopus (*Kirby*) C*i*mex *Lat.* drawn at the bottom. With such instances of carelessness and neglect before one, we must receive with caution the more improbable assertions in her journal of the metamorphosis of the Surinam productions. The Passiflòra is a showy species; though the fruit, which I have received from Demerara, is not valuable, and infinitely inferior to that of many kindred plants.

Plate 22. The three larger figures represent a fine and distinct but undescribed Satúrnia, belonging to the same group as those depicted in plates 6. and 12. The larva is very beautiful, and clothed with a vesture of plant-like branched processes, imitating the ciliated calyxes of some vegetables. She has remarked the *ferrea fila*, or hard pungent bristles, with which the ramuli terminate. The two small figures are the larva and cocoon of some lepidopterous animal, which she idly supposes produced the Lygæ`us, or some cimicoid insect, which is inserted in the plate. These strange mistakes must have arisen from breeding many insects together, but are hardly to be excused by the then imperfect knowledge of annulose transformations. The lily is beautifully drawn, and is common in all West India gardens, where it blossoms without culture, and occasionally becomes double.

Plate 23. Four of the figures illustrate the curiously armed larva, the pupa, and imago of *P*apílio Teùcer Fabr. 271. Gmel. 2248., which appear carefully drawn. The lizard is doubtful; these creatures differ beyond measure in the intensity and disposition of their spots and markings. The eggs of the diurnal species are more elongate than those figured; and they are covered, as in the turtle, with a coriaceous skin. The eggs of nocturnal lizards are rounder, and have a calcareous shell: hence they are deposited anywhere; whereas

the former, unless committed to the damp earth, would perish. The young must be incorrectly traced: I have always observed that, for the size of the eggs, the young of lizards are singularly large and active. The fruit is that of the ripe and edible banana (Mùsa sapiéntum *L.*).

Plate 24. The spotted figure is the Cerámbyx farinòsus *Gmel.* 1820. See also his *C.* cinnamòmeus, 1817.! This she supposes to have proceeded from the linear larva above it, which seems to me to belong to the Elatéridæ; and resembles a luminous one which, I have fancied, belongs to Elater noctilùcus, though I have not bred it. The white larva, she affirms, produced the beetle at the summit of the plant, which [beetle] is the Priònus melánopus *Fabr.* 30., Cerámbyx *Gmel.* 1816., and is quoted as a synonyme of the P. spinibárbis *Fabr.* 25.! It seems to be a pregnant specimen; we have one like it common in the decayed trunks of the silk-cotton bómbax. There seems, indeed, to be a group of kindred species most shamefully confused by entomological writers. The larger figure, which she has not noticed, is the Cerámbyx spinibárbis *Gmel.* 1818., remarkable for the unusual structure of the mandibles. The plant Argemòne mexicàna *L.* is well represented.

Plate 25. The four larger figures exhibit the Papílio passiflòræ *Fabr.* 189., *P.* vanillæ *Gmel.* 2336. The former name only is appropriate. It devours greedily the leaves of Passiflòra laurifòlia, &c. Though it does not injure the arbours on which these delicious fruits are cultivated, it spoils the beauty of the foliage for a time, if suffered to propagate the family. The outlines of the small moth are useless. The plant is a large variety of the vanilla of commerce (Epidéndrum *Vanílla* [*Vanílla* aromática *Swz.*]), so famed for communicating a grateful flavour to our chocolate.

Plate 26. The four figures represent a nocturnal moth, not described. The coco branch (Theobròma *Cacào* L.) is but rudely drawn. The painter, moreover, has attempted to improve on nature in the disposition of the flowers: it is but rarely that the smaller branches are productive. The frail and pretty blossoms issue in an unusual manner from the larger limbs and the rough and unsightly trunk. The spongy pulp which surrounds the ripe berries of which the chocolate is made affords a pleasant acid refreshment.

Plate 27. The three upper figures represent an undetermined moth. The filiform worm resembles nothing in nature; though, on the testimony of her *serva nigrita*, she supposes it to have produced the Mántis, which is the very remarkable M. strumària *Fabr.* 21. *Gmel.* 2053. The figure between

the fruits is the group of eggs. In the *Blattæ*, we have the eggs enclosed in a common inartificial egg-cell (*loculus*). The Phásmadæ lay them separately; whereas, in the Mántidæ, though the eggs are laid singly, they are always agglutinated in a group of a given determined form, which is preserved after the young have escaped by the vertical foramina. After the deposition of the ova (eggs), the female secretes a wax-like fluid, and varnishes the mass; all the time directing the motion of the anus by the styles, which serve as anal antennæ. The cockroach apple (*Solànum mammòsum*), without flowers, is tolerably executed; and is said to expel those noxious creatures [see V. 481.] from which its trivial name is derived: but I doubt whether it possesses this much-desired property.

Plate 28. The three upper figures belong to an undescribed pale moth. The larva is most interesting; the lanate processes are said, like cowitch, to inflame the surface of the body; and the animal adheres by an agglutinating skin. The rude and larger figure represents one of the most gigantic and singular of the capricorn tribes of beetles, the Acrocìnus longímanus *Kirby*, Priònus *Fabr.* 1., *C*erámbyx *Gmel.* 1814., Mácropus píctus *Leach*, Zool. Misc. vol. ii. tab. 89. The fruit is the citron (*C*ìtrus *M*édica var.) cultivated in our gardens; the thick rind of which is dried in sugar, as in Madeira, and used in pastry. Considering the former state of the arts, this is certainly a masterly plate, representing the various states of the gorgeous Uràni*a* Leìlus, *P*apílio *Fabr.* 63. *Gmel.* 2237.* The fine fruit is that of the shaddock (*C*ìtrus decumàna *L.*), said to be so named after the captain who introduced it: there is a variety with red and another with white pulp. If the fruit of the shaddock is suffered to ripen on the tree, it is doubtless one of the finest of the citrine tribe, and certainly the largest. The clusters of this gigantic fruit are so heavy, that, were not the wood close-grained and very tough, Flora would have been compelled to suspend these bulky presents on the trunk; as she has done the jack fruit (Artocárpus integrifòlia *L.*) and other larger productions of the vegetable kingdom.

[* Mr. MacLeay in a communication to the Zoological Society, read on Feb. 11. 1834, has described the egg, larva, pupa, imago, transformations, and characteristics of form and of habits, in a good degree of detail, of a previously undescribed species of Uràni*a*, which he has named Uràni*a* Fernandìnæ. An abstract of this communication is published in Taylor's *Philosophical Magazine* for June, 1834, vol. iv. p. 460—462. third series. Mr. MacLeay, in concluding his communication on the U. Fernandìnæ, refers "to Madame Merian's description of the metamorphosis of U. Leilus, and to her figure of its larva, both of which he regards as unworthy of credit." (Taylor's *Phil. Mag.* as above.)]

Plate 30. The four upper figures are of the *P*apílio rícini *Fabr.* 517. *Gmel.* 2253., which I have received from Demerara. The two other figures may possibly have been intended for the Oikéticus Kírby*i*, which I have described in the fifteenth volume of the *Linnæan Transactions*, with two plates; but her scanty description will not clear up the difficulty. Either we have before us a larva of similar economy, or she has altered and distorted the outline of the habitaculum, in order to give it the appearance of an Indian swinging in his hammock. The case is only suspended by the anterior extremity in our animals. The castor-oil bush (*R*ícinus commùnis *L.*) is correctly done. The leaves are applied to blisters; and the expressed oil used in medicine, or in the nightly chamber lamp.

In *Plate* 31. we have four figures of *P*apílio Polycàon Fabr. 96. Gmel. 2236. It surely cannot be properly quoted as the *P.* Polýdamas? Fabr. 42. Gmel. 2231. The larva is curiously marked; and, instead of the sexes, possibly two species are depicted. The plant is the changeable rose (*H*ibíscus mutábilis *L.*).

Plate 32. The well-armed larva, pupa, and two figures of *P*apílio cássiæ *Fabr.* 461. *Gmel.* 2280., a large and lovely species. The plant is the medicinal *C*ássia occidentàlis *L.*, or stinking weed. The whole is neatly engraved.

Plate 33. Very rude figures of *S*phín*x* fìcus *Fabr.* 31. *Gmel.* 2380.; the female of which is well figured in Drury's great work. The male is smaller, the wings less ample, and the antennæ thicker. The upper larva well represents the alteration of colour which it undergoes before the pupal change. The plant of fig is of that species cultivated in gardens throughout the world.

Plate 34. We have here the *S*phín*x* labrúscæ *Fabr.* 66. *Gmel.* 2380., so beautifully lithographed in the first series of Swainson's *Zoological Illustrations.* The larva is well done, and is remarkable for the attenuated neck, the shagreen-like shoulders, and the changeable lovely spot on the anal prominence. It is very voracious; and, in a neighbouring island, a host of these caterpillars lately destroyed acres of canes: an account of their depredations I have given in the 47th volume of the *Transactions of the Society of Arts*, &c. The black grape looks more tempting than in nature: our fair author regrets it has not been cultivated in vineyards. It is to be feared the excessive heats of these regions would interfere with the proper fermentation of the wine.

Plate 35. The four larger figures illustrate the *P*apílio sophòræ *Fabr.* 459. *Gmel.* 2282. The larva is said to be

gregarious under a common web (*tentorium*), from which it sallies forth at night for food. The three small figures are those of *P*apílio Clìo Fabr. 531. Gmel. 2254. With the plant I am not acquainted.

Plate 36. The four large figures well represent a species of the genus Cástnia, established by Fabricius in his last work, the *Systema Glossatorum*, which death prevented him from completing. It is the *P*apílio Lìcus Drury, i. tab. 16. f. 1, 2. The minor figures belong to some of the *C*icádadæ, which, in their earlier states, if I recollect rightly, imitate the larvæ of the Myrmeleónidæ, and wear a coat of excrements, exuviæ, and other matter, for concealment. The plant, which is only beautiful as the gradually developed flowers are expanded, blossoms in our botanic garden. Well may the fair author complain of the difficulties of penetrating through the "bush," to use a colonial term. Though we have not the many thorny plants which attack the sportsman in England, the traveller meets too often with the strong spines of the climbing Dioscòreæ; and the sharp blades of the frightful razor grass, which inflict deep and painful gashes on the cheeks and hands.

Plate 37. The first three figures are those of a small and pretty, but undetermined, moth; while a small *C*icàda? is rudely drawn below. The plant is said to be a *red* variety of the ochro, which I have never seen. Our true ochro (*H*ibíscus esculéntus *L.*) has yellow flowers and much more ample leaves. The young pods [green, tender, and unripened capsules], which vary in length and shape, are plain boiled, and eaten as vegetables, with butter and pepper and salt. When more advanced, but still green, they are made into a glutinous soup, or form an ingredient in the pepperpot, the most famous dish of the Creoles, which is principally composed of the leaves of the calaloo (a kind of *Calàdium*), and seasoned with crabs, salt fish, or pork.

Plate 38. The upper and smaller figures are meant for the *P*apílio jatrophària *Fabr.* 89. *Gmel.* 2469.; the four lower ones for *S*phín*x* játrophæ *Fabr.* 22. *Gmel.* 2376. Though the larva is better, these seem too rude to be depended on. The species approaches in size *S*phín*x* Tétrio of the fifth plate. The plant is the Játropha gossypifòlia, which abounds in our low lands, and is remarkable for the quantity of those viscous pedunculated glands which form fatal traps, in many cases, to swarms of the smaller insects.

Plate 39. illustrates an undetermined *S*phín*x*, whose imago, in general outline, approaches the subgenera Smerínthus *Lat.* and Thýreus Swains.; but the length of the antlia, and the

outline of the larva, are against its admission into these groups. The plant appears to be a weed which adorns our ditches with its pretty sulphur blossoms.

Plate 40. The small larva, cocoon, and moth refer to a species which, from their rudeness, it is, of course, impossible to determine. The other three figures illustrate the small *P*apílio cáricæ *Fabr.* 155. *Gmel.* 2354., whose larva has curious elongate hair-shaped processes. The sketch of the variety of the papay (Cárica *Papàya* L.), with rounded fruit, is very bad indeed. It is one of those giant vegetables to which justice cannot be done on paper of limited dimensions, and without the aid of a scientific draughtsman. The fruit is sweet when ripe, though little valued. When green, it is boiled as apple sauce, being mixed up with lime juice and sugar. Thus prepared, it is impossible to detect the imposition.

Plate 41. The plants are the Indian shot (*C*ánna índica *L.*) supporting the red-rooted variety of the sweet potato (*C*onvólvulus *Batàtas L.*). The round black seeds of the former serve, at a small distance, for shot. The flowers are pretty; but the fast-spreading roots are difficult to eradicate when once established. The tubers of the latter, when mealy, are a sweet but delicious vegetable, either boiled or fried in slices. The insect figures are all worthless. The more curious larva has strange globular hairy processes, and the cocoon belongs to it. The large figure is the Lygæ'us Meriànæ Fabr. 3., with the antennæ broken. Every boy entomologist will perceive it could have no connection with the larva just noticed, as Madame Merian asserts it had. The upper moth seems one of the Bótydæ common on our plants of the gourd family, whose leaves it often wholly destroys. From its large anal tuft of scales, I have lately referred it to a subgenus, which I have called Phakellùra.

Plate 42. The plant is the musk ochro (*H*ibíscus *Abelmóschus* L.). The seed-vessel has a musky odour, and produces seeds which are strung into necklaces by the ladies. The six entomological figures are vile and useless.

Plate 43. has four figures of *P*apílio Protesilàus Fabr. 69., *Gmel.* 2243. The larva, though black, is rendered interesting by the many ramulose, and the two stellated, processes. The wild fruit Madame Merian represents as eatable. The berried creeper and young Tillándsia are parasites.

Plate 44. — In the lower part of the plate are three figures of Hespèria bíxæ *Fabr.* 307., *P*ap. *Gmel.* 2367. The larva is not only covered with pilose fascicles, but the pupa also. This is a rare circumstance among the Lepidóptera, though

we may occasionally observe scattered squamulæ or a light pruina. Above are three figures of a moth not determined by any scientific writer. The elongate larva bears some resemblance to one I have described in the *Transactions of the Society of Arts, &c.*, vol. xlvii., as very destructive to the fields of sugar cane in the island of Bequia. The *Bixa Orellàna* L., or anotto, is tolerably executed. This plant, so well known in commerce, is easily cultivated here, but has never been attended to by the planter, whose whole thoughts and cares are absorbed by the more productive cane.

Plate 45. has three figures of a *Sphínx*, of the same group as *S.* carolìna, not known to modern authors, though apparently very distinct. The yellow variety? of the Poinciàna pulchérrima *L.*, or flower-fence, as it is called, seems a distinct species, as I never can detect any changing in its petals. It forms a pretty hedge, and is used by the Creole doctresses among their credulous patients.

Plate 46. We have here another distinct species of *Sphínx* not determined. The antennæ seem fictitious. With the plant and snake I am not acquainted.

Plate 47. With a showy figure of a branch and bunch of white grapes, are given, above, three rude figures of *Sphínx* vìtis *Fabr.* 41. *Gmel.* 2380. *Drury* 1. p. 28. f. 1. I have observed, with Madame Merian, the tendency which the more light-coloured larvæ of this and other species have to become rufescent before their pupal change. The singular larva, and the other two figures below, should apparently be referred to *Sphínx* satellítia *Fabr.* 42. *Gmel.* 2381. *Drury* 1. t. 29. f. 1, 2.

Plate 48. The plant seems allied to Eugèn*ia*, and appears to be mistaken for a tree which furnished a pigment to the savage natives. A lepidopterous larva, remarkable for its regular and close fasciculi of hairs, is given with the cocoon: and out of this, without the slightest probability, is said to have proceeded the large bee added below. The beetle with expanded wings is said to be the Priònus cervicórnis *Fabr.* 12., *C*erámbyx *Gmel.* 1814. In the centre is the Cordýlia (*Calándra*) palmàrum *Fabr.* 2. *Gmel.* 1740., the prince of the destructive tribes of the *C*urculiónidæ. The larva or gru-gru worm, so misplaced here, resembles nothing in nature but a lump of fat. In the *Transactions of the Society of Arts, &c.* vol. xlvi., I have given descriptions and coloured plate, fully illustrating this fine insect in all its stages. The gru-gru worm is still eaten by a few persons: they are fried in butter, and the greedy epicure, holding the hard horny head between his fingers, sucks out the fat entrails of this disgusting mor-

ceau. [An abstract of Mr. Guilding's description, and copies of his figures, of the *Calandra* palmàrum, as published in *The Transactions of the Society of Arts*, have been given in this Magazine, V. 466—469.]

Plate 49. — The subterraneous larva and the smaller expanded figure belong to a true *C*icàda, but not, I think, the Tettigònia tíbicen *Fabr.* 8. The larger figures well represent the noble Fulgòra lanternària *Fabr.* 1. *Gmel.* 2089., one of the most singular of all insects, and a precious addition to any cabinet. The creature at the bottom is fictitious. The hollow lantern-shaped head of the Fulgòra has been glued on a Tettigònia, and probably sold to our good-tempered author by some cunning negro. From her words, "Persuasum mihi ab Indis est," she had evidently no better authority for presenting us with this strange figure. The sounds of the *C*icàda, so like those of the razor-grinder's wheel, are not produced by the proboscis, but by the wonderful and complex tympanum, which occupies half the abdomen of the clamorous and impatient male. From the peculiar shrillness of the confused notes drawn from the quickly agitated organ, the creature is heard not only at a great distance, but is superior in attracting the attention to anything I know. Often, as the sun has been descending, and I have been performing the solemn service of the dead, one of these creatures has lighted on some neighbouring plant, and commenced his evening hymn, and thus disturbed me. At other times, attracted by the lights at evening service, the noisy intruder will enter my parish church, and distress the preacher with his rival voice. If its jarring notes cannot be said to drown my powerful organ, they are certainly heard distinctly above everything by the still assembly. Madame Merian gives us an account of her first discovery of the shining property of the Fulgòra, and tells us of the horror which seized her when she opened the box to separate the quarrelling inmates, and saw it filled with fire. A glass full of any of our luminous insects, when in health, is, indeed, a splendid show. The plant is the monstrous or double variety of the pomegranate (*P*ùnica *G*ranàtum *L.*), sometimes cultivated as an ornament of our gardens.

Plate 50. Above is Pássalus interrúptus *Fabr.* 1., *L*ucànus *Gmel.* 1590., with the nympha; and below is the noble *B*upréstis gigantèa *Fabr* 4. *Gmel.* 1926. The two larvæ, from the situation in which she found them, are without doubt improperly referred to these lignivorous beetles: possibly they belong to the *S*carabæ'idæ. The plant is a tropical tuber-bearing *C*onvólvulus *L.*

Plate 51. is useless: it represents a species of Còlias (*Papílio L.*), and some singular plant unknown to me.

Plate 52. has three figures of the bat-like *Bómbyx A'tlas* Fabr. 1. Gmel. 2400. The larva (as is generally the case in these plates) is most carefully engraved. All the insects of this princely subgenus which I have taken in our forests, so far from being "volatu celeres" [swift in flight], were very heavy, and easily captured. She describes the cocoon as affording a good silk which would be useful in commerce were it possible to domesticate the moth. The plant is the Seville orange (*Cìtrus vulgàris*), hardly valued as a fruit. The thick skin, when emptied of the pulp, forms a fine preserve.

Plate 53. The splendid *Papílio Menelàus* Fabr. 270. Gmel. 2244. The larva has very remarkable dorsal needles, and the pupa a free humeral process of very unusual form. The plant, whose seeds are eatable, I do not know.

Plate 54. About the flowers of some kind of Helicònia are six figures of two moths of no value. The vespoid insect belongs to that group so remarkable for its economy in constructing cells of mud, in which the ovum is sealed up with the destined [living] food of the future larva, disabled by the parent's poison, but not destroyed.

Plate 55. Here, again, is a distinct species of *Sphínx*, unknown to Fabricius, on a sprig of some species of *Cápsicum*: on this several varieties of the berries are fixed without any attention to nature. The many kinds of peppers, so useful and palatable in hot countries, are worthy of being well drawn and better known.

Plate 56. contains, as its name imports, the largest of its genus, the *Nèpa grándis Fabr.* 1. *Gmel.* 2120., with its larva. The frog, with its spawn and young, is the *Ràna* (Hỳla) Meriàna Shaw's *Zoology*, vol. iii. p. 133. t. 39. The plant, if my memory is faithful, has been introduced into Barbadoes, where curious persons keep it in tubs of water to enjoy the beauty of its blossoms. At the bishop's residence, I saw numbers of them in flower.

Plate 57. To the left are representations of *Sphínx* carolìna *Fabr.* 25. *Gmel.* 2377., Curtis's *Genera of Insects*, pl. 195. The plate contains also the cocoon and larva of a Satúrnia? If I judge rightly, the caterpillar is remarkable for its dense coat, which gives it the appearance of the French variety of the dog, which I have seen aged people in their dotage cherish so fondly. I have in spirits a specimen equally curious from Trinidad. The hair is said here to have acted like cowitch. The pupa was fly-blown, and Madame Merian has drawn two of the parasites to commemorate

her disappointment. The plant is a variety of guava [*Psídium.*]

Plate 58. — On an unknown plant are figures of a *Músca L.*, with its larva; and the larva, pupa, and imago of *Papílio* (Còlias?) sénnæ *Fabr.* 563. The remaining three figures on the left are a doubtful species of Zygæ`na. The larvæ of this group use their close fascicles of hair to defend the cocoon. The whole is stripped off before the pupal change, and disposed *radiatim* [rayedly] to keep off rain and enemies.

Plate 59. The *Ràna* (Pìpa Laurénti) Pìpa *Cuv.* is figured with its pulli lodged in the temporary dorsal cells.* The Pýrula, and another shell with a parasitic crab, are not worthy of mention. I know not the plant which is here said to be used as a spinach and salad.

Plate 60. With an unknown plant are three figures of the magnificent *Papílio Idómeneus* Fabr. 275. Gmel. 2248. The pupa has a large frontal, and another dorsal, club, which give it a singular aspect. The larva seems in no way connected with this butterfly, and probably would produce a Satúrnia. The words "telæ autem statim sese intexuit" confirm the idea. The *Papiliónidæ* spin no cocoon; even the Hespèriæ are but enclosed in the leaves convoluted by the silken threads of the larva. The wasp is the marabunce of Demerara. I have received its nest, though not quite complete: it was as large as a child's head, and resembled the bowl of a tobacco pipe reversed. It was firmly attached to a strong branch, had a smooth hard exterior, and was composed of the usual paper mortar, made of the loose epidermis and fibres of various woods and branches. At the bottom was a hole, opposite to many others, of the same diameter, which afforded a straight passage through the parallel horizontal stories of the pendent building.

Plate 61. From this number to the end of the work, with one exception, the plates are infamously engraved; the drawing, also, is equally faulty. Indeed, the figures are hardly worthy of being quoted, and cannot be accurately determined. On a branch, which the author, by mistake, calls the white guava, and which appears to be the Játropha *Mánihot* L., from which the cassada is prepared, we have, above, three figures of an unknown pretty moth, and, below, three others, which have been supposed to represent the *Sphínx E'llo* Fabr. 21. Gmel. 2375.

* See Matériaux pour servir à une monographie anatomique du Pipa, par C. Mayer, &c.

Plate 62. With a bad figure of the papaya (Cárica *Papàya* L.), we have six poor figures of two species of *Sphínx*, evidently distinct, but which cannot be ascertained, unless, perhaps, by those who may capture the larvæ.

Plate 63. Above are three figures of some Satúrnia, the hairs of whose larva are said to have caused on her hands the most painful irritation, which subsided on the use of oil. Below are three rude figures of what is said to be the Hespèria Pròteus Fabr. 256. Gmel. 2362. A branch of the coco tree is stuck in the ground, and, by means of much distortion and alteration, is at length made to represent a capsicum bush more than any thing else in nature. Though the pericarp is not very large or heavy, Flora in this most precious tree only suspends the fruit on the trunk and larger branches, and the frail and delicate blossoms have a singular appearance as they start (like the marble snowdrop in its chilling bed) from the moss-clad, rough, and unsightly bark. The plate is worthless.

Plate 64. On another poor sketch of the papaya we have six figures of two doubtful *Sphíngidæ*; the lower one has been said to be the *Sphínx* cáricæ *Fabr.* 67. *Gmel.* 2379.

Plate 65. On a branch of some *C*ìtrus are three figures of *Bómbyx* Hésperus Fabr. 2. Gmel. 2401., all worthless.

Plate 66. The insects are, perhaps, Mántis siccifòlia *Fabr.* 24. *Gmel.* 2049. See also Mántis precària *Fabr.* 32. *Gmel.* 2050. The triangular mass beneath, on which are seen eggs and young, I suspect to be a fungus, and not the collection of eggs; for though in this genus there is no egg-cell (*loculus*), as in the *Bláttadæ*, the ova are always deposited in some determined and tolerably regular shape and group. The quadruped is the Didélphis dorsígera *Gmel.*, with its young, rather too fancifully mounted all together on the parent's back.

Plate 67. On a branch of the cultivated fig we have three figures of an undetermined *P*apílio of a group, the larvæ of which have cervical, elongate, retractile *osmateria*, or scent vessels: in this species they are said to imitate the anal *mastigia* (or whips) of other larvæ, and to give a painful wound, but I doubt the fact. There are also three figures of an unknown moth, remarkable for the spiny process of the pupa.

Plate 68. Above are six figures of two small undetermined moths, and below four coarse ones of *P*apílio Telémachus Fabr. 269. Gmel. 2245.

Plate 69. A rude figure of the crocodile of Surinam, which is said, without probability, to arrive there at the length of

more than 20 feet; and the beautiful *C*óluber *S*cýtale of Gmelin.

Plate 70. is a showy representation of a ground lizard, which she complains of, as destroying her hen's eggs in the coops.

Plate 71. We have here (A) figures of the singular *R*àna paradóxa *Cuv.*, and (B) others illustrating the changes of European frogs. The unusual transformations here recorded by the fair author have, of course, no foundation in fact. The only circumstance worthy of notice is, that this species remains a very long time in its caudate state, and, indeed, acquires, contrary to the usual law, the greater part of its bulk while yet a tadpole.

Plate 72. The work concludes with a zoological caricature, equalling Hogarth's distorted perspective, for we have here a larva half the length of the towering column of an areca palm. The plate is crowded with various animals from different parts of the world, introduced without reason or judgment. No. 1—5. are immature *R*ànæ. A, B, C, are marine plants, or flexible corallines or Gorgòni*æ*. D is the *O*'strea fòlium? E, F, useless figures of shells. G is the *S*carabæ`us Actæ`*on* Gmel. 1529., one of the giant group called Megasòma by our learned countryman, the rector of Barham [Mr. Kirby]. On the tree are obscure outlines of larvæ and pupæ, and above are represented a bunch of the berries of the areca, two *P*apiliònes, and a South American *Z*ygæ`na?

I am, Sir, yours, &c.

St. Vincent, Jan. 29. 1831. LANSDOWN GUILDING.

ART. XI. *On the supposed generic Distinction of* Ranúnculus *Ficària of Linné.* By CHARLES C. BABINGTON, M.A. F.L.S. &c.

THE *R*anúnculus Ficària *Linn.* having been considered by many botanical writers of high authority as distinct generically from the other *R*anúnculi, and having been described by them under the names of Ficària vérna and F. *r*anunculòides, I have been induced to examine the characters on which the genus Ficària is founded, and now give the result.

The plant now under consideration was first formed into a distinct genus by Hudson, in his *Flora Anglica*, p. 244., in the year 1762, under the name of Ficària vérna, in which he has been followed by Persoon and De l'Arbre. In 1794,

Moench, in his *Methodus Plant. Horti et Agri Malburgensis*, gave it the name of F. *r*anunculöìdes; a name totally inadmissible, being, in the words of Sir J. E. Smith [*English Flora*, iii. 47.], "a barbarous jumble of Latin and Greek." He is, however, followed in that nomenclature by Roth and De Candolle, and by Biria, in his *Histoire Naturelle des Renoncules*. In this country, Lindley also has adopted the latter name in Loudon's *Encyc. of Plants*, but considered the plant as a *R*anúnculus in his *Synopsis of the British Flora;* and Mr. George Don has done the same in his recently published *General System of Gardening and Botany*. All other botanical authors have, I believe, followed Linné in considering this plant as a species of *R*anúnculus.

The characters given by all the above-mentioned botanists to distinguish the genera Ficària and *R*anúnculus rest wholly upon the comparative numbers of the sepals and petals; Ficària having 3 sepals, and 9 petals; and *R*anúnculus, 5 sepals, and 5 or rarely 10 petals.

That number is of no value in this case, any more than in many, I may, perhaps, be allowed to say in all, the other cases in which *it alone* has been employed as a generic character, is, I think, clearly shown by the tables opposite, drawn up from the examination of 2682 specimens of this plant. It will be seen that some of the varieties which I have noticed are true *R*anúnculi, having sepals 5, and petals 5 or 10; and that, so far from 9 being the typical number of petals, 8 occurs in very many more, and 7 in nearly an equal number of cases.

I will, however, leave the reader to draw his own conclusions from the facts, and only add, that I am indebted to my friend W. A. Leighton, Esq., for an account of some specimens examined by him at Shrewsbury, given in column 5. of Table I.

In all the subvarieties under varieties 8, 12, and 17, in which the petals are more in number than nine, I consider those above that number as stamens transformed into petals; as they may, as I believe, be always referred to a whorl within that of the true petals.

In one specimen of variety 8 subvariety 2, two of the stamens had become small scales, being apparently in the first stage of their transformation into petals.

In variety 7 subvariety 3, I consider one of the petals to be a transformed stamen, it being slightly within the other petals; and in variety 6 subvariety 3, one of the regular outer whorl of sepals is half converted into a petal.

TABLE I. — Showing the relative numbers of the sepals and petals in 17 distinct varieties, noticed in the examination of 2682 specimens. The * added to the number of sepals, denotes that one additional sepal is placed more or less below the flower in the form of a bractea; ½ denotes that one of the petals consisted of two agglutinated together, and having two nectariferous scales at its base; and, ⅔, that one petal was formed of three joined in the same manner.

Ordinal enumeration of varieties observed.	Sepals.	Petals.	At Cambridge, in March and April, 1833 and 1834.	At Shrewsbury, in March, 1832.	Total of each subvariety.	Total of each variety.
1	2	6	1	0	1	1
2	2	8	2	0	2	2
3	3	4	1	0	1	1
4	3	5	9	0	9	9
5	3	6	71	0	71	72
	3*	6	1	0	1	
6	3	7	376	4	380	387
	3*	7	5	0	5	
	3*	7	2	0	2	
7	3	8	1467	121	1588	1599
	3	8½ etc.	2	0	2	
	3	8⅔ etc.	1	0	1	
	3*	8	8	—	8	
8	3	9	243	5	248	359
	3	10	50	22	72	
	3*	10	1	0	1	
	3	11	25	7	32	
	3	12	2	3	5	
	3	14	1	0	1	
9	4	6	1	0	1	1
10	4	7	35	4	39	39
11	4	8	42	31	73	73
12	4	9	12	34	46	101
	4*	9	2	0	2	
	4	10	6	28	34	
	4	11	3	13	16	
	4	12	1	2	3	
13	5	5	1	0	1	1
14	5	6	1	0	1	1
15	5	7	5	1	6	6
16	5	8	4	1	5	5
17	5	9	4	5	9	25
	5	10	3	1	4	
	5	11	0	2	2	
	5	12	1	6	7	
	5	13	1	2	3	
Total	0	0	2390	292	2682	2682

TABLE II. — Stating the total number of instances of each of the several variations in each whorl which occurred in the whole number of specimens.

Number of parts [in either of the whorls]	2	3	4	5	6	7	8	9, &c.
[Number of examples in the whorl of] sepals	3	2427	214	38	0	0	0	0
[Number of examples in the whorl of] petals	0	0	1	10	75	432	1679	485

[A variety of the *R*anúnculus Ficària *L.*, or Ficària vérna *Hudson*, is cultivated in gardens, in the flowers of which whorls of petals, interior to the usual exterior whorl next to the sepals, occupy, and compactly fill up, the whole included space. Whether any stamens, or pistils, or portions of these, are produced amongst them, I have not examined. — *J. D.*]

Pàris quadrifòlia.—In addition to Professor Henslow's table (in V. 431.) of the conditions of this species, I supply the following, observed in plants of it at Bath, in June, 1832: they note one new variety, No. 39.

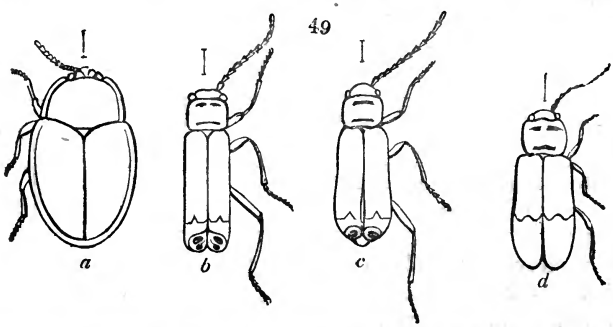
Number of the variety in V. 431.	Leaves.	Sepals.	Petals.	Stamens.	Carpels.	Number of specimens observed of each variety.
9	4	4	4	8	4	18
16	5	4	4	8	4	5
22	5	5	4	9	4	1
39	6	5	5	10	5	1

CHARLES C. BABINGTON.
St. John's College, Cambridge,
May 13. 1834.

Are Potentílla réptans, and Tormentílla réptans, distinct species? (VI. 251.)—In this neighbourhood Tormentílla réptans has five petals in, I would at a rough guess say, three cases out of every four; and hence it is extremely difficult to distinguish between it and Potentílla réptans. The calyx of Potentílla réptans itself is, too, sometimes 8-cleft; and, when this circumstance is coupled with the former, I cannot conceive any imaginable specific distinction between it and Tormentílla réptans. Indeed, I am inclined to believe that they are only varieties of one species, dependent on differences of soil.—*J. Jones. Gelly, Llanfair, Montgomeryshire, March* 28. 1834.

ART. XII. *Short Communications.*

*MALA`CHIUS bipunctàtus* Babington *is not M. ruficóllis* Panzer. (p. 178.)—"Plate 8. fig. 2.", or, as is probably intended, Part 8. No. 2., of Panzer, quoted by Mr. Dale (p. 178.) is Scólytus æ`neus, the Diáperis æ`nea of Panzer's *Index Entomologicus*, and of more modern entomological works; an insect of a totally different section of the Coleóptera, of which *fig.* 49. *a* is a correct outline. Malàchius rufficóllis (as Panzer



spells it), Part 2. No. 10., is correctly copied from his figure in *d*; and my figure *b* is a very good representation of M. bipunctàtus described by me in this Magazine (V. 329.).—*Charles C. Babington.*

My friend Babington having sent me two specimens of his new Malàchius, in order to make a sketch of it to illustrate his note, I have given representations of both of them, as they appear to be the sexes; *b* being evidently a male, and *c* a female, individual. This is a material point, from the peculiar structure of the extremity of the elytra, which thus appear to be appendiculated in both sexes of this species. The same occurs in Malàchius bituberculàtus *Steph.* In M. ruficóllis, on the contrary, the female, at least, has simple elytra. I only possess this sex, and do not know the structure of the elytra of the male; but in some species, as Malàchius rubricóllis and *p*ulicàrius, the males have the extremity of the elytra irregular, and the females have it simple. In other species, M. bipustulàtus and æ'neus, the elytra are simple in both sexes. The construction of these terminal appendages of the elytra is very curious, and apparently dissimilar in the different species, requiring a more minute investigation than has hitherto been given to it. — *J. O. Westwood. The Grove, Hammersmith, April* 4. 1834.

Information on the Limnèus elongàtus Turton; *on the British Limnèi generally; and a Notice of the Difficulties with which British Conchology is at present beset.* — In answer to W.W. (p. 161.), I beg to observe that the genus Limnèus is at present ill understood; many of the species being ill defined, and no two authors, except mere copyists, agreeing which are veritable species and which varieties: in fine, it may be truly designated "*rudis indigestaque moles.*" To disentangle the species, and rectify the errors of authors, would, I fear, in the present state of our knowledge, require greater talents and perseverance than fall to the lot of the generality of mankind. Neither the influence of external circumstances, nor the great differences observable in the various periods of growth, appear to have been hitherto sufficiently investigated; and a correct monograph on this genus would not only require the lyncean eye of a Jenyns [V. 374.], but the searching skill of a host of less accomplished auxiliaries. Linnæus describes only three or four species, which have been recognised as belonging to our country; while my manuscript list of the British land and freshwater shells (and which I intend shortly to have printed) enumerates no fewer than twelve or thirteen kinds which appear to me worthy of specific distinction.

With respect to the Limnèus elongàtus *Turton*, Hèlix octanfrácta *Montagu*, H. octòna *Pennant* (p. 161.), and Lymnæ'a leucóstoma *Lamarck*, they are all synonymes of one species. W. W. is, however, mistaken in supposing that the figure 32. in p. 161. is a correct delineation of the above

shell. It appears to be a truncated variety of the *Búccinum* palústre *Müller*, Hèlix palústris of most British authors, Limnæ`us fúscus of *Pfeiffer*, and is perfectly distinct from the former; differing from it not only in the fewer number of its volutions, but in its whole contour, and in the last whorl being considerably larger or more inflated than the penultimate one.

I have not the first edition of Pennant's *British Zoology* at hand; so I cannot say how far the figure of his H. octòna may agree with W. W.'s shell [fig. 32. p. 161.]. The H. octòna of the second edition is a totally different species, common in the West Indies; but has, probably, no claim to be considered British, although described as such by nearly all our authors. It is arranged in the genus Bùlimus by Lamarck, but is in reality an Achátina.

Linnæus refers to a figure in Gualtieri's *Index*, as representative of his Hèlix octòna; but this figure is, unfortunately, the Achátina acícula of Lamarck, and is wholly at variance with the description given by the illustrious Swede. Baron de Férussac is aware of this discrepancy; and, in his inimitable work on land and freshwater shells [V. 192.], candidly says, in reference to this species, " Nous ne connoissons pas la véritable espèce de Linné, dont la description ne convient ni à *l'acicula*, ni à notre *octona*." On the other hand, Professor Nilsson, a Swedish author, thinks he has discovered the long-disputed shell of Linnæus; and, in his excellent *Historia Molluscorum Sueciæ*, describes it under the name of Paludìna octòna, adding, " Hanc esse veram Helicem octonam *Lin.*, et descriptio Linneana et patria utriusque docet."

The unravelling of the discordant synonymes with which the lovely science of conchology is so thickly beset, is neither calculated to please the generality of readers, nor likely to inspire the uninitiated with a desire to taste the unalloyed sweets resulting from the pursuit of natural history. I will, therefore, conclude by observing, that, if W. W. of Southampton will favour me with his address, and a list of the shells found in his neighbourhood, we may, perhaps, be of farther use to each other by an exchange of specimens, as many species occur in the south which are seldom or never met with in more northern latitudes. — *Joseph Kenyon.* 7. *Butler Street, Preston, April*, 1834.

[In Silliman's *American Journal* for January, there is a " Description of some new species of freshwater shells from Alabama, Tennessee, &c., by T. A. Conrad." Eighteen species are described, and fifteen figured. They are of the genera U`nio, Alasmodónta, Anodónta, Cỳclas, Melània, Anculòsa, Planórbis, and Phỳsa. The description is " to be continued."]

REVIEWS.

ART. I. *Catalogue of Works on Natural History, lately published, with some Notice of those considered the most interesting to British Naturalists.*

EDWARDS, Dr.: On the Influence of Physical Agents on Life. Translated from the French, with Notes by Dr. Hodgkin and Dr. Fisher. 8vo, 489 pages. Highley, London.

This is a work of high interest to the philosophical naturalist. The object of the author's researches is to examine and ascertain the effects, both separately and conjointly, produced by air, water, temperature, light, and electricity on the various classes of vertebrated animals. These agents, no doubt, almost always act simultaneously and conjointly, and and hence it must be a very difficult matter to discriminate the influences of one alone from those of the others. Dr. Edwards, however, has laboured most meritoriously and successfully to elucidate these dark arcana of natural science; and his work is the record of the almost countless, and in many instances very curious experiments he has performed, and of the highly interesting conclusions to which these experiments have conducted him. His original views, which are numerous and valuable, having been rigidly scrutinised and confirmed by the researches of others, we may place the most implicit reliance on their authenticity and correctness. Dr. Edwards is, indeed, an honour to his country (he is an Englishman); his work evinces the most unwearied industry, and, at the same time, great penetration, ingenuity, and judgment. He is quite an original thinker, and his mind is evidently stamped with the signet of true philosophy. — *J. J. May*, 1834.

Jardine, Sir *William*, Bart. F.R.S., &c.: The Naturalist's Library. Vol. III. Gallinaceous Birds. 6*s*.

The pictures of this class of birds (the pheasants, turkey, pea fowl, Guinea fowl, &c., but especially of the pheasants) are, as might be expected, striking for their splendour: they are, besides, enriched with landscapes. A "Memoir of Aristotle," with an engraved head of this naturalist, is prefixed to this volume. The memoir occupies 98 pages.

Partington, C. F., Author of various Works on Natural and Experimental Philosophy, &c.: The British Cyclopædia, in monthly 4to Parts, 1*s.* each [subsequently raised to 1*s.* 6*d.* each]. Division III. (purchaseable separately), Natural History, combining a Scientific Classification of Animals, Plants, and Minerals; with a popular view of their Habits, Economy, and Structure.

Part i. contains 56 pages of letterpress, two plates, and some woodcuts. It is far, indeed, from faultless; but at a cheaper rate than any work on natural history which has yet been offered to the public.

Lees, Edwin, F.L.S., Hon. Curator of the Worcestershire Natural History Society, &c.: The Affinities of Plants with Man and Animals, their Analogies and Associations; a Lecture delivered before the Worcestershire Natural History Society, on Nov. 26. 1833; with additional Notes and Illustrations. 8vo, 120 pages. London, 1834. 3*s.* 6*d.*

This is a choice addition to what we would term the polite literature of botany. Plants have not failed to produce some embellishing effect on the polite literature of mankind in general, while we think that the literature of botany has remained, strange as it may seem, until latterly as unpolite as well could be. The ideas expressed on plants, and the terms in which they have been expressed, have been, among the botanical (ourselves, if we may do ourselves this honour, included), too much those of the dissecting room. Plants are poetical pictures; and to view them but with anatomical eyes is, perhaps, to defraud ourselves of the prime of the pleasures they give. Well, however this may be, Mr. Lees has, in the work before us, collected, and originated, and connected with them, a volume of sweet and pleasing associations; and so done much to enrich the imagery of the science of botany, and multiply the influences of plants upon human sentimentality.

> " There is a still, a soothing thought,
> With purity and calmness fraught,
> That steals upon the mind;
> Soft as the tear that eve distils,
> Sweet as the breath of murmuring rills,
> Or music on the wind."

And plants are, " when all within is peace," effective incentives of this blissful state of feeling. The considerations which Mr. Lees has offered on them are in promotion of this state of feeling; and the enriching and exercising our faculties of fancy, memory, and understanding by means of them: the offices of plants to these ends constitute what Mr. Lees has denominated " the affinities of plants with man."

Lindley, Ph. D., F.R.S. &c.: Ladies' Botany: or a Familiar Introduction to the Study of the Natural System of Botany. 8vo, 302 pages, and 25 plates. London, 1834. 16*s.*

This is another addition to the polite literature of botany; and it is a very welcome one, because such a one has been for some time really wanted, and because it supplies the want in (we conceive, from a glance through the work) a clever and agreeable manner. The office of the present work is not so much like that of the work above, to introduce to ideas which appertain without particular relation to the investigation of their structure; but to lead us through the outlines or general course of this investigation, and to guide us in an agreeable narrative, and not needlessly technical manner, to that dominion in knowledge among plants which botany alone can give. The plan adopted comprises twenty-five letters, each devoted to the explanation, in some detail, of the features which mark the distinctions of the more obvious of the natural orders, and to each of the letters is prefixed a plate, in which the parts described in the given characteristics of the orders, and specimens of the plants from which they are taken, plants for the most part very easily obtainable, are exhibited.

Lea Isaac; a Member of the American Philosophical Society, &c.: Contributions to Geology. Philadelphia, 1833. 8vo., 227 pages; and six plates which bear tinted figures of 224 species of fossil shells, and four fossil remains of species of fishes? Carey, Lea, and Blanchard, Philadelphia.

"I hope to add some new facts contributing to the developement of the geology of our country. Little, comparatively, has yet been accomplished in defining, with perfect accuracy, most of the beds of the great geological masses of our extended formations; and these contributions are presented with a view to assist, though in a small degree, in the accomplishment of an object desirable to every American geologist, a perfect and thorough knowledge of American geology."—*Preface.*

The subjects of the work are, an "introduction," in which an abstract is presented of the conditions and characteristics of the different formations recognised in general geology: then, the "tertiary formation of Alabama:" this is the main of the subjects, and comprises descriptions and illustrations of more than 200 species of shells, and those of some *P*ólypi: then, descriptions and illustrations of "new tertiary fossil shells, from Maryland and New Jersey." In relation to the two last treatises, the author has, in his preface, this remark, "Presuming the species to be new, I have endeavoured to make minute descriptions, accompanied by faithful figures of

each, with the hope of determining their characters permanently." Lastly, a short notice of the "tufaceous lacustrine formation of Syracuse, Onondaga County, New York."

Hawkins, T., F. G. S.: A Memoir on the Ichthyosauri and Plesiosauri, with several Lithographic Prints. Folio, 2*l.* 10*s.* London, 1834.

This work, announced in VI. 267, is now published, and a copy of it, with which we have been favoured, we have sent to a geologist for review, whose remarks we hope to present in our next number. In the mean time, we may notice that the illustrations contained in the work are striking; that they present, besides pictures of the wonderful creatures which are the subject of the volume, numerous details of their osteology and general structure; and so supply, we presume, in conjunction with the text, the fullest and most perfect account of these wonders of the animal world of former ages, which has yet been produced. The author in his geological deductions seems in entire accordance with the account of the creation by Moses, taking the separate days as distinct geological epochs.

ART. II. *Literary Notices.*

A ZOOLOGICAL Text Book, by G. R. Gray, is announced, in the *Entomological Magazine* for April. The text book is to consist of "an explanation of all the terms employed by zoologists in the description of beasts, birds, fishes, reptiles, insects, shells, worms, corals, &c.;" and it is to be "illustrated by numerous plates, representing the various parts in their natural situation, and in detail." This title bespeaks a work nearly respondent to one for which we have often wished; although the title of *A Dictionary of the Language of Natural History* would more precisely express the kind of work of which we have often felt the want.

The Entomologist's Popular Guide to the Study and Classification of British Insects, with an Account of the Habits of the most remarkable Species, illustrated by numerous woodcuts, by G. R. Gray, is announced.

Of the *Iconografia della Fauna Italica*, di L. Bonaparte, it is announced that fasc. 3. 4. and 5, are published: folio, 15*s.* each.

In the press, in 8vo., *A Treatise on Primary Geology*: being an Examination, both practical and theoretical, of the older Formations: by Henry S. Boase, M. D., Secretary of the Royal Geological Society of Cornwall.

THE MAGAZINE

OF

NATURAL HISTORY.

SEPTEMBER, 1834.

ORIGINAL COMMUNICATIONS.

ART. I. *On the Meteors seen in America on the Night of Nov.* 13. 1833. By the Rev. W. B. CLARKE, A.M. F.G.S. (A Supplement to Mr. Clarke's Essay, No. 3., in p. 289—308., *On certain recent Meteoric Phenomena, Vicissitudes in the Seasons, prevalent Disorders, &c., contemporaneous, and in supposed connection, with Volcanic Emanations.*)

" Quid sit, unde sit, quare sit. . . . . quod ipsum explorare et eruere sine universitatis inquisitione non possumus, cum ita cohærentia, connexa, concatenata sint."—M. MINUTIUS FELIX, xvii.

IN the last number of my remarks on the supposed connection of volcanic and other phenomena (p. 289—308.), I have attended to the extraordinary display of meteors on the night of Nov. 13. 1833, as described in Silliman's *Journal of Science and Arts*, vol. xxv. p. 411. In vol. xxvi. p. 132. of that work, for April, 1834, are "Observations thereon, by Denison Olmsted, Professor of Mathematics and Natural Philosophy in Yale College."

Professor Olmsted sets out with quoting previous examples of meteorites seen at various periods. Amongst these, he alludes to several quoted by me, especially the meteors of Nov. 19. 1832 *, seen in England; the matter which fell at Wolokolumsk, March, 1832; the meteor of Brunck, Nov. 14. 1832; and those seen by Humboldt, Nov. 12. 1794, in Cumana; and the aerolites of Candahar. Others are, the fall of *red rain* in different countries, on Nov. 13. 1755, and in Picardy, Nov. 14. 1765; and a great meteor seen in Ohio, Nov. 1825; and that seen in England, Nov. 13. 1803.

* By error, the date is before given, by me, Nov. 17. (p. 293.); as is 1728, for 1828 (p. 305.).

The testimony of an eyewitness is also adduced for the appearance of meteors, exactly resembling those in England, five days afterwards, at Mocha, on the Red Sea, where the same phenomena occurred, from 1 A.M. till after daylight, Nov. 14. 1832. (*Amer. Journ.*, xxvi. 136.)

Professor Olmsted also mentions a shower of meteors seen in America about the middle of April, 1803, which I have no hesitation in connecting with the shower of stones at L'Aigle, in France, April 26. 1803. (*Mag. Nat. Hist.*, VII. 296.) The other examples of the professor are, I think, plainly to be referred at once to a volcanic origin, especially the black dust at Constantinople in 472, which, according to Procopius, was traced from Vesuvius. Additional information has been received that the meteors of 1833 were seen, contemporaneously with the other localities, at Kingston, Jamaica; in Mexico, in lat. 34° 30′ N.; and on the shores of Lake Huron.

The explanation of the professor is most elaborately minute, and does no injustice to his celebrity as a calculator: but I must say that, if I were not attached to my own hypothesis, I could not agree in his upon his present showing. He *assumes* that the matter of which these meteors were composed is similar to that which composes the tails of comets, and that the meteors of 1799, 1832, and 1833 are results of the destruction of *one* and the *same* body; and thence, by the aid of astronomical reasoning, deduces this conclusion: — "*That the meteors of Nov.* 13. *consisted of portions of the extreme parts of a nebulous body, which revolves round the sun in an orbit interior to that of the earth, but little inclined to the plane of the ecliptic, having its aphelion near the earth's path, and having a period in time of* 182 *days nearly.*"

I have neither time nor leisure, at present, to examine here in detail the very ingenious, and apparently satisfactory, process by which these meteors are resolved into cometic fragments. I imagine that philosophers will find so many difficulties in the admission of the professor's theory, that he will not be able to maintain it. I would merely ask, if the appearances seen in such different places imply the object to be the *same*, why we may not include other similar displays in *that* comprehensive *identity?* Why we may not suppose that the meteors, of precisely similar character, seen on August 10. 1833, in Worcestershire, at 10 to 12 P.M.*, were cometic fragments? How happens it that, if this comet has a motion from N.W. to S.E. (Prof. Olmsted, p. 143.), the meteors seen at Mocha, on Nov. 14., made their appearance in England *five*

* See Mr. Lees's paper on the aurora, in *The Analyst*, No. i. p. 33., for August, 1834.

days after, in a directly contrary direction? It is certainly possible, and more than probable, that both occurrences had *one* origin; but, on Professor Olmsted's arguments, they could not, without involving difficulties of a serious nature. Surely he would not contend that the meteors seen by Sir W. Hamilton in the electrical display on Vesuvius (VII. 301.) were otherwise than *volcanic*:—yet, why do we not call them *cometic?*

The whole argument of the professor rests on the general assumption that these displays of falling meteors are different from all others which have been denominated, and even by him, aerolites: now, evidence undoubtedly goes to establish their similarity. The singularity of these occurrences being so commonly about a particular day in November had previously struck me, and certainly lends an air of probability to the professor's supposition. But periodicity is not, surely, confined to extra-terrestrial bodies. I shall, perhaps, have an opportunity of showing, in some future portion of my observations on the earth's derangements, that those disturbances obey a periodical law, and that, consequently, all their results obey the same impression. Professor Olmsted asserts that it is his belief that what has commonly been designated as the zodiacal light is identical with the light from his meteoric comet; and that the frequent displays of that light, recently, so correspond with the assigned position of the comet as to involve the identity of both. On this point I shall be silent: farther observation, and the eyes of astronomers, will be the best means of elucidating it.

After having made these remarks, it is incumbent upon me to offer a few words in defence of my own previous attempt to explain the connection of the meteors with my subject. In order to bring the topic within my reach, I must quote from Professor Olmsted himself, who remarks that the meteors were directed to the earth in a shower from a cloud, which must have remained stationary a long time at a great height above the earth (p. 142.): he calculates, above 2238 miles. (p. 144.) I have always been of opinion, in which many persons will agree (see Mr. Lees, in *The Analyst*, No. i. p. 36.), that philosophers are too apt to talk of hundreds and thousands, when, perhaps, units and tens would be nearer the mark. I allude expressly to the frequent mention of bodies entering the earth's atmosphere from tremendous heights. Is it actually known what is the real height of the earth's atmosphere? and can any one define it? It appears to me more probable that space is filled with atmosphere, denser, doubtless, towards all bodies moving therein; and that it is not philosophical to

suppose each planet to be surrounded by a particular atmosphere, independent of the rest of the universe, and fenced in by a kind of wall, which many expressions seem to imply. If space be filled, as it doubtless is, though we know nothing about it, by a universal atmosphere, bodies which are said now to fall from heights above *our* atmosphere may have been, in their original state, carried up by great heat into very lofty regions, even to a thousand miles. At any rate, it has not yet been shown that the heat generated in a volcanic eruption is not sufficiently powerful to produce such effects. And, on the other hand, it may be questioned whether bodies may not be in some measure displaced in vision by optical causes connected with the atmosphere. These speculations may seem absurd to such men as Professor Olmsted, with whom I have no pretension to dispute an argument: but, having taken a certain view of the subject, I do not like to abandon it hastily, and I have no reason to consider the meteors of 1832 and 1833 as exceptions to the general character of meteoric bodies.

The idea of a "cloud and shower" perfectly corresponds with the idea which we have of transported volcanic matter so discharged; and, as to the effects produced, "the sudden cold," "the change of wind," &c., Professor Olmsted allows the same results to true aerolitic agency. (*Amer. Journ.*, 161.) I have already produced evidence (VII. 296.) to show that meteors *are* followed by such changes in the atmosphere, and no defender of cometic influence can gainsay that evidence.

But it also appears that the western parts of the American continent were subjected to a "change of seasons," and that unusual *warmth* and mildness of weather prevailed on the shores of Lake Huron through the winter. (Mr. Schoolcraft in *Amer. Journ.*, xxvi. 139.; see, also, Mr. Hildreth's paper in the same work, p. 85.) I shall, hereafter, bring forward some evidence upon this point, and show that a line of *cold* extended between two lines of *warmth* during the late winter, which can only be accounted for in one way. That the meteors might, and did, modify for a time the states of the atmosphere, is probable; but we might as rationally impute to them the state of weather in Europe, as the change of season in America. In both cases, those changes appear to me to depend on a cause to which the meteors themselves were originally subject. I would not wish it to be inferred that a volcanic eruption, or emanations from the earth, must necessarily be *immediately contemporaneous* with meteoric appearances. Volcanic vapours may float for a considerable time in space before they become sufficiently condensed to assume a solid form: and, again, it is very probable that such

vapours may issue a long time before the actual outbreak of the volcano. I shall quit the subject, for the present, with this observation, that I have had so many examples before me of the intimate connection of atmospheric and telluric disturbances, as to feel inclined to admit it as established. In the present case, there is only an interval of eleven days between the appearance of the meteors in America, and the outbreak of Bocket Kaba, a volcano of Palambang (Nov. 24. 1833). This eruption was most dreadful. The whole of Java was shaken by earthquakes, attended by inundations from a lake on the mountain called Telaga Ketjiel, which covered several hamlets to the depth of 21 ft., leaving a mud deposit 7 ft. thick. Kaba is 50 leagues from Palambang, and yet the water of the great river Moessie was not fit to drink for several weeks, owing to mephitic mixtures. Even as late as February, 1834, there were floods and great rains; and Telo Mojo, a mountain of the province of Ngassinan, sank down in consequence. (*Journal de la Haye.*) I take one more correspondence, in illustration of the last of the professor's examples of meteors. He quotes (p. 137.), from the *Medical Gazette* and *New England Farmer* of May 1. 1833, an account of a shower of fire in the department of the Orne in France, seen at Caen and at Argenton, for two hours, one morning in the end of April. Earthquakes, &c., were very common about this time in various parts of the earth. Juasco and Coquimbo, in the west (on April 25.), were dreadfully shaken; while, in the east, very early in April, the inhabitants of Manilla were alarmed by the sudden decrease of water in their river, attributed to a volcanic eruption in the interior. The water became green, unpleasant in odour, and could not be used. Pestilence was, in consequence, feared. (*Canton Register*, May 18. 1833.) On April 4. occurred an earthquake at Vicenza; on the 17th, a hurricane in lat. 28° S. 52° E.; and at the end of the month, about the time of the others above named, earthquakes in Demerara. At this time, also, universal and unusual drought extended through the earth, occasioned, doubtless, by internal heat: Buenos Ayres lost 2,000,000 head of cattle in consequence, while New South Wales and the Cape of Good Hope suffered in proportion. Europe also felt its effects. These facts may be considered extravagant illustrations; but, surely, when it is known that the meteors of Nov. 14. 1833, at Brunck, were accompanied by aerolites (see VII. 293.), and by "falling stars" (Olmsted, in *Sill. Journ.*, 134.); and that such meteors have preceded, accompanied, and succeeded, earthquakes; and that they have been seen over volcanoes (VII. 291, 292.), there is, I think, no

reason, as far as the evidence goes, to upset the theory of the zodiacal light, and bring so dangerous, though brilliant, a neighbour as this cometic gentleman seems to be. If I be wrong, and Professor Olmsted be right, the earth will in all probability enjoy the celestial carnival again in November, when meteors will fly about as sweetmeats and *bon-bons* do at Naples and Rome.

Stanley Green, August 9. 1834.

ART. II. *Origines Zoologicæ, or Zoological Recollections.* By WILLIAM TURTON, M.D. &c. [Continued from p. 328.]

THE OX.

IN the earliest stages of society this valuable quadruped became an object of domestic care and regard; for we read in Genesis (xiii. 6, 7.) that "there was a strife between the herdsmen of Abram's cattle and the herdsmen of Lot's cattle;" the flocks of each of whom were so numerous "that the land was not able to bear them, and they could not dwell together." The ox was held sacred by the Egyptians, and elevated into one of the twelve signs of the zodiac (Taurus). A representation of the ox became an object of idolatrous worship, as in the golden calf erected by Aaron. (Exodus, xxxii.) At this day, in India, the sacred cow, as representing one of the transformations of the deity, is held in the highest veneration, and the flesh forbidden to be eaten. The ox became, from associations like these, an acceptable offering of propitiation or gratitude; as we find (Genesis, iv. 4.) that Abel offered in sacrifice the firstlings of his flock; that Abram was directed (Genesis, xv. 9.) to sacrifice a heifer, of three years old, as an offering for the promise of a son; and that twenty-two thousand were sacrificed by Solomon at the dedication of the temple. (1 Kings, viii. 63.) The seven years of plenty and the seven years of want were typified by the fat and the lean kine of Pharaoh. (Genesis, xli.)

Veal, it appears, was the first dressed meat upon record: for, when Abram entertained the three angels (Genesis, xviii. 7.), "he ran into the herd, and fetched a calf tender and good, and gave it to a young man, and he hasted to dress it." The ox and the ass, as the most valuable representatives of pastoral possessions, are expressly forbidden, in the Tenth Commandment (Exodus, xx. 17.), to be unlawfully coveted from our neighbour: and the ox and the sheep were pointed out to Moses, from Mount Sinai, as the chief subjects of sacrifice. (Exodus, xxix.)

A white bull was the most acceptable sacrifice among the Romans: but a black ox was considered as the emblem of misfortune; as we say of one who has been unlucky in his pursuits, that the black ox has set his foot upon him. And a man who has been bribed to silence is said to have an ox in his tongue, *bos in linguâ*; because the figure of an ox was stamped upon the Roman coin: and for this reason the word *pecunia*, or money, was derived from *pecus*, or cattle. Europa was fabled to have been carried beyond sea by a bull, because Taurus, or the Bull, was the name of the ship by which she was conveyed. By the Roman law, the owner of a vicious bull was obliged to distinguish him by a bundle of hay tied to his horn; whence the expression, "he has hay on his horn," as spoken of a dangerous or litigious man: "fœnum habet in cornu; longè fuge." Of a bold adventurer we say, that he has taken the bull by the horns; and of a petulant woman, that the curst cow has short horns. [In Exodus, xxi. 28—36., there are various compensations appointed to be made for injuries received from oxen by human beings or other oxen, as well as for injuries occasioned by man to oxen.]

To plough with the heifer means, to make a friend of the female sex: for when Samson lost his wager to the Philistines by the treachery of his wife, "If," said he, "ye had not ploughed with my heifer, ye had not found out my riddle." (Judges, xiv. 18.) To chew the cud and to ruminate, expressions figurative of deep and serious reflection, are taken from the placid and quiescent habits of this tribe of quadrupeds. To bully and to cow, meaning to intimidate and overbear, are probably words taken from the menacing attitudes of these animals when irritated: so coward, from them when in an opposite condition. Some, however, have supposed that the expression bully arose from the pope's bull, or threat of excommunication. And he who is compelled to retract unwarrantable pretensions is said to draw in his horns.

Bull-feasts are probably remains of pagan sacrifice, or augurial rites; at present a national and favourite amusement in Spain.

> "So Spanish heroes with their lances
> At once wound bulls and ladies' fancies;
> And he acquires the noblest spouse,
> That widows greatest herds of cows." *Hudibras.*

Bull-baiting was first introduced into England in the time of King John, and is supposed to be commemorative of the persecutions of Christians under the emperor Nero, who, among other species of torture, commanded them to be sewed up in the skins of wild beasts, and worried to death by dogs.

After this time, bull-baiting and cock-fighting became such general sports, and the feats and achievements of persons engaged in them were so commonly exaggerated and made the subject of discourse, that any tedious and bombast relation is still called a cock and a bull story. From the great size of the bull, this last word, when formed into a comparative composition, means of larger bulk than usual; as, bull-rush, bull-head, bull-trout, bull-finch, bull-frog, bull-weed, bull-wark or bull-work, &c.: so, in Greek, *boōpis*, from its circular shape, a round central spot in the target of archers, and a small aperture, covered with glass, in the deck of a ship, for the admission of light below, are called the bull's eye. A bull, or blunder, is said to have originated in the simplicity of an upland boor, who, when the village maidens went forth to milk the cows, himself took a pail, that he might milk the bull.

It has been jocularly remarked that the clown in every country is nicknamed from the favourite dish of the people; as the Englishman, Jack Pudding and John Bull; the Frenchman, Jean Pottage; the Italian, Macaroni; the German, Hans Sausage; and the Dutchman, Pickle Herring. The Welshman, in his pride of genealogy and his love of cheese, traces the cow to the line of Adam: —

> "Cheese was akin to Adam from hur birth;
> Ap curds, ap milk, ap cow, ap grass, ap earth."

By the laws of the Cambro-British legislator, Howel-dha, if a man betrayed a young woman, he was sentenced to place a bull in a stall with his tail soaped; and if the damsel could draw him out by the tail, she was to have the bull for her pains.

The arms of the city of Oxford are three oxen passing a ford, with the motto, "Ox on," underneath. This was formerly finely represented in sculpture upon the ancient water-conduit at Carfax; but which is now removed. And here it may not, perhaps, be impertinent to remark, that Carfax is a simple corruption of quatre vaux: it being the centre of four roads radiating in crossing directions.

The bones of cattle slaughtered in London were formerly of such huge accumulation that it became necessary to consume them from time to time. This process was reserved for some holiday or period of public rejoicing, when faggots and combustible materials were collected from the neighbours for the purpose of illumination; whence our term bonfire may mean either bone-fire, from the materials to be consumed, or boon-fire, from the gratuitous collections made for the pur-

pose.* Of a person whom it is intended not to encourage or spare, it is said, that we make no bones of him.

The stealers of cattle have an ingenious method of twisting the horns of these in a direction so contrary to their natural position as to make it impossible that they can be identified by their owners. The cattle are concealed in caves under ground, and hot loaves of bread fastened successively on the horns, the heat and moisture of which soon render them malleable, when they are turned in any direction, and afterwards fixed and stiffened in their new position by cold water.

The age of a cow is known by the horns, reckoning three years for the first circular wrinkle, and one for every additional wrinkle. It is remarkable that the Comte de Buffon, generally so accurate, should assert that the cow sheds her horns every three years.

The ox, when alive, is the only horned quadruped which lends his labours to the service of man, except the rein-deer; furnishing him also with the substantial luxuries of milk, cream, butter, cheese, and whey: and, besides its national ["the roast beef of old England"] and nourishing food, when dead, almost every part is convertible into some useful purpose. The skin makes a durable leather, useful for shoes, boots, and numberless conveniences of life; and the fishermen of Wales, Scotland, and some parts of Ireland still make use of the ancient coracle, or leather boat, the ribs of which are made of osiers, and covered with the hide of a bull. Vellum is made of calves' skins; and Limerick gloves of the skin of such calves as are just dropped. The hair is mixed with lime as a necessary cement for mortar. The chippings of the hoofs, and fragments of the skin, make glue. Goldbeater's skin is made of the fine membrane which invests the larger intestines. Rennet for curdling the milk is made of the salted stomach of the calf.† Of the horns are made combs, spoons, powder-flasks, boxes, the handles of knives,

[* What is the number of the animals of all kinds annually put to death in Great Britain, for the sake of their bodies as food for human beings? This question was first incited in me by seeing a tanner superintending the preparation of a sufficient quantity of hair off the skins of animals, chiefly or wholly oxen, I presume, to cover a space of greensward of perhaps six poles by four. Men were turning this quantity over, and breaking asunder "the knotty and combined locks" which they found in it; exposing it to the drying action of the air; and apparently endeavouring to get it free of lime which adhered to it. In the evening they collected it into conical heaps like little haycocks.]

[† Ineptly called the "calf's bag" by the calf jobbers of Essex, and the dairywives of Cambridgeshire, and, perhaps, by others. The term "calf's bag" gives those who only passingly hear the matter mentioned the idea that the embryo milk bag of female calves is meant.]

drinking-cups called horns *; and, when softened by steam or warm water, they are drawn into thin plates for lanterns; and, when scraped and properly compounded, were formerly used, like bezoar, as antidotes against poison. † The blood of oxen is useful in the manufacture of sugar, is an excellent manure for fruit trees [is an ingredient in the compost or soil used in the cultivation of auriculas], and is the basis of Prussian blue. The bones, besides being useful to mechanics where ivory would be too expensive, produce, when crushed, an excellent manure; are essential in the formation of sal ammoniac and phosphorus; produce an oil, much used by coach and harness makers, called neat's-foot oil; and, when calcined, give a valuable test to the smelter and refiner. The gall is serviceable to the chemist; the tallow contributes to give us light; and, above all, this noble quadruped has become sacred, as being the instrument of eradicating that loathsome disease the small-pox. From the noble sirloin of beef, as being the prince of joints, we say of a man who predominates over his companions, that he rules the roast. The H bone of beef, the derivation of which is not generally known, is a corruption of isch bone, from *ischium*, the hip or huckle-bone; and is so spelt, I believe, by the venerable Mrs. Glasse.

It has been quaintly remarked, that most of our animals serving for food preserve their ancient Saxon names while living; but when they are dead and dressed their names immediately become French. Thus it is ox, calf, sheep, deer, pig, while alive; but beef, veal, mutton, venison, pork, when served at table. This might arise from our neighbours having introduced among us a more savoury and tasteful art of cookery.

[* A fair, for the sale of horn wares, called Horn Fair, is held annually somewhere near to town.]

[† The harvest-horn, formerly blown at early dawn in harvest time in large farm establishments, and still in use in some, perhaps many, was, and doubtless is, mostly, I believe, a bullock's horn. Gray has, in his "Elegy written in a Country Churchyard," given record of this pleasing rural custom, and of some sweet associations of early morning which must ever keep it company.

"Beneath those rugged elms, that yew tree's shade,
Where heaves the turf in many a mouldering heap,
Each in his narrow cell for ever laid,
The rude forefathers of the hamlet sleep.

"The breezy call of incense-breathing morn,
The swallow twittering from the straw-built shed,
The cock's shrill clarion, and the echoing horn,
No more shall rouse them from their lowly bed."]

THE SHEEP.

Of equal antiquity in a domesticated state with the ox, forming the pastoral wealth of the children of Adam, and the earliest oblation of grateful acknowledgment in sacrifice: for the accepted offering of Abel consisted in the firstlings of his flock (Genesis, iv. 4.); and a hundred and twenty thousand were sacrificed at the dedication of the temple by Solomon. (1 Kings, viii. 63.)

Of an animal so serviceable to man, and so constantly before his eyes, many familiar allusions have become consequently popular and common. From his mild and unmeaning aspect *, a vacant or silly look is said to be sheepish; and a swain, when he affects tender glances to the village maiden, is said to cast sheep's eyes at her: and we say of a man unworthily tricked of his property, that he has been fleeced.† A tyrant who exercises his cruelties under the garb of gentleness is called a wolf in sheep's clothing.

The horn of the ram was an early instrument of martial and ceremonial music, at whose sound the walls of Jericho fell down (Joshua, vi.): and the jubilee of old (Leviticus, xxv.) was ushered in with the sound of rams' horns, or the jubilee trumpets; for the word jobul, or yobul, in Hebrew means a ram: so our curved and sonorous field instrument is called a horn. The ram was chosen by the angel as a substitute for Isaac, whom his father Abraham was commanded to sacrifice in proof of his obedience. (Genesis, xxii. 13.) Jacob, for a wife, kept sheep twice seven years (Genesis, xxix.); and Moses kept the flock of his father-in-law Jethro. (Exodus, iii. 1.) Jason is fabled to have carried away the golden fleece from Colchis, in the ship Argo, by the help of the sorceress Medea, as representative of the extension of commerce, and the transfer of the arts; and the fleece of Gideon was the miraculous instrument by which he had assurance of the victory of the forces of Israel, led by him, over the Midianites, who then oppressed Israel. (Judges, vi. 33—40.)

In the reign of Nero the converts to Christianity were

* [It seems to be generally agreed that the face of the sheep is not expressive of any greater sentiment than that of mildness; but Henry Selwyn, in a small volume of published poems, has a tenderly sentimental heroine, who, in her sensitive exercise of this feeling, does

——— " try a character to trace
In every sheep's unconscious face: "

and it may be remarked that the various faces observable in a flock of sheep exhibit a considerable variety of expression.]

† [" Tiberius rescripsit præsidibus provinciarum onerandas esse tributo provincias scribentibus: boni pastoris esse, tondere pecus, non deglubere."]

sewn up in sheepskins and goatskins, and torn to pieces by dogs; or in this state exposed to the heat of the sun or a slow fire, which, by gradually shrinking and shriveling the skin of the animal in which they were straitly enclosed, exposed them to still more exquisite and lingering tortures.

In the ruins of Persepolis were found the statues and figures of rams, which formed one of the astronomical signs at the commencement of the year, when ewes yean: and it was the ensign of the tribe of Gad. The lamb is an emblem of spotless innocence and patience, the symbol of the pass-over, and the type of the Redeemer of man; and a vast slaughter of these unresisting victims is annually made on Good Friday, for the feast of Easter day: and a smooth and pleasant drink is called lamb's-wool. The Bachelors of Oxford, who determine their degrees at Lent, wear lambskin hoods, emblematical of the innocence of the calling they are about to adopt; for all learning, and all learned occupations, were formerly confined to the clergy. This hood is at present degraded into a strip of flannel.

The age of the sheep is known by the teeth: and an old ewe who has lost her teeth is called a crone; a term applied, in low language, to a disgusting old woman. A sheep two years old is called a hog; the double acceptation of which term occasioned the following ridiculous mistake. A commercial gentleman, not much acquainted with husbandry, applied to an agricultural friend for the best means of bringing upon his newly laid lawn a fine clothing of herbage, and was advised to have it eaten down by a score of hogs. Unaware of its less common meaning as applicable to sheep of a certain age, and taking it in its more usual sense, he purchased a score of large pigs; and, to his very great surprise and mortification, soon discovered that his lawn was totally scarified and rooted up. About the neck of the oldest wether of the flock is often fastened a bell, to gather them together, or to conduct the herdsman to their place of pasture; whence a noisy and brawling woman is called a bell-wether or bel-dame.* The Romans used battering rams in their sieges; and our terms ram and ramrod seem to have their origin from this source. Of a person of indifferent character, and

* [Rams fight most desperately. The noise produced by the concussion of their heads may be heard at a great distance. They would seem to proceed to fighting with great suddenness, as if the sentiment of aversion were fixed, and prompted them to battle at sight. I infer this from Shakspeare's remark in *As You Like It:* — "Never was there anything so sudden, except the battle of two rams."]

who may be suspected to corrupt his companions, we say that one scabby sheep infects the whole flock.

By the Israelitish women the wool was spun into garments, and formed a part of their offering to the sanctuary. In good and olden times, the maidens of the family spun the wool of their flocks; whence unmarried women are denominated spinsters; and, in heraldry, bear their arms, not in a warlike shield, like men, but in a lozenge having a resemblance to the outline of a spindle or distaff charged with worsted.

The celebrated morocco leather is made of the skins of rams dyed red. It is probably the most ancient of manufactures, and has formed an uninterrupted article of commerce for nearly four thousand years. With this was formed a covering for the tabernacle in the wilderness, in the days of Moses (Exodus, xxv. 5.; xxvi. 14.); and with this was decorated the celebrated shrine of Minerva, at the Lake Tritonis: and with this are covered, at the present day, our most costly tables and books. The wool of the sheep is considered of such inestimable importance to the comforts and commerce of our own country, that the Lord Chancellor of the realm sits on a woolsack in the House of Lords, as the staple commodity of the kingdom; and the funeral garments of deceased bodies are by law directed to be made exclusively of woollen.

The value of wool, in the days of Queen Elizabeth, may be ascertained by the clown in Shakspeare's *As you like it*, who, in estimating his market produce, says, "Every eleven wether tods, every tod yields pound and odd shilling, fifteen hundred shorn, what comes the wool to?"

The occupation of collecting scattered flocks of wool from hedges and brakes was considered so mean and miserable, that it is said of a person not quite settled in his ideas, that his wits are gone wool-gathering. Its valuable uses in various garments, in flannels, in blankets, in broadcloth, and all materials requiring warmth, are sufficiently well known: the coarser lumps, called flocks, are used to stuff mattresses. The skins of the sheep make parchment and covering for books; and the skins of lambs a finer kind of gloves.

THE HOG.

The emblem of filth, sloth, obstinacy, gluttony, and brutality: abhorred by the natives of warm climates as unclean, and subject to scrofula and leprous disorders of the skin. Hogs are highly sensible of the approach of foul weather, and run about in great agitation before storms, screaming, grunting, and snuffing up the air; whence they are said to

"see the wind." Hogs are of exceedingly rapid growth, and as, when killed, their flesh takes salt more readily than the flesh of other animals, they form a valuable part of the husbandman's stock, and one of the principal objects of sale in a country fair: so, when a man has made a successful bargain, he is said to have brought his hogs to a fair market. Stubborn and inflexible obstinacy is likened to the casting of pearls before swine; and of indocible stupidity it is said, "Ne sus Minervam," You cannot make a silken purse of a sow's ear.

In some parts of the East, they were, nevertheless, objects of pastoral care and attention, if not of commerce: for the herd of swine, into which the evil spirits were suffered to enter, were under the care of feeders. (Matthew, viii. 28—34. [So in the parable of the Prodigal Son. (Luke, xv. 15.)] They are very gregarious, and in the wild and vast forests of Germany collect together in great herds; and persons who are closely packed in society are said to pig together. Hogs, like many animals in a state of domestication, bring several litters in a year, and at all seasons, from the abundance of food and accommodation which can be afforded them, as may also be observed of dogs, cats, rabbits, poultry, doves, cows, and sheep. When caught, they are seized by the ear or lug, and make a most noisy outcry: whence of a person who has fastened his suspicions on a wrong object, it is said, that he has taken the wrong sow by the ear.

The side or flitch, when salted and dried, makes bacon; and as this savoury food too frequently becomes the plunder of rats, bats, and other vermin*, it is said of him who has barely escaped a loss or an injury, that he has just saved his bacon. The smoking of hams is as old as Horace, who considered a hock of bacon and greens as fit food for a country farmer.

——— "Temere edi
Quidquam præter olus, fumosæ cum pede pernæ."

The boar, when in anger, foams at the mouth, gnashes his teeth, and whets his tusks.† We learn that, at the tables of the Roman epicures, the flesh of the boar, together with the turbot, or probably the halibut, was considered as rank, and not fit to be served up, till it had been kept a long time: "putet aper rhombusque recens:" and again, "rancidum aprum antiqui laudabant." [Brawn's flesh, skilfully prepared, is, at our own tables, an esteemed and somewhat expensive kind of food.]

* [One of these is the larva of the insect *Dermestes lardarius.*]

† [Æsop has taught wise instruction by his fable of the boar whetting his tusks in time of peace, that he might be prepared for the most sudden presentment of war.]

St. Anthony was the patron of swine, and celebrated for curing such diseases of the skin as were considered to be of swinish origin or nature, as leprosy, scrofula, and erysipelas, or Saint Anthony's fire. His monks were thence called, in derision, St. Anthony's pigs; and thence originated the ironical taunt of "please the pigs;" and, as the gambols of young swine are singularly awkward, any frolic more than usually ridiculous was compared to a "tantony pig," and a stupid rustic was called a tony. In the monkish legends, it is related, that, when St. Anthony was once sorely beset by the temptations of Satan, he defied him by commanding him to shear his hogs; who, finding them more clamorous and troublesome than productive, exclaimed, that there was great cry and little wool.

Swine, if they are fed on fermented grains, or the must of cider, are subject to fits of the gout; and in large distilleries get rapidly fat and bloated, by being kept in a state of constant intoxication. The hog, although apparently shapeless and unwieldy, is of considerable swiftness and agility: for the hind legs have two bones in each, whereas there is but one in horned cattle.

The hog, as a beast of chase, forms the armorial bearing of many families. It constituted the arms of King Richard the Third: and in his reign, when great enormities were committed by himself, Ratcliff, Catesby, and Lovel whose crest was a talbot or kind of hound, an unhappy wit was hanged for the following not inelegant pasquinade: —

> "The rat, the cat, and Lovel the dog,
> Govern all England under the hog."

In his reign the English coin was first introduced into Ireland, whence an English shilling is in the sister island still called a hog: and after his reign, the popular sign of the hog in armour probably originated, in allusion to his unshapely person and his arms or crest. The bristles are made into brushes; and the skin of the wild boar is used in Spain to hold wine, whence the origin of our word hogshead, a corruption of hog's hide.

In the casting of metallic ores, the red-hot fusion runs from the furnace down a straight groove, and branches on each side into shorter ones, supposed by the workmen to resemble a sow suckling her litter; whence the longer piece is called the sow, and the shorter ones pig iron or pig lead.

A learned monk wrote a long poem in praise of pigs, every word of which begins with the letter P: —

> "Plaudite porcelli porcorum pigra propago."

Although the flesh of the hog is held in abhorrence by the Jew and the Turk, no other animal affords so large a series of savoury viands to the table of the Christian. Every part is in use, except the brains and the marrow, which, from ancient prejudice, are thought to create melancholy. The smaller intestines make chitterlings, and the ears are made into souse; as it was said of the fiddler Crowdero, —

> " His warped ear hung o'er the strings,
> Which was but souse to chitterlings;
> For guts, some write, ere they are sodden,
> Are fit for music or for pudden." *Hudibras.*

The sides of the head are made into cheeks, and the tongue is pickled. The neck or collar makes brawn; whence anything strongly muscular is called brawny. Of the shoulders are made gammons and blade-bones; of the back-bone are made the chine and the griskin; the thinner portion of the ribs forms the spareribs; the sides and the belly make the flitch and the rasher; the hind legs make the ham and the hock; the feet of the sucking pig make petit-toes; of the heart, the liver, and the lights, with morsels from the throat, are made the harslet or fry; of the spare lean parts are made sausages; the larger intestines, stuffed with grits mixed with the blood make black-puddings.

> " And fat black-puddings, proper food
> For men that most delight in blood." *Hudibras.*

The bristles are made into brushes, and point the waxed thread of the shoemaker.

THE BEAR.

Rough as a bear, may be taken either from the coarseness of his coat, or the rudeness of his embrace; for, being furnished with collar bones, he is able to climb, and presses his adversary to death by the closeness of his hug: and he, whose manners are unpolished and his actions unmannerly, is said to be rude as a bear. He was made the instrument to avenge the insult to the prophet, by the mockery of the children, and destroyed forty-two of them. (2 Kings, ii. 24.) In the winter, when his food is hardly to be procured, he becomes sleepy, and partially torpid, rolled up, with the paws before his mouth, that they may be kept warm by the breath, whence he is said to suck, " or quarter upon, his own paws." * At one time, it was thought that the young were brought forth a mere shapeless mass, which the dam brought into proper

* [See, in the *Entomological Magazine*, i. 327—332., an account of the winter habits of bears in Russia; and in Mag. Nat. Hist., VI. 510., a short notice of their earliest vernal habits in Switzerland.]

form by her licking. [Hence it is, probably, that to give rude sketches professional touches is expressed by "to lick them into shape."] The bear was taught to dance by putting boots on his hind legs, and placing him on a floor made hot, thus forcing him to lift up his fore feet, and stand erect; and a rough staff was placed in his paws for support, and to defend himself against the dogs, which were let loose upon him. The amusement of bear-baiting constituted a favourite pastime of our unpolished forefathers. It formed a part of the sports selected by the Earl of Leicester for the amusement of Queen Elizabeth, when she visited Kenilworth Castle. The places where this sport was exhibited were generally pointed out by the sign of the bear and ragged staff. For this purpose a bear was formerly kept in enclosures called bear-gardens, and, when it was baited, was tied to a stake or post; proclamation was then made, that no one should come nearer than 40 ft. Now, the amusement consisted in endeavouring to make him angry, and quit his post or stake, and be worried by men and dogs; whence the expression, stake or venture; and post, in allusion to an employment or office; as, he has lost his post, or keeps his post, and cannot be turned out.* To pluck a bear by the beard was considered a hardy act of venturous and manly courage; and Master Slender boasts to his sweet Anne Page, that he has seen Sackerson loose twenty times, and taken him by the chain. Any assemblage of riot and confusion is now compared to a bear-garden; and, among the noisy money-brokers of the Stock Exchange, the speculators for a rise in the funds are called bulls, and those who calculate on a fall are called bears.

THE FOX.

Cunning as a fox, is truly exemplificative of the manners of this sly and crafty animal, whose shifts and tricks of fraud and evasion are too well known in the farmyard and among hen-roosts.† That all traces of his progress might be lost,

* [" Lucrative offices are seldom lost
For want of powers proportion'd to the post:
Give e'en a dunce the employment he desires,
And he soon finds the talents it requires;
A business with an income at its heels
Furnishes always oil for its own wheels."
COWPER'S *Retirement.*

Does not a desire for an employment argue an affection towards it, and, consequently, some fitness for it?]

† [A fox was fastened with a long chain to a post in a court, where he was fed with, among other things, potatoes. These, the animal was seen

he was formerly supposed to sweep out the marks of his footsteps with his tail: and even to simulate death, to delude his pursuers.

> " And as a fox, with hot pursuit
> Chased through the warren, cast about
> To save his credit, and among
> Dead vermin on a gallows hung;
> And while the dogs ran underneath,
> Escaped by counterfeiting death." *Hudibras.*

Æsop has left us the fable of the fox and the grapes; whence of disappointed hopes we say that the grapes are sour: and when some degree of art and management, as well as decision, is considered essential to the accomplishment of an object, it is said, that we must eke out the lion's skin with the fox's tail.

With three hundred foxes, tied in pairs by the tail, and a firebrand placed between each pair, Samson burnt the standing corn of the Philistines, who kept from him his wife (Judges, xv.): but it is probable that the hyæna, a very common beast in the East, was the animal here meant. The female of the fox is called foxen, or fixen, whence the name vixen is applied in reproach to a woman of a wayward or spiteful temper.

THE HARE.

Timid and solitary, the emblem of melancholy among the Egyptians, and therefore considered as the forerunner of ill luck, if she crossed our path. By the law of the Sabians, if any one called another a hare, he was obliged to compound for the injury, by the payment of a large fine, as the name was considered to be synonymous with coward; and he who indulges in wild and improbable fancies is called hare-brained. *

---

to bruise and scatter about, mostly within reach: he then retired, in an opposite direction, to the full length of his chain. The object of this contrivance was to decoy a number of fowls that were accustomed to enter the court, but which were usually so much attentive to their own safety as to defeat the various stratagems of reynard. When, however, some had become so much off their guard as to venture within the circle of danger, the fox was seen to spring from his lurking-place across the diameter of the circle, and seize his prey.

The fox, when hunted, never runs through a gate; nor does it cross a hedge, in a smooth and even part, but chooses the roughest spot, where briars and thorns abound, and mounts the eminence, not straight forward as a hare does, but obliquely, scrambling up, not springing over it. — *J. Couch. Polperro, Cornwall.* (*Received June* 11. 1834.)]

* [Burns has done much, in the following exquisite verse, to render the faculty of being " harebrained" estimable. He, in sketching the character-

It was formerly thought that she changed her sex every month, and was probably forbidden for this reason to be eaten by the ancient Britons. She was also one of the favourite transformations of the witch, from her silence and facility of escape.

To hunt and course the hare have ever been considered as favourite and joyous sports of the field: and into the social drinking-bowl, after the feast, the foot or the scut of the victim of the chase was cast; whence he that comes too late to enjoy the viands is said to kiss the hare's foot; and any indirect or roundabout way of obtaining information is called to beat about the bush. A true sportsman is said never to taste his game: and Horace informs us, that the Roman huntsman disdained to touch the hare when set before him.

——"Leporem venator ut altâ
In nive sectatur, positum sic tangere nolit."

Martial considers her as a favourite dish among these luxurious people.

"Inter quadrupedes gloria prima lepus."

And Horace tells us that the shoulder was thought the best part: —

"Fœcundi leporis sapiens sectabitur armos."

And again: —

"Et leporum avulsos, et multo suavius, armos."

A German quack doctor, when his patient was surfeited by eating too much hare, upon the principle of antipathy, directed him to take greyhound broth.

Moses supposed the hare to be a ruminant animal, and forbade her to be eaten: "the hare, because he cheweth the cud, but divideth not the hoof, he is unclean unto you." (Leviticus, xi. 6.) But what has been supposed to be the rumination of the hare and the rabbit, is not the chewing the cud proper and peculiar to cattle which have four stomachs, from one of which stomachs the cud or ball of hair is projected at pleasure into the mouth, and swallowed back again; but merely the bringing forward a portion of the food from the cheeks, where such animals as have round mouths,

---

istics of "some Scottish Muse," whom he has fully described in his *Vision*, says of her —

"A 'hare-brained sentimental trace,'
Was strongly marked in her face;
A wildly witty rustic grace
Shone full upon her;
Her eye, e'en turn'd on empty space,
Beam'd keen wi' honour."]

and cheeks more or less dilatable, and capable of being formed into pouches, are enabled to preserve a portion of their food to be brought forward for occasional mastication.

The fur of the hare and the rabbit is much used in the manufacture of hats.

Of Ruminating Animals, or, as they are commonly called, cattle; it may here be remarked, that they form a truly natural division, and were, in the earliest formation of social manners, pointed out by Moses as exclusively, among quadrupeds, constituting the proper food of man. "Whatsoever parteth the hoof, and is cloven-footed, and cheweth the cud, among the beasts, that shall ye eat." (Leviticus, xi. 3.) From all other quadrupeds they are distinguished by peculiarities so characteristic as to remove all difficulty of identification, in a wild or domesticated state, in the living animal or the dead carcass. It was remarked by Aristotle, that such of them as have horns have no tusks, and such of them as have tusks have no horns. Destined to graze upon the herbage of pastures, they have no front teeth in the upper jaw; and, as the head is constantly in an inclined posture, during the time they are feeding, the neck is supported on each side by a strong and remarkably tough ligament, called whitleather, or white-leather [called, at table, packwax]. The hunter, in search of food, may at once distinguish them from impure quadrupeds, or such as are not usually fit to be eaten, if he can see them in a recumbent or crouching posture; for the whole of this tribe rise from the ground with the hind feet first, and all other quadrupeds with the fore feet first: that is, a cow or a sheep first lifts up the hinder parts, with the knees of the fore-legs on the ground; but the horse and the dog first lift up the fore parts, with the front hoofs on the ground, and then the hind parts. This may possibly be occasioned by the weight of the four stomachs, with which all ruminating quadrupeds are furnished. The internal fat of all this tribe is hard, and called suet, sufficiently consistent to make candles; while that of all others is of a softer and more oily consistence. [That of the bear is now known to most by the name of bear's grease; and that of the hog is familiar to all by the name of pork lard, or pork seam.]

AMPHIBIOUS ANIMALS.

A tribe intermediate, as it were, between the inhabitants of land and water, possessing properties in some measure common to both, and often peculiar to themselves. The body is cold, and slow of motion, the countenance stern and extremely expressive; with the senses of sight and hearing of

exquisite acuteness. They are able to live an incredible time without food, and in an atmosphere highly noxious to animal life: and are so tenacious of life, that, if the head be cut off, or the chest opened, they survive many days; and have even the power of reproducing parts which have been destroyed or lost. Instead of bones, the skeleton consists of cartilage.

All the horrible fables of antiquity seem to be taken from this singular class of beings. Satan, when he tempted the parent of mankind, put on the form of the wily serpent, the most dreadful of all created beings; or sometimes appeared, as represented by Milton, "squat like a toad." The siren was a kind of lizard, supposed to possess a voice of such exquisite attraction as to entice its hearers within its reach to their destruction: and the crocodile, at certain seasons, utters, in the night, sobs and cries of bewailing, so bitter and pathetic as to imitate the most distressing lamentations of human misery and woe; and is hence fabled to weep and shed tears over her victims: affected appearances of grief are hence called crocodile's tears. The chameleon is said to live on air, from its long endurance of life without food; and to change its colour at pleasure, because its naked shining body reflects various hues, according to the change of its position in the light. The salamander, another kind of lizard, is reported to resist the power of fire, and even to quench it, because, like many of its tribe, the body is extremely cold, and covered with a slimy exudation. The basilisk, or cockatrice, a species of serpent, was thought to be of such malignancy of vision, as suddenly to destroy those upon whom it fastened its eyes.

THE BADGER.

This animal, which burrows generally in the side of a hill, is to be found throughout Great Britain, but is particularly abundant in Scotland. When attacked it emits a fetid odour, which appears to be the effect of fright, rather than as intended as a means of defence. So intolerably offensive is this odour, that it has passed into a proverb, which is applied to any peculiarly disagreeable smell. The colour of the coat is greyish brown, whence we say of a person whose hair begins to show signs of old age, that he is as grey as a badger.

Baiting the badger with dogs is still a common diversion; and hence originates the phrase of badgering a person, applied in cases where *one* is made the butt of *many*. Its skin is so loose and tough, that the dogs can make but little impression on the animal, except upon the belly, which sensitive part the animal guards with such extreme care that it

never designedly exposes it to its pursuers. From this circumstance, and the inimitable manner in which, notwithstanding the molestation which it receives, it counterfeits death, in order to deceive its enemies, we say of a person notorious for duplicity, that he is as sly as a badger.

THE HAWK.

This bird, from its having been one of those animals which afforded our ancestors so much amusement in the field, has furnished us with many similes. We will pass over the keenness of his vision, so universally known, and throw light upon a passage in Shakspeare's Hamlet, which has hitherto puzzled all the commentators on the grand master of the drama. The phrase we allude to is the following: — "I am not so mad but I know a hawk from a hand-saw." There appearing no connection between the two objects of comparison, a reading, which has been universally adopted, and which is very ingenious, is, "a hawk from a *heronshaw*" [see IV. 425.]; but the *hawk* of Shakspeare is not the *bird;* it is that *flat board* with a handle centrally fixed on the lower surface, which is used to this day by masons for smoothing the plastering of a wall, and which still retains that appellation. The comparison, therefore, is between two operative implements. [For this solution, which restores the original text, we are indebted to an oral communication from Dr. Turton.]

The hawk, from its rapacious habits, has received its Latin name, *accipiter*, and was held in dislike by the Roman poet: —

"Odimus accipitrem quia semper vivit in armis."

A hawk that happened to be once beaten, was ever afterwards effectually cowed, and was technically termed a *craven;* whence the appellation has been transferred to a person eminent for pusillanimity, as being the most bitter term of reproach that can be employed.*

THE DOVE, OR PIGEON.

From the most ancient records that we possess, we find this bird has ever been considered as the emblem of peace

[* The term "craven" has also, it seems, been applied to the rook: some poet has these lines: —

"The craven rook, and pert jackdaw,
Though neither birds of moral kind,
Yet serve, when hang'd, and stuff'd with straw,
To tell from which point blows the wind."]

and innocence *, and has moreover been early employed as a carrier. The first person that ever made this use of the pigeon appears to be Noah, who despatched one from the windows of the ark, in order to ascertain whether the waters of the deluge had subsided. When it was nearly time for the patriarch to quit the ark, the dove returned with an olive leaf in her bill, as a token of reconciliation between the offended majesty of heaven and the sons of men; and, on being sent forth a third time, she returned no more. (Genesis, viii. 8—12.) In the book of Leviticus, Moses commanded that for a sin-offering a man should bring a lamb or a kid, the one the type of the Lamb of God, and the other emblematical of the great scape-goat of mankind; but, should he be disabled by poverty from offering either of these, the remaining means of atonement for the sinner was "a pair of turtle doves, or two young pigeons." (Leviticus, v. 6, 7.) Our Saviour beautifully alludes to the gentle disposition of the dove, when he cautions his disciples on this wise, "Be ye therefore wise as serpents, but harmless as doves." (Matthew, x. 16.) And the descent of the Holy Ghost upon the Redeemer, at his baptism, was in the form of a dove. (Matthew, iii. 16.)

The term of pigeoning, or over-reaching, a person, originated in a practice common amongst sharpers, at a period when the qualities of this bird as a carrier were not generally known, of employing pigeons for the rapid transmission of news connected with the sporting world. A rogue by these means was accurately informed of the result of any important match for some time previous to its being communicated by the accustomed channel, and was thus enabled to lay his bets with certainty; and the phrase has been carried still farther by the application of the term of plucking a pigeon, meaning the depriving a person of all that he is worth by sharping.

* [Shenstone, in his pathetic "Pastoral Ballad, in Four Parts," has these delightful lines:—

"I have found out a gift for my fair;
I have found where the wood pigeons breed;
But let me that plunder forbear,
She will say 't was a barbarous deed.

For he ne'er could be true, she averr'd,
Who could rob a poor bird of its young;
And I loved her the more, when I heard
Such tenderness fall from her tongue.

I have heard her with sweetness unfold
How that pity was due to a dove;
That it ever attended the bold,
And she call'd it the sister of love."]

To this day a roast pigeon is occasionally served up at the table of sharpers, as emblematical of the profession. Fifty or sixty years ago, it was customary to cast off a carrier pigeon at Tyburn, immediately that a criminal was turned off, in order to give the earliest information of the event to the surviving relatives.

ART. III. *An Introduction to the Natural History of Molluscous Animals.* In a Series of Letters. By G. J.

Letter 14. *On their Food and Digestive Organs: Carnivorous Mollúsca.*

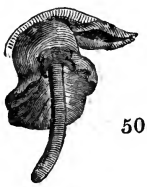
ALTHOUGH it may be true, as stated in the preceding letter, [p. 218—224.], that the great proportion of the Conchífera subsist on food in a state of molecular division, yet there can be no doubt that some of the larger and locomotive species seek a more substantial fare, and feed on worms or other animal matter in a state of partial decay; which they seem to have the power of grasping by means of their extensible labial appendages. Thus the large Cýprina islándica and the Modìola vulgàris of our seas very often swallow the bait of our fishermen, and in the stomach of an individual of the former I once found the undigested remains of a large green Nèreis enveloped in a pulp too consistent certainly to have been the sediment from water, however loaded with molecules. In their manner of feeding, these Conchífera resemble the pectinibranchial gasteropodes *whose shells have a notch or canal at the base of their apertures;* and it is important you should remember that it is only, with a few exceptions, the gasteropodes of this order (Pectinibránchia) so circumstanced that are truly carnivorous. They embrace the Cypræ`*adæ*, the cones, the volutes, the rock shells and the whelks, all of which live on animal food, and it seems to be indifferent to them whether their prey is dead, or still fresh and alive; but, in the latter case, it is obvious, if you remember the inactivity, and sluggishness, and total want of cunning, of these molluscs, that the prey they can master must be fettered and stationary, or endowed with locomotive powers and arms not superior to their own. It is not unlikely that they may prefer a dead prey to a living one, for we know that the whelks will take a bait readily, and they frequently enter the baskets laid for crabs and lobsters, which are always baited with garbage; while in tropical climes we are told that they fish for the olives with lines, to which small nooses, each containing a piece of the arms of a cuttlefish, are appended.

You could never have anticipated that the Bivalved Mollúsca (Conchífera) would be found among the prey of these carnivorous tribes, than which there are apparently no animals less fitted to gain access to their strong-holds, so that even Blainville has expressed himself incredulous on the point. But the fact is certain, and has been known since the time of Aristotle (*Hist. Anim.*, lib. iv. cap. iv. sect. 148–9.); nor, indeed, is it hastily to be believed that such an improbable statement would have been made by the Stagyrite, had it not rested on personal observation. The *P*úrpuræ prove extensively destructive to muscles and other littoral bivalves: the *B*úccina feed upon those which burrow in sand in somewhat deeper water; and it is very probable, considering the similarity of their organisation, that all the whelks and rock shells, and perhaps all the pectinibranchial zoophagous gasteropodes, have the same taste, and an equal capacity of gratifying it. How, you ask, and by what means? Do they glide insidiously, and pop a stone between the valves, to prevent their closure? or do they venture slily to insinuate their foot, and seize upon the unwary inmate? The first they cannot do, and the latter I should deem a hazardous attempt; but nevertheless it is affirmed that the *B*úccinum undàtum really runs the hazard in its attacks upon the clam (*P*écten operculàris), to which it bears a great enmity.* This is not, however, their usual method, which is — what you might never guess — by boring a hole in one valve through which they reach their miserable victim. On examining a number of valves of dead shells, of Máctræ and Anatìnæ especially, you will perceive in many, and generally near the beaks, a small circular hole drilled with a neatness that the gimlet of the artisan could not more than emulate; and these holes are the workmanship of the

* "Is commonly taken in dredging by fishermen, who either use the animal for bait, or destroy it, from a supposition that it is very destructive to the large scollop, *P*écten máximus, by insinuating its tail (as it is termed) into the shell, and destroying the inhabitant: this, we have been assured, they will do even in a pail of sea water." (Mont. *Test. Brit.*, p. 238.) The mode in which they anciently fished for the *P*úrpuræ proves the danger. "Now these purples are taken with small nets, and thinne wrought, cast into the deep; within which, for a bait to bite at, there must be certain winckles and cockles, that will shut and open, and be ready to snap, such as we see those limpens be, called mituli. Halfe dead they should be first, that, being new put into the sea again, and desirous to revive and live, they might gape for water: and then the purples make at them with their pointed tongues, which they thrust out to annoy them; but the other, feeling themselves pricked therewith, presently shut their shels together, and bite hard. Thus the purples, for their greedinesse, are caught and taken up, hanging by their tongues." (Holland's *Plin.*, i. 259.)

gasteropodes in question.* Having secured the shell, by applying to it the disk of the foot, they apply, to the point where they mean to penetrate, the apex of their proboscis, and now by a constant rubbing or grating of their filiform rough spinous tongue, assisted, perhaps, by some corrosive quality of the saliva, they succeed ultimately in perforating the shell. Surely the "patientia vincit" [patience overcomes] had never a more remarkable illustration; for the *Búccina* may work for days, and even weeks, before the life of the animal attacked is fully extinguished.

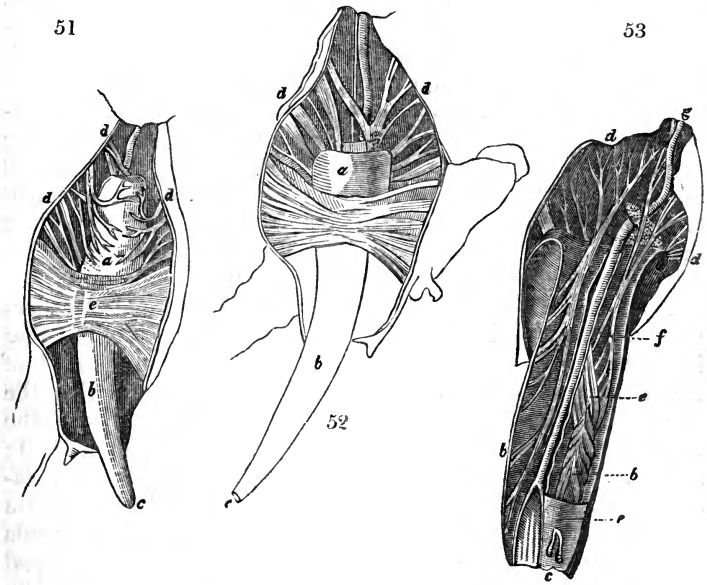
But the proboscis (*fig.* 50.), the organ by which this work is effected, demands a more detailed description; for its mechanism is scarcely less wonderful than the analogous organ of the elephant. It is cylindrical and of considerable length, and when not in use is kept retracted within the body, where it lies beyond the reach of injury. The better to understand its structure, we may represent it as being formed of two flexible cylinders, one within the other, and which are united at the upper margin, so that, in drawing out the interior cylinder, we can only lengthen it at the expense of the other; and, on pushing it back again, we, in shortening it, give corresponding extension to the exterior, but the latter lengthens only on the upper side, because it is fixed to the parietes of the head by its inferior margin. Let us now add a number of longitudinal muscles, all of them very much divided at both extremities: the stripes of their internal or superior extremity are attached to the parietes of the body, those of the opposite end all along to the internal surface of the inner cylinder of the proboscis; and their action, consequently, is to draw this cylinder and the whole proboscis inwards. When thus retracted, a great part of the internal surface of the interior cylinder makes part of the external surface of the exterior cylinder, and it is just the contrary when the proboscis is elongated and protruded. The protrusion of the inner cylinder by the unrolling of the exterior, or, which is the same thing, the evolution of the proboscis, is effected by its own peculiar annular muscles: these encircle it all its length, and, by con-



50

* "The purple hath a tongue of a finger long, pointed in the end so sharpe, and hard withall, that it is able to bore an hole and pierce into other shell-fishes, and thereby shee feeds and gets her living." (Holland's *Plin.*, i. 258.) The ancients were better informed on this subject than some modern writers, who have attributed these operations to the Tròchus. (See Smellie's *Phil. of Nat. Hist.*, i. 396.)

tracting in regular succession, they force it out beyond the lips, in a manner perfectly similar to the evolution of the tentacula of the snail. There is, in particular, one muscle, near the place where the exterior muscle is attached to the head, which is stronger and more effective in this operation than all the others. When extended, the proboscis can be bent to all sides, and at any point, by the action of the retractor muscles, parcels of them acting, while others assume the place and office of antagonists. The *figs.* 51, 52, and 53. will serve



to illustrate this interesting mechanism. In *fig.* 51. the proboscis is retracted about a half: the external cylinder (*a*) is seen enveloping a portion of the inner (*b*), the end of which (*c*) is the end of the proboscis: the muscles which draw it within the body (*d d*) are in a state of contraction, and at *e* we see the great annular muscle, the use of which is to push forwards the inner cylinder, and consequently lengthen the organ. In *fig.* 52. this muscle, and all the annular fibres, have by their action greatly protruded the proboscis, and its retractor muscles (*d d*) are extended and laid bare; the exterior cylinder (*a*) has become very short, and the interior (*b*) is proportionably lengthened. *Fig.* 53. represents the two cylinders cut up in a longitudinal direction to show what they contain, and in what manner the retractor muscles are distributed upon the inner parietes. In the inner cylinder we find the tongue, with all its apparatus (*e e*), the salivary

canals (*ff*), and the greater portion of the gullet (*gg*): the tongue is a very narrow cartilaginous membrane, armed with numerous acute spines or prickles curved backwards; and the principal purpose of the elongation of the proboscis is seemingly to carry its rough point to the body which the snail wishes to perforate and suck. (Cuvier, *Mém. sur les Mollusq. M.*, xvii. 7.)

This anatomy of the proboscis is derived from an examination of the organ in *B*úccinum undàtum, but it is applicable to all the pectinibranchial or proboscidian Carnívora. The other organs subservient to digestion in this tribe present nothing remarkable in their organisation. The stomach is a membranous bag, irregularly plaited on the inner surface; the intestinal canal, like that of carnivorous animals in general, is short, and the lower portion, or the rectum, the inner coat of which is raised into several strong longitudinal folds, is wide, and opens on the right side of the branchial cavity under the margin of the collar. Cuvier observes that the sides of the rectum are thickened by a whitish substance, fatty, and a little granular, of which the use is unknown.

It appears to be ascertained that the Búllæ are also feeders on the Bivalved Mollúsca. Mr. Humphreys mentions that he had found a species of *My*à alive in the gizzard of Búlla lignària. (*Lin. Trans.*, ii. 16.) Cuvier says that the stomach of the Búllæ, in general, is usually filled with the remains of small shells (*Mém. sur les Mollus. M.*, x. 14.); and Mr. Sowerby tells us that they are "exceedingly voracious, as is evident from the fact, that the animal of B. apérta is sometimes distorted by having swallowed entire a Córbula nùcleus, which is a very thick and strong shell, nearly equal in size to itself." (*Gen. Rec. Foss. Shells*, No. 39.) Now, as the Búllæ have no perforating instrument in the mouth, nor jaws to crack them, they are under the necessity of swallowing their prey entire, and, as might have been anticipated, there is provided an internal apparatus to supply this deficiency, and break up the shells, so that the inmates may be exposed to the influence of the digestive agents. This singular apparatus is placed within the gizzard, and consists of three strong calcareous pieces, differing in form and size in the different species, thus modified, undoubtedly, to suit them to their peculiar wants, and moved by powerful muscles against each other.* In the Aplýsia, a genus of the same natural

* Cuv. *Mém.*, x. 13. These stomachal teeth were described by Gioeni as a new genus of multivalve shells; a genus retained by Retzius, Bruguière, and Lamarck, until the mistake was detected by Draparnaud. (See Bosc, *Vers.*, i. 76.)

order (Tectibránchia) as the Búlla, we find a curious modification of this structure, accompanied, however, with a total discrepancy in the tastes and propensities of the creature; and this is a fact which deserves to be remembered in estimating the value of inferences, in relation to the habits of animals, drawn from their presumed affinities. The oral organs of Búlla and Aplýsia are nearly the same, and there is a resemblance in their complicated digestive apparatus; but, instead of three shells, the muscular gizzard of the latter is studded with numerous sharp pyramidal knobs of a semi-cartilaginous consistence, and of unequal sizes, and which may be rubbed off very easily, for they have no muscles to attach and move them. * When Bohadsch saw this structure for the first time, it seemed to him so anomalous and wonderful, that numerous dissections were required to convince him of its being the natural armature of the organ (*De Anim. Mar.*, p. 19.); and he fell into the erroneous conclusion that it was fitted to triturate the shells on which the animal was presumed to prey. (*De Anim. Mar.*, p. 22.) But the Aplýsia is really herbivorous, as is asserted by Pessonel, Cuvier, and others; and, were it necessary, I could add my testimony to this fact, having at one time kept a large specimen of Aplýsia dépilans for nearly three months in a state of confinement, during which it was fed on *F*ùci only, and these it ate greedily, showing some partiality to the dulse (*F*ùcus palmàtus). The food, previously to its reception in this curious gizzard, has passed through a large membranous crop, in which it probably undergoes little change: in the gizzard it is broken down, and in this state enters a third stomach, armed also on its internal surface with hook-like prickles directed forwards, and intended, doubtless, to tease the fibrous mass, that it may be more thoroughly subjected to the dissolving virtue of the gastric juices, and reduced to a homogeneous pulp, previously to its commixture with the bile, which flows into this viscus from two large orifices close to the pylorus, opening between two small membranous prominent crests. (Cuvier, *Mém. sur les Mollusq. M.*, ix. 18.)

* Pessonel's description of this organ is short, but characteristic:— "The membranes are thick, and are set with twelve stones, or horny pieces, of a bright yellow colour, and as transparent as fine yellow amber, ending in points like a diamond; so that the great side, or basis, is set into the membrane of the gizzard, as a diamond in its socket. Others differ in size, having different figures, that, in acting all together, they may be able to break and grind the *herbs* the animal feeds upon, as well by the strength of the muscle, or gizzard, which puts them into action, as by the situation of these stones, assisted by grains of sand found in it, turning the whole by this trituration into a liquor." (*Phil. Trans.*, vol. 50., 1758, p. 587.)

Among the other families of gasteropodes, I do not remember any that are exclusively carnivorous, except the genus Testacéllus, to outward appearance scarcely differing from the common slug, but distinguished by carrying a small shell above the tail, and a species of Vitrina, or shelled terrestrial snail, found under stones in moist, shady, or grassy situations in the higher parts of the Island of Madeira. Unlike the slugs, the Testacéllus burrows in the soil, and is the dread of the earthworm on which it feeds; and these habits are accompanied with corresponding changes in its organisation. Its body is more cylindrical than that of the slug, and, in lieu of a shield confined to a limited portion of the neck, the whole body is encased with a thick coriaceous coat, to guard from the additional pressure to which it is exposed, and to afford sufficient strength to execute its furrows. But the most marked differences are found in the digestive organs. In the mouth there is no corneous denticulated jaw, nor a membranous spinigerous tongue; but from between two vertical lips issues a very small cylindrical proboscis, and appropriated to it a muscle which forms the most curious part in the structure of the creature. It is large, cylindrical, lies along the whole belly, and is attached to the left side of the back by a dozen of very distinct fleshy slips, almost perpendicular to the principal muscle of the body. (Cuvier, *lib. cit. Mém.* xii. 7.) The size and strength of this muscle indicate its paramount importance; nor do all its actions seem to be ascertained, although one of its uses is certainly to retract the proboscis, and probably at the same time to grasp with firmness the struggling victims of its ferocity.* The carni-

* Since this letter was written out for the press, a very interesting paper on the Testacéllus has been published in this Magazine. (VII. 224.) From the observations of Mr. Denson, it is proved that the animal has the power of suddenly darting out its tongue to seize its prey:—"It is projected and applied in an instant; and, when applied, the action of a muscular structure, connected with its origin, draws it, and with it the worm, into the slug's mouth." (p. 227.) We *now* know the use of the remarkable muscle of Cuvier.—*G. J.*

I have, in p. 226—230., shown, that, after I had made the remarks there published, I had found that equivalent and many additional ones had been published, long before, by M. de Férussac and Mr. G. B. Sowerby. The following one, from Mr. G. B. Sowerby, I strove to present in p. 227., in connection with those there published; but want of space excluded it:—

"We have observed them [individuals of T. scùtulum] attentively, and were rather surprised that an animal generally so extremely sluggish in its motions, after discovering its prey by means of its tentacula, thrusting from its large mouth its white, crenulated, revolute tongue, should instantly seize upon, with extraordinary rapidity, and firmly retain, an earthworm of much greater size and apparent force than itself; but which, by its utmost exertion, is unable to escape." (*G. B. Sowerby*, in his *Genera of Recent*

vorous Vitrìna (Helicolìmax Lamárck*ii* of Férussac) differs from our native species in some respects; but, according to the Rev. Mr. Lowe, to whom we owe our acquaintance with its habits, "is so closely allied, that it would be very rash at present to separate it" from the genus.* When leaves and other vegetable matters were given to it, they were never touched, even although care was taken that the Vitrìna should have nothing else for nearly a fortnight; but, on the very first night of its confinement, it would kill and eat a small snail, and it preyed on its own species greedily, the larger slaying the smaller, and then indulging its cannibal appetite. Two of nearly equal size being put together, the stronger or braver slew his neighbour, which furnished a plentiful repast for two or three succeeding nights, for it is during this season only that they feed. (*Lowe*, in *Zool. Journ.*, iv. 342.) It would be well to ascertain whether our own Vitrìnæ are not equally carnivorous and addicted to cannibalism: they are at present believed to be herbivorous; but Mr. Jeffreys informs us that V. pellùcida "has the same carnivorous propensities as the smaller *Limácidæ* and Testacélli; and I once," he adds, "detected no less than seven individuals busily engaged in feeding on a scarcely dead earthworm, which was faintly writhing about, and endeavouring in vain to get rid of its assailants." (*Linn. Trans.*, xvi. 506.)

The Pteropodous Mollúsca are probably zoophagous; the minute Crustàcea and Medùs*æ*, or particles of dead animal matter floating in the sea, furnishing their nutriment. Some species of this order abound amazingly in the Arctic Ocean, where the marine vegetation seems too scanty for the requisite supply of food; and, moreover, they are found floating far from the shore, and at the surface, where no vegetables are. We have, however, no certain information on this head.

On the contrary, it is well ascertained that all the Cephalópoda are carnivorous, and for voraciousness and ferocity may justly claim precedence among molluscs. Such of them as swim in the bosom of the ocean, as *Lolìgo*, feed upon fish

---

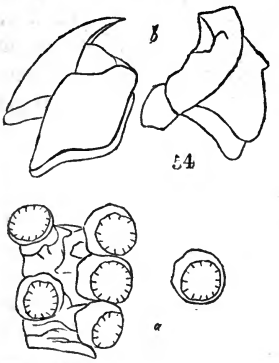
and Fossil Shells.) Mr. J. D. C. Sowerby has, too, shown me, in a specimen preserved in spirits, that the tongue is furnished, around and just beneath (if not upon) its margin, on the outside, with short hair-like bristles, which doubtless increase its power of retaining secure hold. Mr. Sowerby also showed me, in other specimens, that the inner face of the stomach, or of the parts leading into it, is furrowed and roughened, in aid, it may be presumed, of the slug's ingesting its prey. — *J. D.*

* This opinion of Mr. Lowe's is confirmed by the anatomy of the species, excellently developed by the Rev. M. J. Berkeley in *Zool. Jour.*, No. xix. p. 305.

in general, and they will frequently tear large pieces from those which have swallowed the baited hook, and deprive the fisherman of his gain. I have had more than one specimen of *Loligo* vulgaris brought me, which, adhering with a fatal tenacity to the fish, had allowed itself to be drawn from the water; and in the stomachs of others I have found not only the undigested remains of this food, but the beaks of small individuals of their own species. The tribes, again (Octopodeæ and *Nautili*) (See Mr. Owen's beautiful and perfect *Memoir on the Pearly Nautilus*, p. 24.), whose habit is to crawl along the bottom, and seek concealment in rocky places, prey principally on the larger Crustacea, which find in their hard spiny shells, and their powerful claws, no protection against these voracious enemies. In the Mediterranean, the Octopi are held in detestation by the fishermen, because of the havoc they commit among the most esteemed species of lobsters and crabs, which is so extensive that scarcely any are to be found in their usual haunts during the summer season, and what have chanced to escape evince, by their mutilated condition, the peril they have run (Cuvier, *lib. cit. Mém.* i. 4.) According to the early naturalists, the cuttle entraps its prey, partly, at least, by stratagem: "and albeit otherwise it be a very brutish and senselesse creature, so foolish withall, that it will swim and come to a man's hand; yet it seems after a sort to be witty and wise, keeping of house and maintaining a familie: for all that they can take they carry home to their nest. When they have eaten the meat of the fishes, they throw the empty shels out of dores, and lie as it were in ambuscado behind, to watch and catch fishes that swimme thither." (Holland's *Pliny*, i. 250). Pliny also informs us, on the authority of Trebius Niger, that the Cephalópoda "are most desirous and greedie of cockles, muscles, and such like shell fishes;" and, in order to reach the animal scathless, they "lie in wait to spie when the said cockles, &c., gape wide open, and put in a little stone between the shels, but yet beside the flesh and bodie of the fish, for feare lest, if it touched and felt it, she would cast it forth again: thus they theeve, and without all danger, and in securitie get out the fleshie substance of the meat to devoure it: the poor cockles draw their shels together for to clasp them between (as is above said), but all in vaine, for by reason of a wedge between, they will not meet close, nor come neere together. See how subtle and craftie in this point these creatures be, which otherwise are most sottish and senseless." (Holland's *Pliny*, i. 251.)

The cuttlefish, I need scarcely remark, are all guiltless of this clever stratagem: their warfare, though cruel, is open,

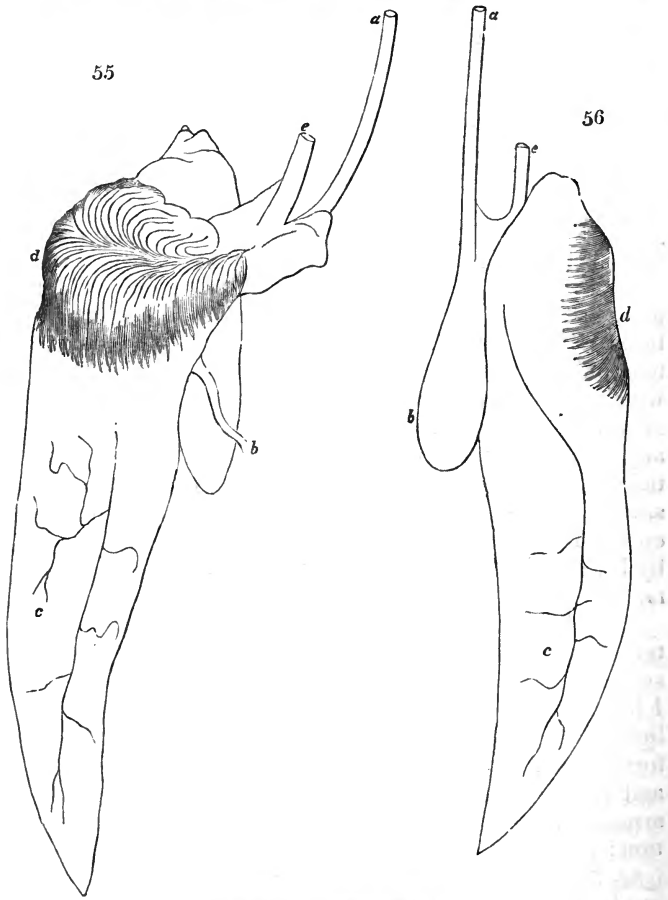
and they are amply furnished with the necessary weapons. The long flexible arms which encircle the head are set along their inner aspects, with numerous cup-like suckers, which the animal can fix to any object, and the adhesion is strengthened by a horny ring round the edge of each sucker often pointed with sharp curved teeth. (*fig.* 54. *a.*) "When an animal of this kind approaches any body with its suckers, in order to apply them more intimately, it presents them in a flat or plain state; and when the suckers are thus fixed by the harmony of surfaces, the animal contracts the sphincter, and forms a cavity in the centre, which becomes a vacuum. By this contrivance, the sucker adheres to the surface with a force proportioned to its area, and the weight of the column of air and water, of which it constitutes the base. This force, multiplied by the number of suckers, gives that by which all or a part of the feet adhere to any body. This power of adhesion is such, that it is easier to tear off the feet than to separate them from the substance to which the animal chooses to attach itself." (Cuvier, *Comp. Anat.*, trans., i. 432.) It must, then, be a fearful thing, for any living creature, to come within their compass; for, entangled in the slimy serpentine grasp of eight or ten arms, and held by the pressure of some hundreds of exhausted cups, escape is hopeless, and the struggles of the hapless victim, by bringing its body into more rapid contact with the suckers not yet applied, only accelerate its fate.



The jaws, and a portion of the enlarged part of the foot, of Loligo sagittata.

The digestive system of this tribe is less uniform in structure than, from the sameness of their food, we might at first suppose; but, in sketches of the very general character to which I limit myself, I pass over the peculiarities of tribes, to notice little beyond what is common to the class. The mouth, formed by a puckered fold of the skin, is placed at the base, and in the centre of the circle formed by the arms, and is armed with two powerful corneous jaws, having a vertical motion: they are fashioned to the resemblance of a parrot's bill (*fig.* 54. *b*), and are well adapted to tear their prey piecemeal, or crush the hard shell, especially when, as in the *Na*útili, their tips are hardened and calcareous. Between the jaws lies the tongue, adherent to the platform of the mouth,

but capable of being unrolled to a slight extent, and having its surface roughened with many rows of small sharply pointed tricuspidate, or semi-tricuspidate teeth, set in close and regular array, which can be erected at will, so as in some measure to grate down the food, previously to its transmission to the gizzard, and they greatly facilitate its descent by their direction, and by their motion backwards and forwards. In the mouth, the food is mixed with the saliva, which is secreted by one or two pairs of large glands. The gullet is a narrow membranous tube, of nearly uniform calibre throughout in the *Lolìgo*



The stomach of *Lolìgo vulgàris.*

(*fig.* 55, 56. *a*), and penetrating the substance of the liver before it enters the gizzard; but, in the Octòpus, the gullet is only bound to the surface of the liver, and at the point of

attachment swells out into a large membranous crop, of the appearance of which, in the Octòpus ventricòsus, at least, I cannot give you a better idea than by comparing it, both in size and position, to the bulb of a small retort. The gizzard (*fig. 55, 56. b*) is a thick muscular organ, like the gizzard of a fowl, and strongly corrugated internally in a longitudinal direction: immediately beyond it, in the *Sèpia* and Octopòdiæ, is situated a curious spiral appendage, laminated on the interior, into which the bile is poured; but in the *Lolìgo*, instead of this spiral cæcum *, and, as it were, to compensate for its deficiency of a crop, there is a very large membranous and somewhat cylindrical bag (*fig. 55, 56. c*), on the posterior and upper part of which we trace vestiges of the spiral structure, for there a fatty substance is so disposed as to assume that form, having the outer edges cut in a deeply serrated manner (*fig. 55, 56. d*). I have found this bag always filled with a grumous fluid, and it is undoubtedly the organ in which digestion is principally effected and completed; for it not only receives the bile, but is itself, or the spiral part of it, supposed to furnish a secretion analogous to that of the pancreas in higher animals. The aperture between the gizzard and this cæcum is oblique and valvular, and another adjoining aperture leads to the intestine (*fig. 55, 56.* † *e*), which, like the œsophagus, winds upwards along the surface of the liver to terminate in the funnel, which is the common vent of all the excrements. The liver is very large in all the genera of this class, and must furnish a copious supply; but, besides this, and the secretions of the other accessary organs to good digestion, Sir E. Home believes that the inky fluid is intended also to have some effect upon the lower portion of the intestinal canal, to enable this to extract from its contents "a secondary kind of nourishment" (*Comp. Anat.*, i. 369. and 393.); an opinion not very probable in itself, and with but a few fanciful analogies in its support.

* "It may with greater propriety be denominated the *duodenum*, as it performs some of the offices of that part of the gut in the higher orders of animals. This stomach is conical, closed at the distal extremity, and performs about a turn and a half, like a spiral shell. Its inner surface is covered with a ridge, which traverses it in a closely spiral direction."—Fleming, *Phil. Zool.*, ii. 424.

† In reference to these figures, it may be observed that they are copied from nature; a remark which seems necessary, since they differ entirely from Sir E. Home's figure of the stomach of *Lolìgo* vulgàris, or the *Sèpia Lolìgo* of Linnæus. Sir Everard's figure appears to have been taken from a species of Octòpus.

ART. IV. *Observations on some British Sérpulæ.* By the Rev. M. J. BERKELEY.

IN an interesting notice of Sérpula tubulària *Mont.*, by Dr. Johnston, in p. 126., a doubt is expressed whether S. tubulària *Mont.* and S. vermiculàris *of Authors* have not been confounded in an article in the *Zoological Journal*, iii. 229. The truth is, that, at the time the article in question was prepared, my text-book for British conchology was Dr. Turton's *Conchological Dictionary*, as being the most recently published work upon the subject; and, throughout, where S. tubulària is mentioned, the species so named in that work is intended, which is not the same with S. tubulària *Mont.*, but is S. tríquetra *Mont.* Test. Brit., pt. 2. p. 511. (Tùbus vermiculàris *Ellis*, Corall. t. 38. f. 2.), but not Mont. *Suppl.* p. 157., which is the true S. tríquetra. Though I was well acquainted with the several allied species and their distinctive characters, I confess freely that I was not then aware of the identity of Montagu's S. tubulària, with S. arúndo *Turt.*, and, in consequence, supposing Turton's species to have been first described by him, adopted his name.

The following synonymes, which I find written on the back of the rough copy of the article above mentioned, I shall beg leave to subjoin, as they may possibly be useful to others in the study of the common British species, whose nomenclature has been most unfortunately confused, though, at the time the *Supplement* to the *Testacea Britannica* was published, the species were well known to Montagu. The only alteration I shall make is the one suggested by Dr. Johnston, of the propriety of which there can be no doubt; viz., that the older name of Montagu should be preferred to the more recent one of Turton. I am quite satisfied, on a careful examination of Turton's descriptions, that he had in view the species figured in Ellis, quoted above, for his S. tubulària, and the S. tubulària *Mont.* for his S. arúndo. If not, the very common species of Ellis is altogether omitted; or, if S. vermiculàris of the *Conchological Dictionary* be supposed identical with it, the almost equally common species with a double infundibuliform operculum, figured by Müller, *Zool. Dan.*, t. 86. f. 7—9. I shall only add to these observations, that S. tubulària *Mont.* ought certainly to be placed in a different genus from S. vermiculàris, &c., being altogether destitute of an operculum. According to the principles of Cuvier's *Règne Animal*, it belongs to the genus Sabélla, and is one of the rare instances in which a shelly tube occurs in that genus.

This has been proposed in a paper printed in No. xx. of the *Zoological Journal*, but not yet published.

The following are the synonymes alluded to above: —

Sérpula (Sabélla *nob.*) tubulària *Mont.*; Sérpula tubulària *Mont.* Test. Brit. pt. 2. p. 513., *Johnst.* Mag. Nat. Hist. vii. 126.; Sérpula arúndo *Turt.* Conch. Dict. p. 155., *Berk.* Zool. Journ. v. 3. p. 229., Tab. Supp. xviii. f. 2.

Sérpula Múller*i* nob.; Sérpula *v*ermiculàris *Mont.* Test. Brit. pt. 2. p. 509., *Mont.* Supp. p. 157. (with reference to Zool. Dan. t. 86.), *Turt.* Conch. Dict. p. 152.

var. b. *Lam.* An. sans Vert. t. v. p. 362.

I am obliged to designate this species, which is characterised by the double infundibuliform operculum, by a new name, as, in the confusion of synonymes, I know not that there is any which can be unobjectionably applied to it. The name now proposed will have the advantage of calling attention to the figure of the animal in *Zoologia Danica*, and thereby prevent any confusion which might arise from the similarity of its shell to that of any other species. I have received from the Western Hebrides a species exactly resembling this as regards the testaceous covering, but furnished with two double infundibuliform opercula. Though the animal was preserved in spirits, it was so decayed that, unfortunately, I could not trace the connection of the opercula with the branchial fringe, and, therefore, do not venture to propose it as decidedly distinct.

Sérpula *v*ermiculàris *Linn.*; Sérpula *v*ermiculàris *Lam.* An. sans Vert. t. v. p. 362.; Tùbus *v*ermiculàris *Ellis*, Corall. t. 38. f. 2.; Sérpula tríquetra *Mont.* Test. Brit. pt. 2. p. 511. not Suppl. p. 157.; Sérpula tubulària *Turt.* Conch. Dict. p. 154. f. 84.

This species is distinguished from the following, in every stage of growth, by its corneous striated operculum. It is seldom found above the ordinary low-water mark.

Sérpula tríquetra *Linn.*; Sérpula tríquetra *Mont.* Supp. p. 157. not *Mont.* Test. Brit. pt. 2. p. 511., *Turt.* Conch. Dict. p. 152., *Sow.* Genera of Shells; Vermília tríquetra *Lam.* An. sans Vert. t. v. p. 369.

This is perhaps the most common of all the British Sérpulæ. The operculum, which is testaceous, is very variable. Specimens occur in which the testaceous coating is a mere pellicle: but in this case there is no difficulty in distinguishing it from the foregoing species, as it is destitute of the beautiful radiating striæ. Other forms of the operculum are described by Montagu, in the place quoted above, and figured by Sowerby in his excellent *Genera of Shells*.

King's Cliff, Wansford, Northamptonshire,
July 19. 1834.

ART. V. *On the Injury produced to Plantations of Sallows and Osiers (Sálices), and Loss of Gain to the Proprietor, by the Ravages, on the Foliage of these Plants, of the Caterpillars of the Insect Nématus càpreæ* F.: *with a Notice, in Sequel, of the very great Importance of a Scientific Knowledge of Natural Objects to those engaged in the Practices of Rural Economy.* By C. D.

I OBSERVE, in p. 265., a short notice of Nématus càpreæ. I am very little, indeed, of a naturalist; but, having suffered from the ravages of this insect, my attention has been drawn to its acts and habits; and the results of my experience may be, perhaps, useful to others. I have a piece of moist ground, in a low sheltered situation, highly favourable in itself for the growth of osiers. I remember it, as first known to me about thirty years ago, when some straggling osier bushes were growing upon it, and it was covered in other parts with weeds and brambles. On the offer of an opportunity, about twenty years since, I determined on cultivating the spot well, and then planting it with osier plants. A sort of tradition prevailed, that osiers would never succeed there. This I disregarded, deeming it absurd, since they grew freely in very inferior situations in the neighbourhood. The ground was thoroughly dug and then planted. After a few years, the osiers had disappeared, we hardly knew how. The spot was again planted, and with a like result. The ravages of the insect were now noticed, indeed, but still they did not sufficiently attract our attention; and osier plants were actually put in a third time. My attention being now strongly drawn to the subject, I discovered that which ought to have been perceived half a century sooner, namely, that Nématus càpreæ, favoured by the peculiar localities, was the cause of all this devastation. The spot is low, moist, shut in by wood, and very near the southern limit of England. The species of willow planted was chiefly one of those with broad leaves, woolly underneath.* The warmth of the situation, and the nidus for eggs afforded by these woolly leaves, were, I presume, the combined cause of the insect being so remarkably attracted to this spot. Some of the plants were of a species with smooth narrow leaves†: these escaped much longer

* [Most probably the *S*àlix càprea *L.* "The name caprea seems to have originated in the reputed fondness of goats for the catkins."—*Smith.* The specific epithet of the insect, Nématus càpreæ *F.*, was doubtless intended to teach the fact, that the foliage of *S*àlix càprea *L.*, and, it may be assumed, that of allied species, as well (all called sallows in some parts of England), is the favourite food of this insect in the larva state.]

† [*S*àlix triándra, *a*mygdálina, Forby*àna*, rùbra, purpùrea, *H*èlix, and Lambert*iàna*, are species of osier, natives of Britain: of this kind, the first four include the species more extensively cultivated in English osier plantations, called, in some places, holts.]

than the others, but still they did not escape eventually: they were also attacked by another caterpillar.

I introduced both red and black ants, and also put some of the caterpillars into their nests; but the ants disregarded them altogether. Having, although thus slowly, ascertained the true state of things, the ground was once more cultivated, and was planted with apple trees. As there happens to be no insect there which much attacks these, they thrive very well. The distance at which apple trees are planted is also less favourable to the propagation of vermin.

I have communicated all this detail, in order to show the importance, to individuals, of attending to such seemingly trifling matters. Many a plantation, &c., fails in an apparently inexplicable manner. A scientific investigation would, in numerous cases, disclose the truth, and prevent farther loss. Had a person acquainted with entomology been proprietor of this osier ground fifty years since, he would speedily have discovered the truth, and might have saved 200*l.* or more to himself and his successors.

Wireworms. — I take this opportunity of mentioning the wireworm. This neighbourhood has been repeatedly ravaged by it. Crops of wheat and potatoes have suffered severely, but the pastures have never been touched. We have no old meadow, and our lands are always broken up when three or four years old. The beetle and its habits are not sufficiently known. If some popular knowledge on these destructive insects could be conveyed to farmers and labourers, they might, perhaps, be destroyed on a large scale.

Penzance, June 18. 1834.

THE facts communicated by C. D. on the habits of the Nématus càpreæ are a welcome furtherance of our knowledge of the natural history of that insect; and they, in conjunction with C. D.'s remarks, are, we conceive, of emphatic value, as exemplifying to entomologists how much their aid in elucidating popularly the forms, structure, transformations, habits, and names of insects is wanted by persons engaged in the businesses of rural life, and also as intimating to them some idea of the extent to, and mode in, which the required aid should be rendered. A remembrance of the nature of our own wants in things entomological, as experienced while engaged in rural practices, and, added to this, some knowledge of the wants of others so engaged, tempt us, therefore, to join C. D. in soliciting entomologists (which C. D. does, in effect) to do, forthwith, what they can, towards leading us, as

farmers, gardeners, orchardists, foresters, intendants of cattle, &c., to the knowledge we so much desire, and so certain to avail us greatly, not only in a pecuniary relation (perhaps, the least worthy regard of all the relations), but in the excellent and best one of intellectual exercise, or mental gratification.

The means by, and the mode in, which this could best be done, is, we have thought, the production of a work which should supply such information on the species of insects eminently injurious, and those eminently beneficial, to rural interests, as is supplied on the plants to which these qualities appertain, in Martyn's *Flora Rustica* (in which the species of plants described and treated of are identified by figures), and in Holditch's *Essay on the Weeds of Agriculture.* It may be urged, that very much of the suggested information, and well-nigh all that entomologists possess, has been already placed on record by them, for the public benefit. This may be true; but it is also true that the places of record are too various, and the access to the whole of them a matter too consumptive of time and money, for many rural practitioners to indulge in. It is needless to remark, that every technicality which could be spared, should be kept out of such a work; and the more nearly it could be written in the phraseology of ordinary life, it would be, we think, so much the better. Should woodcuts be deemed sufficient (to spare coloured figures) for the purpose of identifying each species, they would be much to be preferred, as being introducible amongst the text, and thus to be viewed at once without the distraction of a distant reference. In the descriptive matter, it would be well to indicate what facts require to be confirmed by additional testimony, and what points in the economy of each insect remain yet to be explored; and thus the practical man, in appropriating the researches of the entomologist, might be induced to return the result of his own, and might, while he appropriated the fruit of the researches of the entomologist, be instigated to institute others for himself, and to contribute the result of them to the general store. The publication of *Notes* on such a work would, it is possible, be scarcely less common than *Notes on White's Selborne;* and, out of each of them, something of truth and means of completeness would surely be acquirable. Neither can it be fallacious or ungratifying to presume that such a work would tend very much indeed to the extension of the studying of insects in an entomological manner. Every accurately represented and described species would make known one of a certain type of form and structure, and lead the way to assimilation and association. Under the description of each of the species, something of the leading points of affinity might perhaps be guardedly hinted. —*J. D.*

ART. VI. *On the most advisable Methods for discovering Remedies against the Ravages of Insects; and a Notice of the Habits of the Onion Fly.* By J. O. WESTWOOD, Esq. F.L.S. &c. Read before the Entomological Society, May 5. 1834.

ONE of the most common, and at the same time most weighty, charges brought against the entomologist is, that, whilst he bestows endless labour and trouble on collecting and preserving various kinds of insects, his attention is never, or but very seldom indeed, directed to enquiries into the most effectual remedies for those insect scourges which nature has inflicted upon our vegetable productions. He is told, over and over again, that, to make the science which he cultivates more beneficial to society, and thereby more generally known, a share of his attention must be occupied in prosecuting experiments for the purpose of discovering how this or that insect enemy may be combated in the most successful manner. And, indeed, it must be admitted, that this is a charge too well founded; although, perhaps, a few observations may convince those who are the most ready to bring it forward at every opportunity, that it may be very greatly palliated.

In the first place, therefore, it may be urged, that these destructive insects, appearing, as they do, in occasional seasons, in vast profusion, are produced in such myriads, for some wise purpose, which we may not be permitted to understand. They, like the locusts, of which so splendid a poetical description is recorded in the second chapter of the prophet Joel, form portion of the army of the Almighty, wherewith he scourges the nations; and, although the scientific researches of mankind might discover means of destroying in some degree their hosts, it may, perhaps, not unreasonably be supposed either that he would not be allowed to frustrate the designs of Providence, or that, if this evil were removed, others, perhaps more weighty, might arise in their stead.*

* [Man, it is true, fails occasionally to secure to himself all the fruits of his own sowing; but, nevertheless,

"His portion in the good that Heaven bestows"

is undeniably a munificent one. In relief of his partial losses, no sentiment is perhaps more healthy and more just than the unflattering one of our great moral poet, Pope:—

"Has God, thou fool, work'd solely for thy good,
Thy joy, thy pastime, thy attire, thy food?
Who for thy table feeds the wanton fawn,
For him as kindly spreads the flow'ry lawn.
Is it for thee the lark ascends and sings?
Joy tunes his voice, joy elevates his wings.
Is it for thee the linnet pours his throat?
Loves of his own and raptures swell the note.

In the second place, the minuteness of the size of these creatures presents an almost insurmountable barrier against those delicate enquiries and observations on every stage of their existence, by which alone we can arrive at a knowledge of the real nature and cause of the mischief, and be thereby, and thereby alone, enabled to judge of a suitable remedy.

In the third place, the want of sufficient opportunity is not the least objection which may be brought against the charge. It has always appeared to me, that no effectual check can be given to the ravages of any insect, until its entire habits and economy have been ascertained. Thus far, in the enquiry, is the strict province of the entomologist, whose attention ought, as it seems to me, to be directed, from day to day, and from year to year, not to isolated spots of ground, but to whole acres, more especially with reference to the peculiarities of seasons, and to atmospheric changes: but here we have only gone half way. It now becomes the province of the agriculturist to discover a remedy; since it seems equally clear that this ulterior branch of the enquiry can be prosecuted effectually only by persons perfectly conversant with the chemical nature of soils, the action of various ingredients which may be employed as remedies not only upon the insects themselves, but upon the plants which may be attacked. Such persons, too, are alone able to judge of the practicability of the application of the proposed remedies: since it is surely needless for an indoor entomologist to endeavour by experiment to discover remedies which, when discovered, cannot be adopted, either from the great expense of the article itself, or the impossibility of applying it; or the liability of the destruction, not only of the insect, but also of the plant itself; and even instances of the latter description have come under my own notice.

Hence it appears that the most efficient remedies will in all probability be suggested by those persons who, residing in the country, can obtain a knowledge of the economy of these destructive insects, founded upon the most general and prac-

---

The bounding steed you pompously bestride,
Shares with his lord the pleasure and the pride.
Is thine alone the seed that strews the plain?
The birds of heaven shall vindicate their grain.
[Thine all the subjects of fair Flora's reign?
The insect races here their rights maintain.]
Thine the full harvest of the golden year?
Part pays, and justly, the deserving steer.
The hog that ploughs not, nor obeys thy call,
Lives on the labours of this lord of all."

Essay on Man, ep. iii. 27—42.]

tical modes of examination, and who unite the entomological knowledge requisite to trace most effectually their habits, with a perfect and scientific knowledge of the true principles of agriculture.

Thus, it seems undoubted, that this want of sufficient opportunity for investigation has hitherto proved one of the greatest barriers to our proposing satisfactory remedies against the ravages of insects; and knowing, as we too well know, that the study and investigation of these objects have hitherto been almost totally uncultivated, it is not perhaps to be wondered at, that so little has been done. The observer of insects has proposed remedies which the agriculturist cannot adopt; and the agriculturist, on the other hand, ignorant of the nature of insects, has pursued the very plan which has been the most congenial to the habits of the insects which he wished to destroy: as in the case of the French gardener, recorded by Reaumur, who, thinking to destroy the caterpillars of the cabbage moth, buried them just at the time when they were themselves on the point of going into the earth to change to chrysalides.

The study of insects is, however, beginning at length to emerge from that contempt with which it has been so long regarded; and I trust that the labours of the members of the Entomological Society will show that practical utility has not been lost sight of in their discussions.

It is owing to this more extended observation of insects, that we now find gentlemen, possessing great agricultural knowledge, applying themselves to the investigation of noxious insects; and no one appears to have entered more fully into this united species of enquiry, or to have obtained more decided success, than the gentleman whose communications, in various works [especially in the *Entomological Magazine*, vol. i.], are published with the name of Rusticus of Godalming; although, perhaps, there is a shade too little of the entomologist in his writings.

In one of the papers of this gentleman, published in the *Entomological Magazine* [i. 363—367.], upon the turnip fly, an apparently successful remedy has been proposed against its attacks, by steeping the seeds, upon which it is supposed that the eggs of the insect have been deposited, in brine.

The object of the present communication is to suggest the application of a similar remedy for the prevention of the ravages of a scarcely less destructive insect, the onion fly.

On examining a bed of onions in the month of May, almost as soon as the plants are out of the ground, some of them will occasionally be observed to be in a drooping state; these soon

die, and others of a larger size are then observed to decay in a similar manner: and this continues until the middle of July, and even until the onions are full grown, at which time they have occasionally sufficient strength to survive the injury, with the decay of a portion only of the outer layer or coat: the centre part remaining sound. In this manner whole beds are destroyed; and it seems to be of little use to sow again, as the fresh-sown plants do not fare better. In light soils, especially, the attacks of this insect are occasionally very annoying to the gardener.

On stripping off the coats of the young onions, which show evident signs of decay, it is at once perceived that it is owing to the attack of a small apod [legless] grub upon the vital parts of the young bulb or stem of the plant, that its destruction has been occasioned. On pulling up a very young onion, its interior is found to be completely devoured by a single grub at its very heart, but in plants of larger growth I have counted at least half a dozen of these grubs, varying considerably in size. They are of a moderately long cylindrical form, pointed at one end, which is the head, and this is furnished with two minute tentacula; the other end is the broader, and is obliquely truncated, with the edges rugose, and with two small reddish spots, from which appear to proceed two internal and dark-coloured veins: the body is smooth and shining, and of a whitish colour. When full grown, they much resemble the common maggots of the flesh-fly, and are nearly half an inch in length. In the summer season they are about a fortnight in arriving at their full growth. They generally consume the entire of the interior of the onion, the outside skin of which is alone left dry and entire, serving as a place in which they undergo their transformations, without forming any cocoon, or without shedding their outer skin; the skin of the larva, in fact, shortening gradually, and assuming an oblong oval form, rather truncate at the posterior extremity, within which the real pupa is to be found. This puparium, as it may be termed, is of a chestnut colour, having its posterior end blackish, with the extremity red, and two large black spots observed in the larva: the oral tentacula are also observable at the other end, they being somewhat exserted.

In about another fortnight the perfect fly makes its appearance. It is a dipterous insect, belonging to the family *Mús*cidæ, and genus Anthomỳia; and appears to have been noticed by Linnæus under the name of *Mú*sca radìcum; it is the Scatóphaga cepàrum of Kirby and Spence *, which is referred

* Anthomỳia radìcum *Meig. Zw.* v. 168. *Linn.* ii. 992.; (*Mú*sca) brássicæ *Wied. Z. M.* i. 78.; (Anthomỳia) Scatóphaga cepàrum *K. and S.* i. 192.

by Stephens to the Anthomyia radicum of Meigen and Wiedemann. Although I regret that want of time, as well as ignorance of the more scientific principles of agriculture, have prevented my making the extensive series of observations by which, as above insisted upon, a knowledge of the entire natural history of, and consequently of the most efficient remedies against, this insect can be obtained, yet I may be allowed space for a few suggestions resulting from the facts already acquired.

If, from the somewhat similar growth of the turnip and onion, we consider that the grubs which attack the latter plant in a very young state are produced from eggs deposited (in the same manner as Rusticus states to be the case with those of the turnip fly) upon the seeds of the onion, then it is evident that, if immersion in brine had the effect of destroying the turnip fly's eggs, the same effect will be produced with those of the onion fly.

If, on the other hand, such should not be the case, and the eggs should be deposited by the parent fly upon the young plants, or even if, from what is known of the repeated generations of the domestic fly in the course of the season, the first grub should be produced from eggs deposited upon the seed, and the latter generation of grubs from eggs deposited upon the growing plants by the flies produced from such early grubs, then, and in either of such cases, it appears to me that an effectual remedy will be to destroy the early grubs, to as great an extent as possible, by carefully selecting and burning (not burying) the young infested onions.

The safest way, however, will be to employ both remedies, at least until it shall be ascertained whether the eggs be actually deposited upon the seed or not. I make this remark, because, as has been suggested to me by a naturalist of eminence, the pods of the onion are closely shut, not being suffered by the seedsmen to split before they are gathered *; more-

Cinereous, clothed with distant black hairs, proceeding, particularly in the thorax, from a black point: legs nigrescent, back of abdomen of ♂ with an interrupted black vitta down the middle; wings immaculate; poisers and alulæ pale yellow; length 3½ lines.

* The same objection exists against the idea that the eggs of the turnip fly are placed upon the turnip seed. Moreover, there are some other circumstances connected with the natural history of this insect, which call for minute investigation. Thus, it is contrary to analogy to suppose that the egg of an insect, the grub of which, when hatched, must feed above ground, should be placed by the parent fly in such a situation that it would necessarily be buried. Again, if the turnip fly be produced, as Rusticus presumes, from eggs laid upon the seeds, how did it happen that "there were some *beetles* from the very first coming up of the plant?" since there would be no necessity for their living through the winter, like some butter-

over, unless we suppose either that the grubs of the fly are liable to a very great difference in their period of developement, whilst in their unhatched state in the egg, or that all the grubs are produced from eggs deposited by the different generations of the fly upon the plants themselves, we cannot account for the constant succession of grubs, or for the very great difference in their size in a single bulb. Again, it seems contrary to our ideas of the proceedings of animals, that a fly should at one period of the year have the instinct to deposit the eggs upon the ripe seed, whilst its descendants should place their eggs at the root of the growing plants; and yet, if this be not the case, in what state does the fly remain through the winter? Again there appears a difficulty how the grubs find their way to the centre of a root under ground, if produced from eggs not placed upon the seed, but

---

flies, to deposit their eggs in spring. Again, if the eggs were deposited upon the seed, how did it happen that the grubs " were very various in size ? " Again, as there is but one generation of herbivorous beetles in the course of a year, if the eggs of the turnip fly were deposited upon the seed in the autumn, there would be no perfect beetles until the grubs to be hatched from these eggs, in the next summer, had arrived at this state; and yet Rusticus observes, " I knew from experience that the turnip beetle fed on wild mustard and several other hedge plants; and, therefore, it was not at all an improbable thing that, when they smelt the fragrance of the fresh-bursting cotyledons of their favourite food " (at which period he had just stated that the *grubs* were most abundant), " they should skip down from their *spring* habitations, the hedges, and commence the attack."

From these remarks I think it will be evident that minute research is as necessary into the economy of the turnip fly, as of that which infests the onions; and it is under such circumstances that the turnip fly has been selected by the Entomological Society [see p. 3. of the cover of *Mag. Nat. Hist.* for July] as the subject of the prize Essays upon noxious insects for the present year.

[" Turnip-seed, committed to properly prepared ground, makes its appearance on the fourth day. Now, suppose that the eggs of the insects are attached to the seed, as is represented by Rusticus, is it probable that they can be transformed first into grubs, next into chrysalides, and lastly into perfect beetles, in the short space of five, or six, or even fourteen days ? This is for Rusticus to explain; and it is to be hoped that his description only is erroneous, not his doctrine." This remark is quoted from the *British Farmer's Magazine* for November, 1833, where an abstract of Rusticus's discovery, and remarks upon it, are presented. In the abstract, Rusticus's statement of the effects of steeping the seeds of turnip in brine is, from misapprehension, misrepresented, but has been corrected in a subsequent Number of the same Magazine, by the author of the abstract and remarks. In the *Gardener's Magazine*, ix. 505., x. 78., some facts in relation to the habits of the turnip beetle are registered; but the work most likely, it would seem, by its title, to avail the researcher on the habits of this insect, is one about to be published, entitled, " Report of the Doncaster Agricultural Society on the turnip fly, founded on the returns received from upwards of a hundred gentlemen, cultivating turnips on every variety of soil in the country."

deposited by the fly above ground: it may be said, indeed, that the ovipositor of the parent fly is constructed in a manner capable of great elongation, so as to enable it to protrude its eggs to a distance beneath the ground, and to fix them there upon the outside, or even beneath the outer coats of the bulb.

These, however, are all points of natural history, which a minute series of observations can alone determine: and my chief object, in thus noticing them, is in the hope that some experienced agriculturist will take up the enquiry. It is this class of the community who are the greatest sufferers from this and similar evils; it is not too much to hope that they will consider the subject worthy of investigation.*

The Grove, Hammersmith, July 30. 1834.

ART. VII. *Volcanoes.* By W. M. HIGGINS, Esq. F.G.S., Lecturer on Natural Philosophy to Guy's Hospital. [Concluded from Vol. VI. p. 350.]

THE Cause of Volcanic Activity. — There are few persons who agree as to the cause of volcanic activity; for there are so many difficulties connected with the investigation of it, that it may be fairly doubted whether we have sufficient data to warrant the adoption of any one theory more than

* [In the *Gardener's Magazine*, vii. 90—92., there are brief notices of papers which had been reported on at the eighty-ninth meeting of the Royal Prussian Horticultural Society. From one notice I quote that "Herr Borggreve also confirms, by experience, the good effect of sprinkling pulverised charcoal over beds destined for onion seed. The mixing of charcoal powder with the superficial mould, to protect bulbous roots against the larvæ of a fly (Anthomyia cepàrum) has already been recommended in the Transactions of the Society." These Transactions are entitled *Verhandlungen des Vereins zur Beförderung des Gartenbaues in den Königlich Preussischen Staaten*, of which the first part of the tenth volume is published: they are in quarto, and some insects troublesome in gardens are figured and described in them. Growing plants of the cultivated onion are occasionally eaten by other species of insects. In a bed of about 7 ft. long, by 3½ ft. broad, sown with onion seed in 1833, so late as early in May, a plentiful crop of onion plants arose; of the first number of which scarcely more than half remained on September 12., the absent plants having been successively eaten off at, and just below, the surface of the soil, by larvæ of some species of *Noctùadæ*, resident in the soil. Of these larvæ, I found within the area of the bed, on September 14., on digging up then the remainder of the onions, forty-seven, most of them full grown, but some of them not so. The late sowing of the seeds from which the onion plants had arisen had occasioned them to be in a growing or vernal state, that is, without bulbs and maturity, through much of the period named, and thus had, perhaps, preserved them as eligible food for the *Noctùadæ*, when earlier-sown, forwarder, and riper onions would not have been. The bulbs of those left till the last were very small.]

another, except that some of them better account for the phenomena which have been observed than others. This state of uncertainty has given every student liberty to form a theory for himself, or to modify that which pleased him best. The pages of our scientific journals and works on volcanoes abound, therefore, in explanations of volcanic action; and we might almost have been excused if we had passed over the subject. But, as there is no probability of ascertaining truth while the mind is cherishing error, there will be some advantage in exposing false opinions, and in breaking the fetters which prevent the intellect from healthy and vigorous activity. We shall therefore enumerate some of the most remarkable theories which have at various times engaged the attention of the learned, and state some of our objections to those which may appear the most plausible.

There is reason to believe that much of ancient fable derived its origin from an erroneous estimate of natural phenomena. The history of astronomy affords abundant proof of this statement; and we believe that, in every country where the inhabitants have been accustomed to the sight of volcanic phenomena, they have ascribed them to occult deified agency.

The Egyptians attributed all physical evil to the demon Typhon; and the Greeks, who adopted the superstitions and science of the Egyptians, have evidently symbolised the volcanic phenomena in their description of this personage. Typhon, they tell us, was a giant more powerful than all the children of the earth; his head reached to the stars, and his arms embraced the rising and the setting sun; with his hands he hurled the rocks to the highest heavens; fire gleamed from his eyes, and liquid fire boiled in his mouth. He is said to have been born in Cilicia, which is known to be a volcanic district; and having, shortly after his birth, frightened the gods from heaven, he was pursued by Jupiter to the borders of the Lake Serbonis, another volcanic district, and was at last imprisoned in the Island of Sicily, where he still continues to rave, shaking the earth with his groans and ejecting liquid fire.

The philosophical opinion, if such we may call it, of the ancient Greeks and Romans, as standing in opposition to the fable by which the uninitiated were imposed upon, is stated by the Roman poet Lucretius, in his *De Rerum Naturâ*. Volcanoes were supposed to derive their origin from the conversion of the confined air in the cavities of the earth into violent winds by heat. By this process, it was said, caloric was generated, and the combustible bodies in the bowels of the earth were inflamed.

This is certainly the meanest theory of volcanic action that

has ever been proposed, it is nothing more philosophical than the fable we have mentioned, and far less poetical: but it is not surprising that such a theory as this should have obtained currency among the ancients, for they were almost entirely ignorant of all those facts upon which an explanation of the phenomena of nature must be founded; and the same reason which is an apology for the ignorance of the moderns upon the cause of volcanoes applies equally to the ancients. The phenomena which accompany eruption prevent a direct examination of its cause; and, consequently, opinions must be formed from the circumstances under which the effect is produced, the extent of the volcanic action, and the character of the ejected mass. With all these the ancients were unacquainted; but our knowledge is much inferior to our opportunities.

Werner was among the first of the geologists who ventured to propose a theory of volcanic action. He attributes eruption to the ignition of coal and other inflammable substances; and, in support of this hypothesis, Pallas informs us that the ejection of mud by the volcanoes near the Cimmerian Bosphorus was occasioned by the combustion of the coal measures.

Brieslak proposed to improve this theory by attributing volcanic phenomena to the ignition of petroleum by sulphuric and phosphoric acids, and, in support of his theory, adduces the presence of these substances in lava.

As it would be difficult to find, in the present day, an advocate for either of these theories, we shall not stop to disprove them.

A much more singular theory, and one which has a much greater appearance of probability, was proposed by Sir Humphry Davy. After the discovery of the metallic bases of the earths and alkalies, he was induced to imagine that the earth itself might, perhaps, have been originally a globe of metallic alloy. Now, if this had been the primitive condition of the world, the combination of the oxygen of the atmosphere with the metals would, he says, have formed a crust of earthy matter, as a superficial covering, the interior still remaining a deoxidised metallic mass. Now, if water should, by penetrating through the crust, reach this metallic mass, a chemical action would be immediately produced. The oxygen of the water, having a great affinity for the metal, would be liberated from the hydrogen, and a metallic oxide would be formed. This chemical action would cause the disengagement of caloric, sufficient to melt the surrounding rocks, while the disengaged hydrogen gas would, exerting its influ-

ence as a confined elastic fluid, rend the rocks, and burst into a flame upon exposure to the atmosphere. There is certainly a great degree of plausibility about this hypothesis, and it is not altogether unphilosophical; but Davy was, from some cause, induced to renounce it, and give preference to an explanation founded on the doctrine of central heat. Dr. Daubeny, who has adopted Davy's discarded child, suggests that it is not inconsistent with what we know of Davy's character to suppose that he acquired a distaste for the theory in question, when he found it an object of admiration among an humbler class of enquirers. This observation may be correct; but perhaps a better reason may be given for Davy's want of confidence in his own theory.

If the assumption of a number of unproved statements as facts afford any argument against the correctness of a theory, this one of Davy's must stand very low in our estimation. But, lest we should be charged with arrogance in thus speaking of that which was proposed by Davy, and is still supported by an acknowledged scholar, we will give our reasons for the statement. Two admissions are required by this theory, and they appear to draw largely upon the faith of the reader, but it is absolutely necessary that he should admit the probability of the existence of a metallic nucleus, and its inflammability, or he must at once give up the theory itself. We must first allow the existence of a metallic nucleus. It is possible that the interior of our world consists of metallic alloys, but we have as much reason to believe that it consists of water or of stone. We will, however, grant, for the sake of the argument, that the earth, beneath its superficial covering, consists of metals, for it is only a matter of opinion, and we may imagine it one substance as well as another; all that is required by ascertained facts is, that we should fix upon some heavy body. We are next required to admit that this metallic nucleus is of such a character that it is oxidised by the presence of water, the hydrogen being liberated and ignited. To determine the nature of the metallic nucleus, we must examine the character of the lava that is ejected, or of the earths composing the crust of our globe, which are supposed by this theory to have been at some former period a part of the metallic globe. Dr. Daubeny accurately states that silica, alumina, lime, and iron are the chief constituents of volcanic products. The metallic alloy, therefore, must be composed of silicon, aluminum, calcium, and iron. Now, of all electro-positive substances, silicon is the most incombustible: it may be made white hot in the open air without evincing any tendency to burn; and, so far from decomposing

water at common temperatures, it may be boiled in that fluid. But there is every reason to believe that silicon is not a metal, but has a closer resemblance to carbon, a non-metallic substance. But, however this may be determined, it is so far from alloying with the metals, that it has no tendency to unite with other bodies, except when in a nascent state, or when double affinities are exerted. We cannot help remarking that it was only a short time after Berzelius had discovered the properties of silicon, that Davy renounced his theory. A consideration of the properties of aluminum is equally fatal to the theory; for it sustains no visible alteration by long boiling in water, even when in the state of fine powder, and only begins to oxidise when its temperature is raised to a red heat. Of calcium and iron we need not speak: the former is only an imaginary substance, and the properties of iron are too well known to require a remark.

That any compound of these substances, in any proportion, should fulfil the conditions required in the theory, is utterly impossible. It is true that metallic alloys are more oxidisable than pure metals; but we have given a reason for the supposition that, if the substances of which we have spoken were existent in a deoxidised state, it would not be in union with each other. If it could be imagined that the earth was originally a ball of potassium, there might be some reasons to support the theory, for then the decomposition of water, and the burning of potassuretted hydrogen, might be supposed to mimic the exhibitions of Etna, if not of Tomboro. But, as the constituent elements of lava evince no tendency to act agreeably to the requisitions of the theory which we have examined, we ought not to give them properties which do not belong to them.

Dr. Daubeny has modified the details of this theory. He admits that the action of water is not of itself sufficient to account for all the phenomena, and introduces the agency of atmospheric air. But it must be quite evident that, if our objections to Davy's theory be sound, they are equally so as applied to Dr. Daubeny's amendment. No one would have a theory of volcanic action suggested from pouring water upon a cold cannon shot, yet the chemical action is as strong in this instance as that which would be produced upon the unoxidised nucleus of the earth. Iron is much more readily oxidised than the bases of silica and alumina; for in a spongy state it will decompose water, and become red hot, on being exposed to the air at common temperatures. We no more believe that this theory can be received as an explanation of the cause of volcanic action, than Southey's assertion as a

philosophical fact, that the atmosphere of Elysium and the Fortunate Islands consists of the protoxide of nitrogen.

But, independently of the chemical objections that we have urged, there are many derived from the physical constitution of bodies, such as the arrangement of the metallic nucleus; the impossibility of water ever penetrating to it; the improbability of the presence of atmospheric air, and the doubt whether any chemical action could be developed under great pressures. Each of these might, and the sum of them would, lead us to the conclusion that the theory is doubtful, if not visionary.

Another hypothesis attributes volcanic eruption to central heat. The cause of this central heat is variously accounted for by geologists, according to their particular notions or fancies. Some attribute it to one cause, and some to another; but, whatever may be the origin of the singular phenomenon, it has, we think, been proved that the interior heat of the earth increases from its surface. It is very evident that this fact would afford an ingenious theorist the opportunity of creating a plausible hypothesis. We shall not attempt to explain the almost endless variety of opinions that have been entertained and defended upon the general idea that central heat is the cause of volcanic activity, as this article has already exceeded the space usually allotted to an individual subject; and, in closing the communication, it cannot be denied that the information already obtained, in relation to the activity of volcanoes, is too vague and limited to warrant the formation of a theory built upon observation.

July 10. 1834.

ART. VIII. *A Notice of some of the Contents of the Freshwater Formation at Copford, near Colchester, Essex.* By J. BROWN, Esq.

MR. WOOD has, in p. 275., invited some correspondent in this neighbourhood to communicate notices on this subject. I, for one, have pleasure in offering the results of my own observations.

From what attention I have given to this locality, I have only been able to obtain perfect specimens of the Valvàta piscinàlis. Some of these freshwater beds are mainly composed of fragments of shells, but in such a state that it is almost impossible to ascertain their species. Among the sand and small fragments are found numerous opercula (probably belonging to the genus Paludìna), but no entire shell: the

Valvàta piscinàlis appears to be the only species that has escaped destruction. I have, it is true, detected forms of the genus Planórbis in these beds; but, in trying carefully to remove them, they have invariably fallen to powder.

The beds containing these lacustrine shells, and other organic remains to be noticed, consist principally of white calcareous marl and ferruginous sand, mixed with broken shells, and alternating for about 4 ft. in thickness; the whole surmounted by what was formerly called a diluvium, 3 ft. thick, consisting of brown clay, and gravel composed chiefly of rounded and angular flints, quartz boulders, and bouldered fragments of the trap rocks. These mineral substances, more or less mixed with sand or clay, and coloured with oxide of iron, constitute the surface of our neighbourhood: and are the source from which the materials are supplied for our excellent roads.

Under the beds containing the shells and fragments is a stratum of lignite 3 in. thick, which divides these beds from a thick deposit of clay that lies beneath them; in this lignite I have found shells of the Cyclas rivícola in groups from the bed. Immediately above this lignite, and associated with the shells and fragments, I obtained a horn of the ox, and some large fragments of bone, and amongst them a scapula belonging to the same animal. This horn, or rather part of a horn (for both ends are truncated), measures 16 in. in circumference at the larger extremity, and is 21½ in. in length, not continuing to a point, but broken off to 2 in. in diameter at the smaller end: some of the fragments appear to be parts of the skull, and are very thick compared with the thickness of the skull of our recent ox. These remains were found, in the winter of 1832, in excavating for brick earth; and I thought myself very fortunate in rescuing from destruction such memorials of days long gone by. About a month ago, I also, fortunately, obtained, from the same stratum and the same spot, some more bones, with pieces of deer's horns, antlers, &c., which at present form a part of my little collection.

Under the layer of lignite is found a deposit of fine blue clay, with mica regularly disseminated throughout it in very small plates; there is also much calcareous matter in it. This is a most excellent material for white bricks, chimney-pots, &c., for which it is extensively used.

This clay is generally excavated to the depth of 8 ft., or 10 ft., from the layer of lignite mentioned above. At this depth there are found many rounded portions of soft chalk, the size of walnuts, and some smaller, although we have no chalk formation nearer than Sudbury, which is fifteen miles

hence, unless it is to be found *in situ* at a moderate depth below this clay; which is, I think, not very improbable, considering that these portions of soft chalk could not have been drifted a long distance without being dissipated by the transport. I only notice this circumstance in support of the continuance of the chalk strata to our western coast, where it has been perforated in boring for water; and [in the idea] that its basin is shallower, under this lacustrine deposit, than in many other places; as many of the wells in this neighbourhood are 50 ft. and 60 ft. deep, without getting through our gravel beds, although my own well, only 37 ft. deep, and within a mile and a half of Copford brickfield, penetrates the London clay about 2 ft.

Although the shells of these strata are in a broken state, still, by an attentive observation, we can trace the forms of several genera; the Planórbis, Paludìna, Valvàta, and Cỳclas; all of which are abundantly found living in the pools and ditches in this neighbourhood.

Admitting the ox to which the horn above noticed was once attached, to have belonged to one of our lost species of Mammàlia, its being found associated with recent Testàcea is an illustration of Professor Lyell's observations on this interesting subject, in his most excellent work, the *Principles of Geology*, vol. iii., p. 140.

Stanway, near Colchester, May 5. 1834.

ART. IX. *Enquiries on the Causes of the Colour of the Water of the Rhine;* by J. R.: *with Remarks, in Contribution to an Answer;* by the Rev. W. B. CLARKE, A.M. F.G.S.

I DO not think the causes of the colour of transparent water have been sufficiently ascertained. I do not mean that effect of colour which is simply optical, as the colour of the sea, which is regulated by the sky above or the state of the atmosphere, but I mean the settled colour of transparent water, which has, when analysed, been found pure. Now, copper will tinge water green, and that very strongly; but water thus impregnated will not be transparent, and will deposit the copper it holds in solution upon any piece of iron which may be thrown into it. There is a lake in a defile on the north-west flank of Snowdon, which is supplied by a stream which previously passes over several veins of copper: this lake is, of course, of a bright verdigrise green, but it is not transparent. Now, the colouring effect, of which I speak, is well seen in the waters of the Rhone and Rhine. The former of these rivers, when

it enters the Lake of Geneva, after having received the torrents descending from the mountains of the Valais, is fouled with mud, or white with the calcareous matter which it holds in solution. Having deposited this in the Lake Leman * (thereby gradually forming an immense delta), it issues from the lake perfectly pure, and flows through the streets of Geneva so transparent, that the bottom can be seen 20 ft. below the surface, yet so blue, that you might imagine it to be a solution of indigo. In like manner, the Rhine, after purifying itself in the Lake of Constance, flows forth, coloured of a clear green; and this, under all circumstances, and in all weathers. It is sometimes said that this arises from the torrents which supply these rivers generally flowing from the glaciers, the green and blue colour of which may have given rise to this opinion; but the colour of the ice is purely optical, as the fragments detached from the mass appear simply white. Perhaps some correspondent can afford me some information on the subject. J. R.

March, 1834.

I CANNOT say that I think the Rhine is so extremely clear and pellucid as J. R. states. In its passage through Germany, where it receives the tributary streams of many districts, it is, in places, very far from transparent; and few persons who have made the passage from Mainz to Cologne in the steamers, can have failed to remark the shower of dirty calcareous matter which is constantly falling over the deck of the vessel, from the steam, as it is condensed in the air. At the junction of the Nahe with the Rhine at Bingen, the waters of the two rivers may be traced a considerable way in separate unmingled currents, by the *red* tint of the former, which gains its hue from the red-sandstone country whence it flows. The Rhone, also, clear as it is immediately after leaving Geneva Lake, is, where it goes underground near Carouge, of the colour and appearance of pea soup. As to the colour of the Rhine waters, after leaving the Lake of Constance, *that* doubtless depends on causes similar to those which have given that well-known cerulean tint to the Rhone at Geneva; arising from some unknown property of matter derived from the parent snows and ice of the mountains, which acts upon light, so as to reflect

* [This lake, however, if the poet have spoken truly, is not very feculent: —

" Lake Leman wooes me with its crystal face,
The mirror where the stars and mountains view
The stillness of their aspect in each trace
Its clear depth yields of their far height and hue."

BYRON.]

the colours in question.* We know that the icebergs of the polar seas are frequently of an emerald green †, and the glaciers ‡ of the Alps are of a green or a deep blue, and that the waters from them issue of a pale blue colour. As Mrs. Somerville has observed in her recent work *On the Connexion of the Sciences* (p. 174.), it is on the property of unequal absorption that "the colours of transparent media depend; for they also receive their colour from their power of stopping or absorbing some of the colours of white light and transmitting others." This, however, J. R. seems aware of, in part.

Mr. De la Beche has some remarks on the coloured waters of different seas, quoting Sir Gore Ouseley, in which *green* and *blue* water are alluded to. (*Geological Manual*, 1st ed. p. 89, 90.) All lakes are more or less coloured, even when most pellucid. There is a lake on the summit of Blencathra or Saddleback Mountain, in Cumberland, the deep waters of which are quite black to look upon, and it is said that they reflect the stars in the daytime; which, by the way, I could never observe, though frequently looking for them. The most perfectly clear expanse of water in England is Derwent-

* The Rhine, from the Alps to the Lake of Constance, is blue; afterwards grass green; then, after having received the waters of the Black Forest and Alsace, yellowish green. The Maine, traversing the red sandstones of Franconia, takes a yellowish red tint, but in very cold seasons it becomes greenish blue by the precipitation of the oxide of iron; it is amber grey when it is not coloured yellow by long rains. All the rivers of Bavaria Proper are bluish green in winter, grass green in spring, and pale grass green in autumn. (*New Edin. Phil. Journ.*, Jan. 1830, p. 193.) Sir H. Davy (in his *Salmonia*) says, the colour of snow water is deep blue; that the green tinge comes from the vegetables that grow on the banks; and the yellow and brown, from turf; and that the green hue of the sea is derived from vegetable matter, iodine, and bromium. He relates some experiments with iodine on the ice of the glaciers.

† On the colour of icebergs, see Scoresby's *Arctic Regions*, i. 254. The glacier of Rosboden in Switzerland, is all through of a dark blue: but green is a general colour.

‡ It must be observed, that the ice of the glaciers is very different from common ice. It consists of snow which has been melted, frozen, and compressed, perhaps, a thousand times; till it has become solid, hard, and often as compact as marble. I have frequently seen, at Geneva, cubes of alpine ice upon the table, used to cool the wine in the drinking-glasses. It may be also remarked, that it is in the warm months of the year that the ice of the previous colder season is generally subjected to the processes alluded to; that, in those months, avalanches occur; and that the alpine rivers, contrary to what occurs in colder localities, are most swoln with the waters arising from melted ice and snow. There are, however, certain seasons when, as in 1816, winter seems to extend throughout the year. It is asserted, by an observer, that not a single week, in 1816, passed without a fall of snow on Mont St. Bernard. I shall produce the quotation in another place.

water: nothing can equal the brilliancy and accuracy of the reflections of the scenery from its surface. J. R. says, coloured ice, when in minute fragments, is "simply white." The sky is of a deep blue, approaching to black, in great heights, yet a thin stratum of air is nearly white. The colour is, therefore, dependent on the quantity of the matter which absorbs or reflects. There is, says Mrs. Somerville, "no substance which is either perfectly opaque or perfectly transparent: the clearest crystal, the purest air or water, stop or absorb the rays of light when transmitted, and gradually extinguish them as they penetrate to greater depths." (p. 173.) I cannot quote all that Mr. Scoresby has said upon this subject; but he has fully detailed the facts, as observed by him in the polar seas, and has come to the same conclusion as Mrs. Somerville. The real colour, he says, of the sea, "may be recognised in storm or calm, in fine weather or foul, clear or cloudy, fair or showery, being always nearly the same" (*Arctic Regions*, i. 175.); which agrees with what J. R. says of the Rhine. Mr. Scoresby says, also, the sea in the arctic regions is generally blue, but occasionally diversified; since "in 1817, he fell in with such narrow stripes of various-coloured water, that he passed streams of pale green, olive green, and transparent blue, in the course of ten minutes' sailing" (p. 176.); "and that the different qualities of water were kept distinct from each other." He states that *blue* is the natural colour of the sea; and that the green water alluded to was coloured by myriads of medusæ, &c., or the food of the whale. [See in this Magazine, VII. 222. note *.] "The water of the main ocean is well known to be as transparent and as colourless as that of the most pure springs; and it is only when seen in very deep seas that any certain and unchangeable colour appears. This colour is commonly ultramarine blue, differing but a shade from the colour of the atmosphere, when free from the obscurity of cloud or haze. Where this ultramarine blue occurs, the rays of light seem to be absorbed in the water, without being reflected from the bottom; the blue rays being only intercepted. But where the depth is not considerable, the colour of the water is affected by the quality of the bottom." (p. 173.) Wood, in 1676, sounded, off Nova Zembla, in 80 fathoms; in blue water, which was so transparent, that "even the shells on the ground were clearly visible." (p. 181.) Hudson says, in 1607, the sea was blue where ice was, and green where it was open. (p. 175.)*

* "And now there came both mist and snow,
And it grew wondrous cold;
And ice, mast high, came floating by,
Green as an emerald."

COLERIDGE'S *Rime of the Ancient Mariner*, part i.

From the summit of Skiddaw, in a very clear day, I once saw, very distinctly marked, all the sandbanks in the Solway Frith, by the yellowness of the water above them. This arose from the reflection and shallowness of the water.

Stanley Green, April 3. 1834. W. B. Clarke.

Causes of the Colour of the Water of the Rhone and Rhine. The Rhone, at Geneva, is some 17 ft. deep, but so exquisitely clear that a pebble may be seen in the bottom at that depth; but, seen with its surface at a small angle, to the eye it appears of the most beauteous transparent blue. This, some assert, arises from the lake's waters being actually coloured; but the transparency of the waters *en masse* disproves this. The fact is, it arises from the colour of the bottom, which, being of the same substance as the neighbouring side of Jura, a calcareous tufa, is nearly white; and the blue of the sky is thus reflected with such singular beauty. (*Robert Mallet, Esq., Capel Street, Dublin;* in *Gard. Mag.*, viii. 526.)

Mr. Mallet mistakes, I think, in two points. The side of the Jura is not "a calcareous tufa;" nor is the bottom of the channel under the bridge at Geneva so "nearly white" as he states. The bottom is strewed with stones, broken pots, &c.; and there is also an alluvial coat of mud, not, perhaps, very thick, but still sufficiently so to resist the current. Had the bottom been "*white*," or "nearly white," the colour of the water would be *green*, and not blue. I would refer Mr. Mallet and J. R., upon this fact, to the very instructive and elaborate treatise of De Maistre, in the *Bibliothèque Universelle* (an accurate translation of which, by Professor Griscom, is published in the *American Journal of Science and Arts* for April, 1834*); in which treatise, actual experiment is brought forward to show that *white substances at the bottom of blue water reflect green light.* The count alludes, in his paper, to the Rhone and the Rhine, to the green and blue tints of the glaciers, and to the colours of the sea near the shore and in deep places; and introduces some discussion on the blueness of the sky and of the veins in the human body, and on the properties of mixed colours to reflect the blue rays. By far the most instructive account which I have seen is also there given of the singular grotto at Capri, called the Azure Grot; the description of which might, with good effect, be transferred to the pages of this Magazine. That description would be particularly illustrative of J. R.'s en-

* "On the Colour of the Air and of deep Waters, and on some other analogous fugitive Colours," by Count Xavier de Maistre.

quiries. Two extracts from other parts of the count's memoir are here appended, as belonging to the subject before us, and which it would be wrong to omit: — "Although the blue colour of water is often marked by numerous causes, it is sometimes exhibited in all its intensity: a fine example of it is witnessed in looking at the Rhone from the bridge at Geneva. The river seems to flow from an ultramarine source. The spectator is in the most favourable situation for observing the internal reflection, disengaged, as much as possible under an open sky, from the reflection at the surface." (Griscom's translation, *Amer. Journ.*, xxvi. 68.)

"The bluish green colour of crevices in the glaciers is occasioned in the same manner as that of water near shore: if the mass of ice were as great and homogeneous as that of the sea, the interior of the crevices would be blue; but the ice contains air-bubbles, particles of snow, and fissures, which reflect the transmitted light, throwing it from one face to another of the crevice, until it finds an escape. These opaque substances in the glacier produce the same effect as a white surface in the depths of the sea." (*Ibid.*, p. 70.) That De Maistre is correct may be shown by this, that our homeward-bound ships can, when out of sight of land, distinguish their approach to the Channel by observing the colour of the sea change from blue to green. Captain Basil Hall (somewhere, in one of his amusing works) speaks of the "reign of *blue* water," to designate the deep open sea. Every one who has happened to have been in a violent storm in the ocean, has seen huge *green* waves approaching his vessel; the water composing which, in time of calm, would be *blue*. Seen horizontally, the wave, by transmitted light, becomes *green*.

To sum up all, De Maistre concludes his remarks by observing that the effects alluded to above appear to him "to depend wholly on the peculiar property which the blue ray possesses of being reflected, in preference to other rays more or less refrangible, by the simple mechanical resistance of the molecules of bodies which reflect light." (p. 75.)

Stanley Green, Aug. 8. 1834. W. B. Clarke.

Art. X. *Data towards determining the Decrease of Temperature in Connection with Elevation above the Sea Level, in Britain.* By H. C. Watson, Esq. F.L.S.

We have very few data for determining the decrease of temperature, either of the earth or atmosphere, in connection with increase of elevation above the sea level: an enquiry

amply meriting more attention than appears to have been hitherto bestowed upon it. The following data will furnish a commencement to any one willing to undertake the task of observation and experiment on this head.

1. *Temperature of the Atmosphere.* — Sir Thomas Brisbane and Mr. William Galbraith have brought together a few observations (*Edin. New Phil. Journal*, Nov. 1832—Jan. 1833), by which it appears that the thermometer falls 1° of Fahrenheit in 212 ft. of ascent for heights of 2000 ft. or 3000 ft. Thus: —

Ben Lomond, from Edinburgh, gave	243 ft.
Ben Lomond, from Rowardennan (its base)	205
Ben Nevis and its base	216
Carnethie and Edinburgh	183
Cheviot and Holy Island	212
Average	212

In the *Edinburgh New Philosophical Journal* (Jan.—April, 1833) I have published a series of observations, made in July and August, 1832, on the temperature of the Highland mountains. By these it appears, that, with a mean difference in elevation of 2055 ft., the mean difference of temperature was $9\frac{1}{2}$° Fahr. Dividing the former by the latter, we should get only 216 ft. of ascent for 1° of temperature. The true average, however, should be drawn from the mean of the number of feet required to sink the thermometer 1° on the different days. The following are my results: —

Date.	Place.	Difference of Elevation.	Difference of Temperature.	Number of feet for 1° of temp.
July 16.	Clova Mountains	2139 ft.	10°	214 ft.
17.	Clova and Braemar	1112	5	222
23.	Ben-na-Buird	2157	6	359
21.	Braemar Moors	1057	4	264
24.	Ben-na-muic-Duich	3013	14	215
31.	Ben Heeal	1370	10	137
Aug. 1.	Ben Loyal	1717	$16\frac{1}{2}$	104
5.	Ben Hope	2154	$5\frac{1}{2}$	391
14.	Ben Nevis	2368	$15\frac{1}{2}$	153
15.	Ditto	3315	$12\frac{1}{2}$	265
16.	Locheil Moors	1657	7	232
17.	Red Cairn	2599	8	327
	Means	2055	$9\frac{1}{2}$	242

The observations at the upper stations were usually made between 1 and 3 P.M.; those at the lower stations preceding or following them by from two to six hours; more usually by only two or three. This would, of course, give an excess of

1° or 2° to the upper stations. But, as a balance against this, it is to be remarked, that ascents were commonly commenced on fine mornings; which, on some of the days, were followed by cold and rainy afternoons. Ben Loyal, and the first ascent of Ben Nevis, furnish examples of this; while on Ben Nevis, the second day, Red Cairn, and the Locheil and Braemar moors, the weather was warm and sunny. On Ben-na-muic-Duich and Ben Hope, there was thick mist: on the former, it was more dense towards the summit; on the latter, it was partially transparent to the sun's rays near the summit of the hill, though very dense below. On the whole, I incline to believe that these several sources of error would nearly counterbalance each other.

From a few similar observations in Cumberland, during May and June of 1833, I obtained 298 ft. of ascent for a decrease of 1° of temperature; the weather being dry, warm, and sunny. Other observations, in Caernarvonshire, in the beginning of May, 1832, give only 212 ft. for 1° of temperature; the weather cold and humid. Otley's *Guide to the Lakes* mentions incidentally that the difference of temperature between Keswick and the summit of Skiddaw is about 12°. This gives 230 ft. for 1° of temperature; but the author informed me that his average was only drawn from a few observations, not sufficient for much confidence. The following is a summary of these several conclusions:—

Place.	Observer.	Number of feet.	Place.	Observer.	Number of feet.
Caernarvonshire -	Watson -	212	Scotland - Highlands -	Brisbane, &c. Watson -	212 242
Cumberland	—	298			
Ditto -	Otley -	230		Mean -	239

The only place of considerable elevation, the mean annual temperature of which has been determined with precision, is that of Lead Hills in Lanarkshire, at 1280 ft. Comparing the average temperature of it and of adjacent situations near the sea level, we find a much slower decrease of temperature than the preceding observations would lead us to expect:—

Canaan Cottage gives 1° of temperature for	340 ft.
Carlisle - - - -	- 480
Kendal - - -	- 462
Keswick - - -	- 294
Jesmond - - -	- 400
Mean -	- 395 ft.

We can hardly doubt that the temperature of Lead Hills is above the true average for its height. The observations were made at 6 A.M. and 1 P.M.; which hours, taken together,

should represent very nearly the mean of the twenty-four. Let us, for the convenience of whole numbers, make the preceding general average of 239 ft. into 240 ft., and take it as the standard for the diminution of temperature during the whole year, as well as in the summer. The mean annual temperature, near the sea-level, in lat. 57°, is about 47°; and that of summer, 58°. From these data, the temperature of the Grampians should be thus: —

Altitude.	Mean of year.	Mean of summer.	Altitude.	Mean of year.	Mean of summer.
1000 ft.	42·83	53·83	3000	34·5	45·5
2000	38·66	49·66	4000	30·33	41·33

The mean annual temperature at Lead Hills (corrected by the Leith Fort observations) is 44½°; that of summer, 55¼°. The height is 1280 ft., as above mentioned.

2. *Temperature of the Earth.* — The mean temperature of the earth, at Lead Hills, is stated to be 44°. In other neighbouring places, of moderate elevation, it is given thus: —

	Elevation.	Temperature.		Elevation.	Temperature.
Keswick -	250 ft.	46·6	Edinburgh	214	47·76
Kendal -	—	47·2	Ditto -	230	47·08
Jesmond -	200	45·7			
Newcastle	180	49·42		Mean -	47·3
Leith -	—	47·3			

In the *Edinburgh Philosophical Journal*, the temperature of springs on Ben Nevis is given as here copied: —

	Temperature of springs.	Temperature of air.
At an elevation of 1200 ft. -	41·5°	48°
2000 -	38	47
A well near the summit -	36	46

I observed the temperature of a bubbling spring, throwing out a stream of water, on the moors near Locheil, and of the well near the summit of Ben Nevis, on the west side, in August, 1832. The temperature was then: —

	Elevation.	Spring.	Air.
Locheil spring -	2200	43°	62°
Ben Nevis well -	3760	39	49

On the 9th of May, 1832, the temperature of seven small springs, or drains, from the sides of Carnedd David, in Caernarvonshire, varied only between 39° and 39½°, though the

heights at which they burst from the mountain were from 2700 ft. to 3247 ft. At the end of April, the temperature of drain-springs at lower elevations in the adjacent hills was : —

	Temperature of springs.	Temperature of air.		Temperature of springs.	Temperature of air.
At 300 ft.	46°	?	At 1400 ft.	44°	46°
520	47	50°	1600	42	43
1200	44	47			

In Otley's *Guide to the Lakes* it is stated, that, "on the sloping side of Helvellyn, about the distance of 300 yards, and 300 perpendicular feet below the summit, is a spring, called Brown-rigg Well, where the water issues, in all seasons, in a copious stream; its temperature in the summer months being from 40° to 42°." The height of this spring must be about 2750 ft. In May of 1833, I found the temperature of a feeble spring (in very hot weather), at about 350 ft. of elevation, to be 49½° of a thermometer graduated by Ronchetti of Manchester; and of a spring-drain, at 450 ft., the temperature was 53°: but as this thermometer stands 2½° above thermometers obtained from Adie, the temperatures may be called 47° and 51½°.

Now, using these very imperfect data, we get the results given below, towards ascertaining the decrease of temperature in the earth as we ascend above the sea level.

	Difference of Temperature.	Difference of Height.	Feet for 1° of temperature.
Mean of the Year.			
Lead Hills and Leith -	3·3°	1200	364
Lead Hills and Keswick - -	2·6	1000	385
		Mean -	374½
Spring and Summer.			
Ben Nevis - - -	5·5	2560	466
Ben Nevis and Locheil - -	4	1560	390
Hills of Caernarvon - -	4	1300	325
Carnedd David - -	7	2670	381
and Adjacent hills - -	3	1000	333
		Mean -	382½

I have before assumed the decrease of atmospheric temperature to be 1° for 240 ft. of ascent. Let us compare this with 380 ft., as the rate of decrease of temperature in the earth; and we then have, as the assumed temperature of the earth and atmosphere on the Grampians: —

Height in feet.	Temperature of the earth.	Temperature of the air.	Difference.
0	47°	47°	0
1000	44·10	42·83	1·27
2000	41·21	38·66	2·55
3000	38·32	34·50	3·82
4000	35·42	30·33	5·09

The difference of temperature between the earth and atmosphere increases more rapidly than I should have anticipated. How near these results and assumptions may approximate to truth, future observations must determine. Meantime, I should feel much indebted to any one for additional information on this subject.

Ditton Marsh, July, 1834.

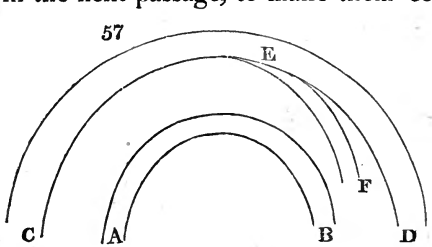
ART. XI. *Facts and Arguments in Relation to the Causes of a singular Appearance of a Rainbow, of an unusual Appearance of the Sky, of Mirage, of Dew, and of Hoar-Frost.* By A SUBSCRIBER.

ALONG with B. (IV. 79.), I have been looking for an explanation, from some correspondent, of the phenomenon described in III. 544., under the head of "Notice of a singular Appearance of the Rainbow, by E. G.;" and, with a view of recalling attention to the subject, I beg to submit the following extracts from Sir D. Brewster's treatise on Optics, in Lardner's *Cyclopædia*, p. 269, 270.: —

"Many peculiar rainbows have been seen and described. On the 10th of August, 1665, a faint rainbow was seen, at Chartres, crossing the primary rainbow at its vertex. It was formed by reflection from the river."

To save a new cut, I have altered the letters of reference in the next passage, to make them correspond with the diagram in III. 544. [which we here repeat (*fig.* 57.)]. In addition to which, it will be necessary to suppose that the segment E F reaches to A; and that there is a similar segment on the left side, which I shall call E′ F′: the arch F′ E′ E F thus being the remaining part of the circle of which the primary bow A B is a portion.

57



"On the 6th of August, 1698, Dr. Halley, when walking on the walls of Chester, observed a remarkable rainbow. A B is the primary bow; C D, the secondary; and F′ E′ E F, the new bow intersecting the secondary bow C D, and dividing it nearly into three equal parts. Dr. Halley observed the points E′ E to rise, and the arch [of the new bow] E′ E gradually to contract, till at last the two E′ E [of the secondary bow], and E′ E [of the new bow], coincided; so that the secondary iris, for a great space, lost its colours, and appeared like a white arch at the top. The new bow (F′ E′ E F) had its colours in the same order as the primary one (A B), and, consequently, the reverse of the secondary bow; and, on this account, the two opposite spectra at E′ and E counteracted each other, and produced whiteness. The sun at this time shone on the river Dee, which was unruffled; and Dr. Halley found that the bow F′ E′ E F was only that part of the circle that would have been under the castle, bent upwards by reflection from the river.

"A third rainbow, seen between the two common ones, and not concentric with them, is described in Rozier's *Journal*, and is doubtless the same phenomenon as that observed by Dr. Halley."

Now, though it may be very presumptuous in an anonymous individual like myself, to object to an explanation sanctioned by the names of Halley and Brewster, yet I am obliged to say that it is as unsatisfactory to me as it seems to be to E. G.; and that I, therefore, consider the problem as yet unsolved. I cannot imagine the sort of reflection supposed by it possible; except on such an inadmissible principle as that the rainbow is the base of a hollow cone of prismatic light proceeding from the sun, and rendered visible by being received upon falling rain, or the clouds, or the earth, as a screen. Still, however, as in the instances mentioned, the phenomenon seems to have been observed in the neighbourhood of an extent of water, it may somehow depend on reflection; but, as it would be almost vain to attempt a solution without being perfectly acquainted with such circumstances as the position of the observer, and the relative situations of the bow and the water, as well as the state of the latter, it would be useful if E. G. would oblige your readers with such particulars of the instances witnessed by him as he can now recollect, in reference to these points.

E. G.'s question ought not to be lost sight of, "What becomes of the received opinion that the eye of the observer must be in the apex of the cone of which the bow is the base?" (III. 545.) How is that opinion to be reconciled

with the fact of two bows, not concentric, having been seen by the same person at one time?

A very unusual Appearance in the Sky. (III. 199.) — The Rev. W. B. Clarke will find an explanation of this appearance in Sir D. Brewster's treatise on Optics, in Lardner's *Cabinet Cyclopædia*, p. 277—279. It is not *very* uncommon: I have myself seen it several times towards sunset, and once very distinctly; on which occasion the eastern horizon was more cloudy than the rest of the heavens. "This," says Sir David, "seems to be necessary as a ground for rendering visible such feeble radiations." Speaking of an instance observed by himself, he adds: — "A few minutes after the phenomenon was first seen, the converging lines were black, or very dark; an effect which seems to have arisen from the luminous beams having become broad and of unequal intensity: so that the eye took up, as it were, the dark spaces between the beams more readily than the luminous beams themselves." On this I may observe, that an additional reason for the dark spaces attracting the eye is, that the light of the converging beams little exceeds, and, near the horizon, rather falls short of, the average brightness of the rest of the sky.

"The phenomenon is entirely one of perspective." The beams of light arise from a portion of the sun's rays passing through openings in the clouds, while the adjacent portions are obstructed. These rays, practically, may be considered parallel; and, consequently, according to the laws of perspective, must appear, to a spectator on the earth's surface, to converge towards each extremity; on the same principle of perspective, clouds, carried along by the wind in lines parallel to its course, seem to diverge from the windward horizon, and to converge towards the leeward.

The "singular Phenomenon" observed by L. F., and described in III. 200., is noticed by Sir D. Brewster, in his treatise on Optics, in Lardner's *Cabinet Cyclopædia*, chap. xiv. p. 113., "on the colours of fibres and grooved surfaces."

Mirage. —When I wrote the article in III. 484—486., I had seen no explanation of the phenomenon, except that proposed by Y., in III. 200. Since that time, I have seen many notices of it, and several theories; but none of them do I prefer to my own. In the present, I mean to confine myself to the following, by Professor Jameson, in the eighth volume of the *Edinburgh Cabinet Library*, p. 254, 255.: —

"*Mirage.* In viewing distant objects, it often happens, under certain circumstances, that these objects present many images which are straight, oblique, or inverted, and always more or less changed in the contour. It is the appearance of these images, without any visible reflector to produce them,

which constitutes *mirage*. In explanation of this phenomenon, it may be remarked, that, as soon as the soil becomes heated, the lower stratum of air is also affected by the calorific influence. Numerous aerial currents are established, and, an undulatory motion taking place in the air, distant objects become changed in form, and variously distorted and broken. If, when these changes are going on, a calm should prevail, and the mass of atmosphere upon the plain remain at rest while the stratum in contact with the ground becomes gradually heated, mirage will arise. In such cases, the observer will see distant objects in their natural positions and forms; but, *below* them, these images will be seen reversed, and the spectator believe that he is looking at a *reflection* from the surface of a body of water. The sky, also, joins in completing the illusion, its images being reflected in the same manner. The whole visible appearances, the French philosophers who visited Egypt remark, are, indeed, the same as those usually exhibited by water. All the laws by which the observer has been accustomed to judge of the existence of water, viewed at a distance, are here called into action; and the man of science as well as the peasant alike find themselves deceived."

In this description of the phenomenon, it is stated that distant objects are seen in their proper positions; and, at the same time, under them their reversed images, as if reflected from the surface of water. The sky, also, is in the same manner reflected; the whole appearances, in short, being the same as those usually exhibited by water; and the explanation is, that these reversed images are owing to reflection from an invisible mirror; that is, from a supposed reflecting surface at the place where two strata of different densities are in contact: which (speaking from memory) is, I think, the theory of the French philosophers referred to as explaining the phenomenon.

I have seen this kind of mirage, I dare say, a thousand times; and have often attentively observed it for a length of time, with a view of accounting for it; and I have to say, that the appearances, though *like*, are *not the same* as, those usually exhibited by water. The images seen by me were always very indistinct; though, generally, their colours were tolerably bright, their outlines were undefined, and they more or less approached to a triangular form, the base being uppermost; appearing, on the whole, very much as if reflected from water slightly ruffled by a light breath of wind. The images were *never reversed, but invariably erect:* though this was not always easily made out; for, from the constant form

just mentioned, the image of a hill, a tent, or of a house with a steep roof, appeared at the first glance distinctly reversed; but if the hill had a white building on its summit, it might always be seen that, if it appeared in the image, it was towards the base, not at the summit, of the hill; so, if the house had white walls and a roof of red tiles, in the image the roof and walls seemed to have changed places.

But the hypothesis of a reflecting surface at the place where the rarefied stratum and the dense one over it meet, will by no means account for, it is even contradicted by, other observed facts. On such a supposition, to see the image the eye must be raised into the dense stratum above the supposed mirror, and to make it disappear, the eye would only have to be lowered into the rare stratum below it. But the facts are, that, as the eye is raised, the mirage gradually disappears, and as it is lowered it gradually increases, till at last, when brought close to the ground, all is mirage, even the soil within a few feet not being distinguishable. This I have often tried. Belzoni says (*Narrative*, p. 196.), "If the traveller stand elevated much above the mirage, the apparent water seems less united and less deep; for, as the eyes look down upon it, there is not thickness enough in the vapour on the surface of the ground to conceal the earth from the sight. [This is Belzoni's theory, but I quote him solely for his facts.] But if the traveller be on a level with the horizon of the mirage, he cannot see through it, so that it appears to him clear water. By putting my head first to the ground, and then mounting a camel, the height of which might have been about 10 ft. at the most, I found a great difference in the appearance of the mirage."

In stating the result of my own experience, I do not mean to deny that other observers may have seen reversed images *; but *I* have never seen them, and therefore I have come to the conclusion that they are *not characteristic* of this kind of mirage. I am also of opinion that hasty observers, misled by the extraordinary resemblance of the whole to objects reflected from water, have often taken it for granted that the indistinct images were reversed, when, in reality, they may have been erect; and that, in consequence, much perplexity has arisen, and the idea of a reflecting surface has been had recourse to, to account for this, perhaps imaginary, part of the phenomenon.

* This communication has no reference to those cases of unusual refraction where images are seen in various positions, erect, reversed, and multiplied. Sir D. Brewster mentions that Dr. Wollaston, in looking through a square glass bottle, containing water floating above syrup, saw an object in its proper position, and under it an inverted image, but whether by reflection or refraction, he does not say. This experiment seems to have some relation to mirage, and to make against my theory.

I shall conclude by repeating my own explanation in a few words. In ordinary states of the atmosphere, the air is more dense towards the surface of the earth, and, in consequence of the refraction thereby produced, distant elevated objects appear *higher* than they really are; but, in the case under consideration, a stratum of heated, and, consequently, rarefied air, resting on the surface of the ground, produces an effect the very reverse: distant elevated objects are seen *lower* than they are, by an eye placed near but below the upper surface of the rarefied stratum, while from this situation of the eye they will at the same time be seen nearly in their true places.

Observations on Dew and Hoar-Frost, principally with reference to a paragraph in III. 562.—If we leave *solution* and *precipitation* out of the question, and admit that water exists in the solid, liquid, and aeriform states, in consequence of being combined with a less or greater quantity of heat, we shall remove some of the difficulties stated by J. M. Having thus premised, we may expect, from analogy, that, if the heat thus necessary to retain water in its aeriform state be abstracted, it will reassume its liquid form, and, if more heat continue to be withdrawn, it will take the solid state, and freeze. This, in fact, we find to be the case. A greater or less quantity of aqueous vapour is always mixed with the air of the atmosphere; if, therefore, a body at a temperature considerably lower than that of the atmosphere be exposed to the air, it will abstract heat from the air and vapour in contact with it, till at last the latter, being deprived of that portion requisite to sustain it in the gaseous state, will deposit itself on the body in the form of dew. The degree *just* necessary to produce deposition is termed the *dew point*. If the temperature is sufficiently low, the dew will freeze and become hoar-frost.

From this it follows that dew, speaking of it as a condensation of aqueous vapour, may be formed at any temperature under the boiling point; but, in the more common acceptation of the word, dew will not be formed except when the surface of the ground is at a considerably lower temperature than the air immediately over it; and this will rarely be the case except when the atmosphere is calm and clear, and the sun is absent. For though all bodies on the earth's surface are constantly throwing off their heat by radiation, yet, while the sun, the great source of heat, is shining, they will receive more than they radiate; and when the sky is overcast, the heat radiated by the clouds will prevent their cooling down much below the atmosphere: but a cloudless sky radiates little or no heat towards the earth, consequently bodies on its surface exposed to this clear sky must neces-

sarily fall in temperature, if situated so as not to receive heat from other radiating bodies in their neighbourhood.*

When bodies are thus exposed, some of them are found to part with their heat faster than others: the former are therefore called good radiaters, and may be observed covered with dew; while the latter, called bad radiaters, remain dry. In fact, each body will cool down, and receive a deposition, in proportion as it is a good radiater.

A calm atmosphere is necessary. In order to the deposition of dew, the air and vapour must remain under the influence of the cold body until their temperature is brought down to the dew point. Wind not only prevents this, but rapidly reduces the objects exposed to it to a common temperature, thus neutralising the effects of radiation.

Fluids are bad conductors. Heat is slowly propagated through them, when applied above or abstracted from below. The cold, therefore, in the case we are considering, extends to no great height; indeed, it is generally confined to a few feet from the surface of the ground. I often observe a thermometer placed outside, at a height of about 7 ft., stand at 40° when the ground is white with hoar-frost; and the Rev. W. T. Bree (IV. 480.) has mentioned many striking instances in point. The extent of the cold stratum is very obvious in the neighbourhood of water; the partially condensed steam from it marking the limits very distinctly. (See, again, IV. 480.)

I have said that dew will rarely be seen except in clear weather †, for otherwise the surface of the ground will seldom be found colder than the air; but it sometimes happens. Last Saturday night (Nov. 18. 1833), the thermometer sunk to 29°, and during Sunday did not rise to 33° in the shade; at night it fell to 28°, and on the morning of the 18th it suddenly rose to 47½°, the atmosphere becoming dull: a calm prevailed all the time. The consequence was a copious deposition of moisture, which, on the grass, indeed, could be distinguished from the melted hoar-frost, but was very remarkable on stones that had been previously dry. The rooms in my house that had been without fires had partaken of the severe cold, the temperature being 40°, and the windows of them, as might have been expected, were covered with condensed vapour on the outside. This, though of the same nature with dew, is not what, in common language, we would call by that name.

* Dew and hoar-frost are seldom observed in the close streets of towns, or under shady trees.

† The common people here call a clear calm atmosphere "a frosty sky."

While on this subject, I may observe, in regard to high, exposed, and sloping grounds escaping the effects of hoar-frost, while low grounds suffer, that, in addition to the causes that have been assigned, it may be the case that the cold stratum, as fast as it is formed in such situations, may, from its increased density, slide down to the lower levels, and be replaced by a warmer stratum, and so on; thus helping to produce the destructive effects of frost in low situations, so often noticed.

Vale of Alford, Aberdeenshire, Nov. 20. 1834.

ART. XII. *Short Communications.*

MAMMIFEROUS ANIMALS. — *PERFORATION of a Leaden Pipe by Rats.* — The sharpness of the incisory teeth of the *Glires*, and the power with which these animals can employ them, are well known to those who have unfortunately allowed a finger to come within the range of those of any one of the species. How readily will a squirrel penetrate the hardest shells of a nut; and how do we hear, night after night, the patient and persevering grinding of a rat's teeth, working its way through some particular plank or joist below a skirting-board, forming a barrier interrupting the intruder in its progress towards a larder, storeroom, or closet, wherein its instinctive shrewdness assures it that its labour will meet with a plentiful reward! It was not, however, till very lately, that I had learned to what extent rats will employ their teeth, when bent on making their way towards a desired point, whatever be the nature of the intervening obstacle.

The facts of the case which informed me of this are the following: —The kitchen and scullery, &c., of a gentleman's house, were supplied with water from a pool at some distance, by means of a leaden pipe about $1\frac{1}{4}$ in. in external diameter, with a bore of about $\frac{3}{4}$ in. in diameter; thus leaving a solid circumference of metal varying from $\frac{1}{2}$ in. to $\frac{3}{4}$ in. in thickness. This pipe, on reaching to the building, was carried under a flagged pavement, and embedded in brickwork, till it terminated in a cock, at a convenient height, for the purpose of affording the supply of water. For some months in the summer the pool of water had been intentionally lowered while some improvements near its banks had been carried on, and the pipe had, in consequence, never been used. I know not how far this circumstance influenced the operations of the rats, whose avidity for water, more especially in dry weather, is such as to induce them to lay aside their usual shy and

secluded habits, and expose themselves, even in the middle of the day, to public view; so much so, indeed, that, after several days of drought last summer, on the first drops of rain falling from a slight shower, a whole colony of rats emerged from under the eaves of an outhouse, and almost filled an open wooden gutter which ran the whole length of that side of the building. There they remained, old and young, only occasionally retreating, but immediately again advancing, in the presence of several persons, myself amongst others, assembled to witness so singular a troop; and there did they remain till a gun was loaded, and fired amongst them, by which four or five were killed on the spot, and many others, doubtless, severely wounded.* But to return to the leaden pipe: some repairs being necessary, a bricklayer was employed to open the brickwork surrounding the pipe, when he found that the mortar had been already removed, and a passage effected by rats to the side of the pipe, which, it might have been supposed, would completely check their progress. Great, however, was his surprise, when, on laying bare the pipe, he found it entirely laid open to the extent of about 4 in. in length, and considerably more than half the solid circumference of lead actually removed. Not a doubt could exist as to the cause; for on the surface of the edges of the opening were continuous marks of rats' teeth, deeply impressed, with as much uniformity and regularity as if indented by a carpenter's file. How long the rats, or more probably the rat (for, in so confined a space, I think, it would have been difficult for more than one to have gnawed and nibbled at a time), had been occupied at this tough job, it is not possible to determine; but the effects were such as to convey a very fearful impression of what might be effected by these animals in the work of destruction; and, at all events, how little resistance the thickest and most solid planks would make to their united and persevering efforts. I send a sketch of the piece of leaden pipe sawed off by the plumber, and now in my possession. — *E. S., F.L.S.*

[The drawing corresponds with the description, which does not need illustration.†]

* [Upon the thatched roofs of buildings in the country, unfurnished with eaves' troughs, they may be seen, after showers, in the daytime, lapping the drops of water which hang at the ends of the reeds or straw of the roof; and are not rarely shot while thus intent on slaking their thirst.]

† [Mr. Bree has, in a communication in the *Gardener's Magazine*, vii., 235., described the attacks of some species of mice upon his holly bushes; and those of rats upon his "young oaks in a plantation near a brook and small pond. They [the rats] gnaw the tree off just below the ground; sometimes nearly as level as if it had been cut with a saw. Young trees nearly as thick as my wrist have been served in this way; and I have been quite astonished how the rats could cut them through so com-

Singular Robbery committed by Rats. — A clergyman, in the spring of last year (1833), had a brood of turkeys, amounting to a dozen or fourteen in number, when, one morning, all of them, with the exception of two, had disappeared. In vain was the dairymaid sent out in all directions to search for the remainder; not a vestige was visible, in the shape of body or limb, to account for their death by vermin; and the whole remained a mystery, though suspicions rested on rats, which abounded in the barns and stabling adjacent to the pen in which the mother turkey and her young brood had passed the night. At this moment, when all were either deliberating on what could possibly have happened, or diligently searching for the delinquent, a farmer joined the party, who, in the course of investigation, turned their attention to a slight looseness of a piece of turf near the hedge bordering on the lawn, on uplifting which, a hole appeared, and, on stooping down, a slight noise was heard, which induced him to widen the orifice, and insert his hand; when, to the astonishment of all, he pulled out one of the young turkeys, and, on still farther extending their excavations, the whole of the remainder were discovered; and, what was still more extraordinary, all were alive, with the exception of two (if I recollect my friend's report correctly), and apparently not much the worse for their imprisonment; and, to crown the discovery, at the farther extremity the plunderer himself was found. That instinct should have prompted the marauder to carry off one, or even two or more, if his appetite could command such a number, is not beyond credence; but that he should, with a view to future provision, furnish his subterranean larder with a sufficiency of

---

pletely, and could not at first tell whether it was done for meat or malice. The fact is, the rat begins his operations under ground among the soft and tender roots, and eats upwards as far as he finds the wood soft enough for his purpose, which is just below the surface: the consequence is, that the tree will often remain erect, and appear to the eye as if nothing had happened to it: but, of course, it throws out no leaves in the spring, and, on taking hold of it, you find it loose, and ready to come up with a touch." We have witnessed the same effect produced upon young willow plants growing in somewhat marshy soil, and have always referred it to the water campagnol, or water rat (Arvícola amphíbia). All of the Rodéntia have, we presume, the power of cutting with that remarkable evenness which Mr. Bree has mentioned; hares have, it is well known, in cutting their way (muse) through young hawthorn hedges. The fact of rats gnawing through lead is, perhaps, less remarkable than that of *Cerámbyx bájulus L.* making its way out even through sheet lead one sixth of an inch thick, when this has happened to have been nailed upon the rafter in which the insect has assumed its final metamorphosis. Holes a quarter of an inch wide in their longer diameter have, it is stated, been found drilled by insects of this species through such lead, and lead has been discovered in the stomach of the larva. (See Kirby and Spence's *Introd.*, ed. 1822, i. 232. note *d.*)]

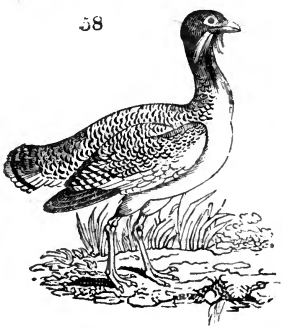
live stock for several days, is a fact which I could not have believed, had it not been thus established by the testimony of a most respectable witness, on whose accuracy I can place implicit reliance. — *E. S.*, *F.L.S.*

[This account reminds one of that in VI. 206., by W. L., of a polecat, out of whose larder "he poked out, and counted carefully, forty large frogs and two toads . . . . all and every one of them alive, but merely so!" See VI. 206.]

The Water Rat (*Mús amphíbius* L., *Arvícola amphíbia* Fleming). — On Feb. 28. 1829, one was brought to me that had been taken in a mole-trap, under ground, more than a mile from any river. I have also been informed of the water rat's being dug out of the ground in a potato field. No motive can be supposed to have brought the water rat into a mole creep, but in search of the mole to devour it. The weasel also pursues the same prey. — *J. Couch. Polperro, Cornwall, May* 29. 1834. [The fact of a handful of mangled remains of earthworms, being, as I have noticed in V. 490., found in the run of a water-rat, suggests it to be possible that the water rat, in the above case, was but seeking earthworms in the mole's run.]

Birds.—*Of the Great Bustard* (*Otis tárda* L., *fig.* 58. ♂), three females resorted, last spring, to Great Massingham Heath, Norfolk, for incubation. Their eggs consisted of two pairs and a single one. These were taken away, under the impression that, as there was no male bird, they were good for nothing. I have one of the pairs. Does the male associate with the female during the period of incubation? Bewick says that "the male is said to live apart after the females have been impregnated." Is this the case? If it be, it may be well, should female bustards again visit the same place, not to deprive them of their eggs. A correspondent, in VI. 513., states that the last bustard seen at Icklingham "was a hen bustard, sitting on six or seven eggs." Is he correct in stating that there were so many eggs? I have always understood that the number of a bustard's eggs never exceeds a pair. — *J. D. Salmon. Stoke Ferry, Norfolk, Dec.* 28. 1833.

58



Of the Little Bustard (*Otis Tètrax* L.), a fine individual has been recently killed in this neighbourhood. It has been preserved; and the specimen is deposited in the valuable

cabinet of British birds belonging to the Philosophical and Literary Institution of Chatham. — *Stephen Hart, Subcurator* [*of that Institution*]. *Jan.* 21. 1834.

Rooks feeding on Grain, &c. — Sir, In reply to J. D., who hints (p. 244.) that "the soil's being covered up, in summer and autumn, with ground crops, may prevent access to it for ground grubs and insects, and so account for the rook's then feeding on grain, &c.," I would observe, that the rooks feed quite as much on grain in the spring (March and April), when they are not driven to that necessity by the ground being covered up by crops. Neither will the excuse offered be sufficient to exculpate the rooks from the charge of their autumnal depredations on the corn; for the ground is bare enough at that season to afford them an opportunity to stock it up in search of grubs; and, accordingly, they do then stock it up, and destroy immense numbers. The real fact is, and it must not be disguised, that my friends the rooks have a natural taste and propensity for grain, especially when it is a little swollen by having lain a few days in the ground; and, accordingly, the periods at which they commit the greatest depredations are just after the grain is sown (the wheat in autumn, and the oats and barley in spring), and before it is come up. I have known the blackbirds do me much mischief in the summer and autumn, especially if the season be dry, by plucking up most unceremoniously low-tufted alpine plants (e. g. *Saxífraga hypnöides*, Arenària balearica, Sibthórp*ia* europæ`a, &c.), in order to get at the grubs *

* [Those of some *Curculiónidæ*: not rarely those of the *Curcùlio* vastàtor *Marsham*, which, according to Curtis's *Guide*, is a synonyme of Otiorhýnchus *Ger.* pícipes *F.* It is not a little vexatious, to those who cultivate plants with a passion for them, to find the tufts of *Saxífragæ* and other plants (but more frequently the tufted *Saxífragæ*) turned or turning to a brown colour, and, at a lifting up with the hand, come clear off the soil upon which they had grown, and appearing partly rootless, and in a dying state. On exploring the soil below, insects in the pupa state (they have wings formed, and pretty obvious) are discoverable. The larvæ of these, it may be presumed, had fed upon the roots of the plants. A fine plant of the Crássula cordàta was once kept upon a stand in the drawingroom, near a window, by the late Sir Thomas Cullum, Bart.: it flourished, and its branches hung tressily and prettily over the edge of the pot, and bore flowers in its season. After this plant had been kept some time here, it died suddenly, and, on exploring the soil, larvæ or pupas of an insect were, Sir Thomas informed me, discovered in it: doubtless those of one of the *Curculiónidæ*. The grape vine, in forcing-houses, has its sprouting herbage and embryo fruit not a little ravaged by an Otiorhýnchus. O. raúcus has abounded about Liverpool in the spring of this present year (1834), and eaten to an unwelcome extent of the leaves of the trees and shrubs of that neighbourhood. These facts aid in showing the value of the agency of the black birds, however much or little they may do towards reducing the numbers of the weevils.]

which lie just below the surface, and feed on the roots of the plants. Sometimes whole patches of these and similar plants have been nearly stocked up from the rockwork, or the pots in which they grew. But to return to the rooks: I am surprised to find it mentioned (p. 244.), as a *new* fact in natural history, that "the husk of grain taken by the rook is separated, in the rook's stomach, from the grain itself, and is afterwards discharged from the mouth of the rook in masses of the size [nearly] of a pigeon's egg." This fact I have repeatedly observed, and any one may satisfy himself of it, who will but examine the ground under a rookery in the spring, where he will find the surface strewed with abundance of such rejectamenta.* I may here mention one circumstance connected with this fact, which is not noticed by your correspondent: the rooks, to grind their corn, seem to require stones, like other millers†; and, for this purpose, they swallow lumps of brick, grit, broken platter, coal, and other like substances (but chiefly brick), which are discharged again along with the pellets of husks. These fragments of brick, &c., are from the size of a vetch seed, or less, to that of a damson stone, rough and irregular sometimes, but usually more or less rounded or bouldered by the action of grinding in the bird's stomach, before they are thrown up in the pellets; and the pellets, in consequence, are sometimes slightly tinged with a red or brickdust colour. I herewith

* [Mr. Hewitson, in his *British Oology*, t. 71., has spoken of it as a fact hitherto unnoticed, except in this Magazine, VII. 244. In the case described by Mr. Hewitson, "the whole surface of the ground underneath the trees [which bore the rookery] was thickly strewed with disgorged pellets similar to those ejected by the owl, but consisting entirely of the husks of oats; and must have contained, altogether, the remains of many bushels. [We shall add his speculation on this fact.] I suspect, however, that the rook is by no means so destructive from choice as one might be led (from what I have stated) to infer; and that the dryness of the spring, and the consequent difficulty in obtaining its usual food, had driven it to a more than usual destruction of grain. If I am right, it will also account for the habit having remained unnoticed."

Bushnan, in his *Introduction to the Study of Nature*, proposes, in p. 157., that birds adapt the time of rearing their young to the period in which there will be a certainty of procuring food suitable for them. . . . . "The rook hatches in April, when the turning up of the soil affords abundance of grubs and worms, which could not be found at a later season; and, when this source fails, the common chafer affords a long supply." How long was the rook in existence ere tillage was much practised?]

† Most, if not all granivorous birds, I believe, as well as some others, swallow grit, in order to promote the trituration of their food. I have sometimes been much amused by seeing chickens, especially such as have been confined in a pen, and cannot help themselves to grit, swallow with avidity large pieces of broken oyster shell, which have been given to them, of the size of a sixpence, or larger. — *W. T. B.*

transmit you a packet of these ornithological millstones, collected from the pellets found under the trees of the rookery on my premises.

I have somewhere lately met with an extract from Jesse's *Gleanings in Natural History*, in which it is contended that the rooks do no injury to the agriculturist. After speaking in just commendation of the rooks, and of their utility in destroying grubs, this pleasing writer goes on to say: — "In order to be convinced that these birds are beneficial to the farmer, let him observe the same field in which his ploughman and his sower are at work: he will see the former followed by a train of rooks, while the sower will be unattended, and his grain remain untouched." Our own characters, I believe, often suffer by the extravagant and injudicious praises of our friends; for, when men come to perceive that we do not possess all the good qualities, or at least do not possess them to that extent which we are said to do, they are apt not to give us credit even for those which really belong to us. I fear it may fare the same with the rooks in the present instance. Some who read the above erroneous statement, will be likely to condemn the rooks *in toto*, and to discredit what is most truly said in their favour, on account of the error mixed up along with it. Mr. Jesse makes the rooks too good by nearly half. They may not follow the sower, it is true, because, as already stated, they prefer the grain when it has become a little swollen, from having been a short time in the ground. But that they do eat grain, the pellets we have been speaking of are an incontrovertible proof. If farther evidence were needed, I might mention what occurred to myself this spring. A few days after the oats were sown, my man came to complain to me of the rooks, which, he said, were settling on the newly sown ground in numbers, and pecking up the corn like a flock of chickens. The fact was even so; and, in corroboration of it, abundance of disgorged pellets, consisting of oat husks and brickbats, was soon perceived under the trees of the adjoining rookery. "Keeping crows," as it is called in this part of the country, that is, guarding the newly sown fields from the depredations of rooks, is a very usual occupation for boys and children who are unfit for more laborious employment. Mr. Waterton himself (the friend and advocate of all wild animals, even of some which are usually accounted vermin) does not deny (p. 102.) the rook's propensity, "if not narrowly watched," to peck a little new-sown corn. Let it not be supposed that, in making the above statement, my object is to injure the character of these useful and amusing birds. On the con-

trary, I am one of their firmest friends, being fully convinced (indeed, it has been proved by actual experiment) that they are, on the whole, beneficial to the farmer. Unquestionably, they commit some injury; but then, by way of compensation, they do a vast deal of good. Only let the balance be fairly struck, and the good they do will be found greatly to preponderate. — *W. T. Bree. Allesley Rectory, May* 12. 1834.

[*The Rook is very rare, and never builds, in the Islands of Guernsey and Jersey. The Red-legged Chough occurs in Jersey, but is rare there.*] — Dr. Latham has remarked (as quoted by Mr. Selby), as a curious circumstance, that the Islands of Guernsey and Jersey should be without rooks, particularly as it is ascertained that they frequently fly across the Channel, from England to France. I learned on the spot [see 473.] that they do sometimes make their appearance there in winter; but never breed in the islands. The red-legged chough occurs in Jersey, but is rare. — *E. Blyth. Tooting, Surrey, May* 22. 1834.

The Swift (H. A*pus* L.) *builds its own Nest: this Nest described.* — It is generally understood, I believe, that the swift occupies, for the purpose of incubation, the deserted nest of the sparrow (*Fringilla doméstica L.*). Most authors agree on this point; I suspect for want of opportunities of examining, personally, the nests of swifts, in consequence of these birds invariably selecting the roofs of churches, houses, &c., as the places for their nests. By comparing the statements of different authors, it will be, I think, found that they have, in fact, copied from each other. I must, however, except one author, of a very recent date, from this charge. Mr. Mudie says, in his *British Naturalist*, "the nest is constructed much in the same manner as that of the common swallow." A. R. Y. has, in V. 59., well commented on the fallacy of this notion [and his remarks should be read in connection with this subject]. In the *Architecture of Birds*, the swift is classed with the "parasite birds;" and there is a quotation from Montbeillard, *Oiseaux*, viii. 218., who, after describing the nest as "consisting of a great variety of substances, stalks of corn, dry grass, moss, &c. &c.," says, "of seven nests found under the head of a church porch, 15 ft. from the ground, there were only three which had a regular *cup shape*, and of which the materials were more or less *interwoven, and with greater order than usual in sparrows' nests;* they had also more moss and fewer feathers, and were in general less bulky." This author had evidently laboured under a mistake, in supposing these were the nests of the sparrow. I have, during 1831, had an opportunity of inspecting two nests belonging to a small co-

lony of swifts (for I find that they, like their congeners the martin (*H.* úrbica) and sand martin (*H.* ripária), delight in associating together, whenever it is practicable), consisting of three pairs, these being all that visited this village last spring. They took up their quarters under the eaves of the roof of the church, all of them entering by the same aperture: this was too small to admit my hand; and I was, in consequence, under the necessity of untiling a very large space before I succeeded in finding the nests. There were but two, which were placed in opposite directions from the entrance: one contained *three* eggs of a clear white colour; the other not any. I was much surprised to find these nests so totally different in their structure from what I had hitherto been led to expect. Instead of being "loose and slovenly structures" (A. R. Y., V. 60.), I found them both (for they were precisely similar) quite the contrary; being very neat and compact. They were chiefly composed of that part of the blade (the sheath) which is left adhering round the straw: this is a light substance, and there can scarcely be a doubt that it is obtained by the bird on the wing, as it is waved about by the wind; the remainder was of dry grass, none of the pieces more than about 6 in. in length; not any feathers whatever. These substances were very closely interwoven, and were held firmly together by an adhesive substance very much resembling glue, and so disposed round the inner edge of the nest as to hold the straws in their places; the whole forming quite a cup of an oval shape, of about 4 in. in length, not very deep. These facts will show, I think, that the swift is entitled to more merit than has hitherto been awarded to it. In fact, I think it scarcely possible for the sparrow to occupy those places that are generally selected by the swift, as the swifts go a considerable way up under the roofs before they reach their nests: those I have mentioned were, I should say, from 5 ft. to 6 ft. from the entrance; nor could there be any thing like sufficient room for the sparrow to form their *dome*-built nest, which I believe they invariably form, even where there is a natural covering. I hope some correspondent, who may have opportunities, will be induced to examine the nests of the swift, and let us know how far those of the little colony resident here last year agree with those of the main body. I suspect there will not be found any very great difference.—*J. D. Salmon. Stoke Ferry, Norfolk, Dec.* 28. 1833.

Additional Particulars, communicated under Date of Thetford, Norfolk, July 14. 1834.—My observations have been fully verified. These birds are very numerous in this town [Thetford, Norfolk], and they made their first appearance this

spring on April 26. Several pairs having taken up their residence at a house, entering under the eaves, I, on May 22., examined this situation, and found that there were seven nests, all of them containing eggs, two with a pair, four with three, and one with even four. The nests, in this case, instead of being some way up under the roof, were all placed upon the wall plate, although at some distance from the different entrances under the tiles: they were precisely similar in form and structure to those previously described, the only difference being in the materials of which they were composed. As, however, they had been occupied for the same purpose the preceding season, if not for a longer period, as was evident from their appearance, it was rather a difficult matter to ascertain precisely what the materials were. I should think principally feathers and other light substances. I took the precaution of removing every nest, and all rubbish; and, as I perceived that the birds still adhered to the same place, I, on June 27., again examined the same situation, and found that the swifts had constructed eight other nests; these, of course, having been built since my previous examination. These nests were, in form and structure, precisely similar to the others, except that there was in some a greater profusion of feathers, intermixed with a few straws and other light materials, all held together firmly by a viscous substance: each contained only a pair of either young or eggs. On removing the tiles, several of the old birds would not leave their nests, although exposed to view, until gently taken off. The author of that interesting work, lately published, *The Feathered Tribes*, has remarked, in mentioning the different situations selected by this bird, its occupying "the jutting rocks that rise to a considerable altitude amid fertile places, and its instinct leads it to adapt the structure of its nest to the elements. The straws and other matters of which it is composed are *said to be* soldered to the rock, and to each other, with a viscid substance, elaborated by glands for the express purpose, though, perhaps, the same glutinous matter may more assist the bird in the capture of its prey." I think I may now with certainty state that the swift does not make use of the deserted nest of the sparrow, except as a foundation on which to place its own nest, the same as it would upon any other substance.

The swift is remarkable for its early rising and retiring late to rest, and may be seen for a considerable time in the evening after all the other *Hirúndines* have retired, and even seeming to dispute the acquisition of flies, &c., with the bats, whose flapping movements are strangely contrasted with the swift's rapid and silent evolutions; for at these times it is

quite silent, being eager and intent upon securing its prey, as it passes and repasses with the utmost velocity, and at the same time flying much lower than it is wont at midday to do.

I have great pleasure in forwarding you specimens of the nests. No. 1. taken on May 22.; No. 2. on June 27.; which will speak for themselves. — *J. D. Salmon.*

[Both nests are neat ones. No. 1. seems as if it has been much used: the feathers about its interior surface are not numerous, and have a trodden battered appearance: it is remarkable that a twig, the thickness of the tine of an eating-fork, as tough as wire, passes at the bottom of this nest across its longer axis. No. 2. is a nest much thicker in its walls, which are interiorly coated with many feathers, several of which retain their expanded form. The viscous matter, by which the materials are cemented together, is obvious in each of the nests. We have given them both to Mr. E. Blyth.]

[I have not seen a swift since July 25. and they appear to have left this village even some time before that: I think we see fewer and less of them every year. — *W. T. Bree. Allesley Rectory*, in a letter dated Aug. 7. 1834.]

A Pair of the Wryneck have suffered their Nest to be removed and replaced Five Times, and Four Layings of Eggs to be taken away, before they would quit the Place of attempted Incubation. — I was wishing, last spring, to obtain the eggs of the wryneck to place in my cabinet, and accordingly watched very closely a pair of this bird that had resorted to a garden in this village, for the purpose of incubation; I soon ascertained that they had selected a hole in an old decayed apple tree for that purpose, the entrance to which was so small, as not to admit my hand. The tree being hollow and decayed at the bottom near the ground, I was enabled to reach the nest by putting my arm upwards; and I found, on withdrawing the nest, that the underneath part of it was composed of moss, hair, &c., having every appearance of an old one of the redstart's of the preceding summer; which, I suspect, was the case: the upper part was made of dried roots. The nest did not contain any eggs, and I returned it by stuffing it up in the inside of the tree. On passing by the same tree, about a week afterwards, my attention was arrested by observing one of the birds leaving the hole, upon which I gently withdrew the nest, and was much gratified at finding it contained five most beautiful glossy eggs, the shells of which were perfectly white, and so transparent that the yolks shone through, giving them a delicate pink colour, but which is lost in the blowing. [This is the case with the egg of the kingfisher.] I replaced the nest, and visited it during the ensuing week, and was induced, out

of curiosity, to examine it again, when, to my astonishment, I found the bird had not deserted the hole, she having laid six eggs since: I took these away, and was obliged to keep them, as I was only able to replace the nest by thrusting it up in the inside of the tree as before, which I did. I again visited the spot in the following week, and found that they had still pertinaciously adhered to their domicile, having farther laid four more eggs. I repeated the experiment, but, not having an opportunity of visiting the tree until ten days afterwards, I thought at the time that the nest was abandoned, and was not undeceived until I had again withdrawn the nest, having taken the precaution of endeavouring to frighten the old bird off, should she be on the nest, which I found was the case, she suffering me to pull the nest to the bottom of the tree, before she attempted to escape: there were seven eggs, which were slightly sat upon. What appears to me extraordinary is, that the bird should suffer her nest to be disturbed *five times*, and the eggs (amounting altogether to twenty-two) to be taken away at four different periods within the month, before she finally abandoned the spot she had selected. After this the pair quitted the garden, seeking, I presume, and, I trust, finding, some more fortunate spot in which to rear their young. — *J. D. Salmon. Stoke Ferry, Norfolk, December* 28. 1833.

[This is the case referred to in p. 338. Mr. Blyth has given, in the *Field Naturalist's Magazine* for January, 1834, ii. 50, 51., various facts on the habits of the wryneck. According to his experience, "it forms no nest, but lays its eggs on the soft sawdust-like chips at the bottom of the hole."]

The Habits of the Wheatear (*Motacilla Œnánthe.*)—"One most probable reason for the solitary habits of the wheatear is the nature of its food; for, living, as it seems to do, on the few insects which frequent such places as the little heaps of stones collected from the ridges of a corn field, it would be impossible for more than a pair of these birds to find subsistence near one spot. The gregarious habits, again, of other birds which feed on insects, depend on similar habits in the peculiar insects to which they are partial." The observation here given, I have found quoted from "*Time's Telescope*" for 1832; of which year the natural history is ascribed [V. 186.] to Professor Rennie; and it affords a proof of the necessity of more extended enquiries, before we can venture to speak with certainty of the natural habits of even the common birds of our own country. The only specimens of this bird that are ever found in corn fields, in Cornwall, are such as are not our own residents, but which are engaged in travelling, with all haste, to their summer homes. The time of this their spring

migration is, therefore, confined to the month of March; after which they are seen only on the slopes of our hills fronting the sea, which, being only sheepwalks, afford abundance of wild thyme, and other plants that are supposed to attract the insects on which the wheatear feeds. The only other situation in which, I believe, I have seen a resident wheatear, is on the wild downs close to Dozmerry Pool, in the middle of the county of Cornwall. The periods of this bird's first arrival are here given:—March 17. 1817; March 18. 1816 and 1822; March 20. 1818. My subsequent notes showed so little variation in the periods, that I have since ceased to mark them. The wheatear reaches our shores so early in the morning as to prove that it must have taken flight from the French coast long before daybreak. Few come after nine o'clock in the morning, and none after twelve. They sometimes perch on our fishing-boats, at two or three leagues from land, in an almost exhausted state. They do not cross the Channel every day; and, as it usually happens that our own residents are not the first to arrive, it is common for them to abound in a morning; but in the afternoon, and for a day or two after, for not one to be seen. My own observations do not confirm the remark, that one sex materially precedes the other; they rather appear to arrive indiscriminately. Through the summer, the wheatear is a common bird along our coasts, on the slopes fronting the sea, somewhat above the bare uncovered rocks. On the least alarm they flit over the precipice, and take refuge in some place of shelter. The nest is not often seen; but our prying fisher-boys inform me that it is concealed in the bottom of a deep recess, beneath some huge stone or rock, far beyond the reach of their arms. Consequently when discovered, a circumstance of some difficulty, they are able to obtain it only by means of a hook fastened to the end of a rod. This bird has a slight, but not unpleasing, song. It is vulgarly known by the name of nacker.—*J. Couch. Polperro, Cornwall.* [*Received June* 11. 1834.]

[For the provincial name of the wheatear in the Orkneys, and for a notice of its building, and of its eggs, as observed there, see V. 424.: for a notice of the conditions of the wheatear's migration in Donegal, Ireland, see V. 582, note *.]

Spiders. — *A Spider infested with Insects.*—I found, last year, in a hotbed, a spider so completely covered with individuals of a dark brown coleopterous [?] insect, that scarcely any part of the spider was visible except its legs; so that it was with great difficulty the poor spider could move about. I have preserved the spider in spirits, with all its pests about it. — *L. E. Reed. Tiverton, March* 15. 1833.

INSECTS. — *The Death-watch.* — Sir, I enclose you a specimen of one, and beg to preface the circumstances I observed respecting it by two short extracts on the systematic names for the species of death-watch.

" Authors formerly were not agreed concerning the insect called the death-watch; some attributing it to a kind of woodlouse, others to a spider. But it is a received opinion now, adopted upon satisfactory evidence, that it is produced by some little beetles, belonging to the timber-boring genus, Anòbium *Fabricius.*" (*Kirby and Spence*, Letter 24.)

" One of the insects which produce the ticking termed the death-watch, is a woodlouse (*Tér*mes pulsatòrius *Lin.*, A'tropos lignàrius *Leach*). It is not so large as the common louse, but whiter and more slender, having a red mouth and yellow eyes. It lives in old books, the paper on walls, collections of insects, and dried plants. . . . . The ticking noise is made by the insect beating against the wood with its head. . . . . Another death-watch is a small beetle (Anòbium tessellàtum)." (*Insect Architecture*, p. 304.)

As naturalists are not yet agreed respecting the insect, or insects, popularly called the death-watch, I enclose you one, which, you will perceive, is a small brown beetle, three-tenths of an inch long, having its elytra, or two wing-covers, uniformly fluted or furrowed in the direction of their length. It appears to be the Anòbium striàtum of the Fabrician system, and one of those insects which bore their galleries, like pinholes, in old wood. Its history, as far as I am acquainted with it, is as follows: — On the 28th of July last [1831], at midnight, having entered my bedroom in this town, and laid down my watch, I heard a noise as of the ticking of another watch. The noise proceeded from within or under a half sheet of brown paper, in which mould candles had been wrapped. The paper lay loosely rolled up on the chimney piece. I placed my ear close to the paper while the insect was ticking, and although my watch was at the same time beating loudly at the distance of only two feet, I could not distinguish any kind of difference in the ticking of the insect from that of the watch. Occasionally, while the insect was ticking, its ticking would suddenly change into a louder, less acute, and less frequent sound than that of the watch. This latter sound, however, did not continue above twenty or thirty beats at a time, whereas the ticking in unison with the watch would continue without intermission for some minutes. With the exception of a few intervals (and those short ones), the little beetle continued its noise all the time the candle remained burning, which was about a quarter of an hour. As

I had never seen a death-watch, I was anxious to secure this; but, fearful that it might escape me by candlelight, I deferred my search until morning. The light being extinguished, I still heard the insect imitating and keeping time with the watch, the beating of which it probably mistook for the call of its mate. The next morning, after sunrise, I again heard my little visiter mimicking the sound of my watch, the voice proceeding from the same spot as before. I now slowly and carefully unrolled the paper, and lifted it from the chimney-piece, minutely examining every part of it; but I found nothing whatever therein. I then examined that part of the chimney-piece on which the paper had rested, and there I perceived the enclosed beetle lying on its side, apparently dead. The chimney-piece, which was painted white, was quite clean, and, having carefully examined it, I can state that nothing in the shape of a living creature except this insect, was on the chimney-piece; but whether it fell from the paper as I was carefully unrolling it, or whether it was before on the chimney-piece, I do not know. The wooden chimney-piece was not pierced by any insect. I have said that the beetle lay apparently dead. Those who are acquainted with this genus (Anòbium) of coleopterous insects are aware of the pertinacity or fortitude with which some of the species simulate death to deceive their enemies: and I might, no doubt, have torn this individual limb from limb, or roasted it alive, before it would have betrayed any sign of life. That the insect was not however actually dead, was afterwards evident from my finding it, during the same day, on the top of a paper box, at the bottom of which I had placed it for future examination.

That the enclosed insect produced the *two different kinds of ticking* which I heard, there can be therefore no question; but whether it produced those sounds by striking on the paper, or by striking on the chimney-piece, or by any other means, I am not prepared to say. Possibly the deeper, louder, and less frequent beating which I heard was produced by striking against the chimney-piece, while the other was produced by striking on the paper. In the *Philosophical Transactions*, No. 245. p. 376. and No. 271. p. 832. are descriptions of death-watches by Mr. Allen and Mr. Derham; but neither there, nor elsewhere, have I met with any account of a death-watch similar to that which I have now given. Yours, &c. — *R. Edmonds, jun. Redruth, Dec.* 31. 1831.

[Our correspondent's insect came to us in a crushed state; but still its length, and the longitudinal furrows of its wing-covers, were readily observable, and were as stated in his description. Mr. Westwood, to whom the specimen has

been submitted, has little doubt that the insect is Anòbium striàtum, or the nearly allied species A. nítidum of Herbst., (*Steph. Ill.* M. iii. 340.) Of the Anòbium tessellàtum *Fabr.*, and *T*érmes pulsàtorius *Lin.*, both alluded to above, a fuller, and of the *T*érmes a very interesting, account, will be found in our II. 461. Mr. Westwood, besides communicating the name of our correspondent's insect, has favoured us with the following remarks on death-watches generally.]

As to the identity of the death-watch, it is to be observed, that more than one insect is thus designated: the name, in fact, being a generic rather than a specific one; any unusual ticking being called *the* death-watch. The noise, however, made by the A'tropos lignàrius is not near so loud as that of the Anòbium. One species of this genus, A. striàtum, bores into the painted wooden chimney-board of my study. The perfect insects appear, in the hottest part of the summer, flying about the room in search of their mates; but for many weeks previous to the appearance of the beetles, I hear the ticking in the interior of the chimney-board; and as it is most probable that these insects lie but a very short time in the pupa state, I cannot help thinking that this noise is caused by the larva in gnawing the wood with its powerful jaws. The females, after impregnation, must deposit their eggs either by boring into the wood with their ovipositor, or they probably creep into some of the old holes made on their exclusion, and so get into the wood without any trouble.

P. S. A confirmation of my supposition occurs whilst I am writing (Oct. 13.), as I hear the ticking in the chimney-board precisely similar to what I heard some months ago, although it is some weeks since I saw a beetle; so that, as there has been sufficient time for the eggs deposited by the females to be hatched, and for the grubs to acquire a moderate size, I have little hesitation in laying it to the latter. — *J. O. Westwood. The Grove, Hammersmith.*

Addenda to my former Note about the Ticking of Anòbium.— In corroboration of my opinion that the ticking of the death-watch is occasionally caused by the gnawing of the wood *by the larvæ*, I may mention that I have continued to hear the noise in the wood of my chimney-board up to the middle of November. I find, moreover, that the celebrated French entomologist, Olivier (in opposition to Geoffroy, who supposed the noise was caused by the perfect beetle knocking a dwelling-place for itself in the wood with its jaws), conjectured that the larvæ were the cause of the noise: he, however, thought it was produced by the blows of the larvæ in the interior of the wood for the purpose of ascertaining the thick-

ness of the barrier through which the insect, when arrived at the perfect state, would have to make its way; its jaws, in that state, not being so strong as in the larva state. — *Id. Dec.* 7. 1832.

Feb. 21. 1833. I have, within a few days, again heard the ticking of the Anòbia in my chimney-board. — *Id.*

March 12. I have heard the ticking repeated in my chimney-board both during February and the present month: it is, however, only at distant intervals that I hear the noise. Your correspondent, R. Edmonds, jun., has shown that the statements of Swammerdam, Derham, Latreille, &c., that the perfect Anòbium ticks, are correct, whilst my own observations, strengthened by those of Olivier (which I have mentioned in my note of Dec. 7.), as well as by Swift's lines, —

——— " A wood *worm*
That lies in old wood," ——
" If the *maggot* cries click when it scratches the post,"

seem to establish that the larva is the cause of at least some of these portentous sounds.

I may add, as bearing upon the question, that I have, at the present time a larva of Anòbium tessellàtum, which I have been endeavouring to rear for the last three years. — *Id.*

March 14. My friend, Alexander Greisbach, Esq., informs me that he distinctly saw the large Anòbium tessellàtum, whilst standing upon an old rotten oak tree in Windsor Forest, throw back its head and the front part of its body, resting at the time upon the hind pair of legs, and then suddenly jerk its head upon the surface of the wood upon which it was standing, and produce a sharp sound. [See also Vol. II. p. 461.]

May 22. The insect in my chimney-board has kept up his noise without any change of place, during the last and present months, together with another in my window frame; and, since the hot weather set in, the noise has been much more continuous, as though the larva had arrived at a larger and stronger size: even whilst I write this, the noise is going on, and I cannot compare it to anything more apt than the sound caused by scratching the lid of a small chip box with the point of a pen. I have not yet seen a perfect Anòbium. — *Id.*

Nov. 18. The ticking in my fireboard has been continued in precisely the same spot through the whole of the summer and autumn, and long after the perfect Anòbia had made their appearance. This the more confirms my idea of this noise being caused by the larva, which remains several years in that state. Had it been caused by the imago, it would not have been heard at the same spot for so many months. Whilst writing this, the noise is continued in the same spot. — *Id.*

The ticking in my chimney-board is still continued in the old place. — *Id. Feb.* 20. 1834.

These mentions of Anòbium striàtum have led me to remember the fact of the insect's prevailing in the woodwork of my father's cottage, and to request from him specimens of the insect, and a description of any facts on its habits with which he might be acquainted. He has replied as follows: — "*Nov.* 9. 1832. Notwithstanding the terrible havoc made in the deal boards of the chamber floor and partitioning of my back room by the insect, I have had to search a long time to find for you, at this season, a single specimen in the winged state. I have found one, dead, and send it to you, along with many live larvæ, packed in the dust from the old wood, which I have sawed and broken up to procure them. They are destructive vermin; and, although small, will, by their aggregate exertion, shortly destroy the timber of any building, when the wood has become in a proper state for them to prey upon. Frequent washing and scouring of the floors, particularly at the time the insects are about to deposit their eggs; and painting or limewashing the partitions, doors, beams, and other objects of their attack, not readily scourable, appear to me to be the best preventives. Besides deal, they attack the wood of ash or elm; and my neighbour, Mr. Cooper, the wheelwright, says no kind of wood comes amiss to them.

"I have visited Mr. Cooper's timber yard, to endeavour to obtain you specimens thence also; and he has gouged out of a piece of wood of white deal one specimen, which you will find sticking dead, with its head outwards, though not projecting, in the mouth of the hole it had drilled."

I have submitted the two specimens mentioned to Mr. Westwood, who has confirmed my application of the name Anòbium striàtum to that from my father's cottage, and determined that taken from the wood of white deal, in Mr. Cooper's timber yard, to be the Ptilìnus pectinicórnis of Fabricius. The circumstance of this insect not being distinguished from the Anòbium striàtum, by my father or Mr. Cooper, gives ground for this question: may not the imputation above, on Anòbium striàtum, that, "besides deal, it attacks the wood of ash, elm, and no kind of wood comes amiss to it," belong in part to other insects of the *P*tínidæ family? It is probable that to some one species of this same family the following allegation, by the poet Cowper, is referable. In the first book of *The Task*, in the historical deduction of seats, it is said: —

> "And such [a stool] in ancient halls and mansions drear
> May still be seen, but perforated sore,
> And drilled in holes, the *solid oak* is found,
> By *worms voracious* eating through and through."

On April 16. 1833, I happened to be at my father's, and the above-mentioned Mr. Cooper was then removing a beechen bedstead from the vicar's house, which he, Mr. Cooper, had, not more than two or three (but I am pretty sure he said two) years before made and put up. It was, on April 16. 1833, a mere mass of powder, pierced through and through, with countless larvæ in various places, although in others less so; a difference which Mr. Cooper attributed to the wood having been taken from trees various in age, or from the centre and circumference of the same tree, &c.: however, the parts least attacked were somewhat so, and other parts so completely destroyed, that the whole bedstead was fit only for the fire. In passing my door he broke off, and gave me, a small cubical block, almost a lump of powder, and this I, after my return, sent to Mr. Westwood, who, as soon as the insect had become winged and had come forth, sent it back to me, with Ptilìnus pectinicórnis as the name for the insect. The aptness of its specific name was evident enough on May 25., when, the weather warm, some were flying about in apparent high joy, with the lamellæ of their antennæ as obvious as the teeth of a comb. This fact shows that beech is one of the kinds of wood ravaged (or eaten, as the Ptilìnus itself would doubtless term it) in addition to the white deal, in which it had been previously, as stated above, found in Mr. Cooper's timber-yard.

My own first acquaintance with the habits of the *P*tínidæ began thus: — Some six or eight years ago, some tallies, that had been employed to bear the names of plants in a garden, were cut over to remove decayed parts, and fit them again to receive paint, and inscription, that they might be a second time employed. These tallies had been made out of old coach spokes, and one of them, the wood of which, I remember, was oak, (whatever that of coach spokes generally may be), had tracks eaten in it by larvæ, some of which were then in it: this was saved, at some time in the winter, and observed until the perfect insects had come forth, which they did some time in the summer following. I ascertained their name at the time, which, I think, was Anòbium striàtum. — *J. D.*

Remarks on the Clouded-yellow Butterfly (*Còlias Edùsa*); *and on other Lepidopterous Insects noticed in the Isle of Jersey.* — Happening lately to hear the observation made, that, "in all probability, the pale varieties (C. Hélice Hübner?) of Còlias Edùsa will yet prove to be a distinct species," I am induced to offer a few remarks which I made on this insect in the Island of Jersey, where in particular situations, especially over the fields of lucern (Medicàgo satìva) by the sea side, I found it exceedingly abundant.

It is a remarkable fact that all these pale varieties are

females. Of many hundreds of males, which I have seen in the course of a single day's ramble, I have never observed one variety of this sex, though I made it a point to capture every pale specimen which I saw. Where this insect flies in great abundance, the females are seldom seen, but where it is comparatively rare, the latter may as frequently be noticed on the wing as the males; precisely as in the common *P.* cardámines: I have seen the woods quite alive with the male orange-tipped white butterflies, when I have not observed above two or three females in the course of the day; yet, where this species is not very abundant, both males and females may be seen flying about in nearly equal numbers; which fact will, indeed, reconcile some rather conflicting descriptions of this latter insect. In Jersey, the number of pale females of Còlia*s* Edùs*a* bore the proportion, to those of the usual colour, of at least one third; but, though the males were so very plentiful, female specimens were difficult to procure, as they sluggishly concealed themselves in the lucern: I was never able to take above half a dozen in a day, though of males I might have captured some hundreds. Yet, in September, 1833, the two sexes were observed in this neighbourhood [Tooting, Surrey], flying in about equal numbers; but the species was, here, far from being common.

I took, on the whole, about twenty individuals of the pale variety of Còlia*s* Edùs*a*, and observed in them considerable variation; some being whiter than others, and some having the spot on the upper surface of the hinder wings white, others having it yellowish, and others orange: they also varied much in size, but not more than individuals of the usual colour do.

It will not, perhaps, be uninteresting to name here a few other species which I observed in that island, during a stay of three months, in August, September, and October, 1833. I saw there no sort of butterfly that was not common in Britain. The other European species of Còlia*s* I sought for much, but in vain.

Hippárchi*a* Ægèri*a* swarmed in unusual abundance, far beyond what I had ever seen in England; the numerous shady lanes there being peculiarly adapted to its habits. H. Megæ`r*a* was also extremely plentiful; it was unusually common in the vicinity of London that season. H. piloséllæ and Pámphilus were there as abundant as here; as were the different autumnal Póntiæ. Lycæ`n*a* Phlæ`a*s* was very plentiful, also Polyómmatus Aléxis; this last mostly retiring to roost in small clusters, chiefly on the sea holly (*Er*ýngium marítimum), or on rushes; a habit which may be observed in several of our

British Polyómmati, and which furnishes the best mode of procuring unrubbed specimens of them, where they occur in sufficient abundance. I noticed P. Argìolus, which was rare, but no other member of this genus. Cýnthia cárdui was rather common; Vanéssa urtìcæ exceedingly so; V. Ĭo somewhat rare; V. Atalánta very abundant; and I witnessed there a very large concourse of this last-mentioned butterfly, and of common wasps (*Vé*spa vulgàris), upon the trunk of a diseased pollard oak, from which exuded a saccharine juice. A similar occurrence has been noticed by Mr. Lukis of the neighbouring island of Guernsey. (VI. 222. [see also VII. 265.]) In the instance now mentioned, one side of the tree was completely covered with alderman butterflies; these are always readily attracted by any thing sweet.

I heard several times there of a large and very showy blue butterfly, which I have not since been able to make out. It decidedly was not the emperor (Apatùra Ĭris): although it was about when I was in the island, I did not once succeed in getting a sight of it.

A very common insect there is the humming-bird hawk-moth (Macroglóssa stellatàrum), one of the most interesting of our native Lepidóptera. I have seen as many as seven or eight of them together, hovering around the flowers of a honeysuckle, whisking from bloom to bloom with the rapidity of thought, suspending themselves in the air around each blossom, and inserting into the tubes their long proboscides, then quick as lightning darting out of sight; though sombre in their hues, reminding us of the fairy tenants of the western world. One that I reared from the caterpillar came out in the short space of four weeks. I observed a favourite resting-place of this species to be immediately under a small projection, over the sea beach, formed by the action of high tides against a crumbling sandy soil, the matted roots of the turf holding together, while the ground beneath had been washed away. In this situation I have seen within a very short space four or five of the M. stellatàrum, which would readily suffer themselves to be transfixed, and this in midday, when others were flying about in abundance. To this place I have often seen them fly direct, and, after hovering a little, alight to rest themselves.

It would here take too much space to note down the various moths, &c., which I observed. I found the larva of the Sphínx A´tropos, but I failed in the endeavour to rear it. The angle shades moth (Phlogóphora) was uncommonly plentiful, as was also the common Plùsia gámma, the latter flying chiefly by day, a feeble miniature of the Macroglóssa stellatàrum. — *Edward Blyth. Tooting, Surrey, May* 22. 1834.

REVIEWS.

ART. I. *Catalogue of Works on Natural History, lately published, with some Notice of those considered the most interesting to British Naturalists.*

BUSHNAN, J. S., F.L.S., &c.: An Introduction to the Study of Nature; illustrative of the Attributes of the Almighty, as displayed in the Creation. 8vo, 310 pages. London, 1834. 9*s.* in boards.

A work of dignified purpose, as is shown in its title; and this the author has striven to execute in what he has conceived to be a consistent manner, namely, a vigorous and lofty one. We honour his purpose; we applaud his efforts, that is, his facts, his arguments, his illustrations, his eloquence in many places, adduced in the elucidation, relevance, and production of this purpose; but we do not quite agree with him in the manner in which many of these are presented, nor in all the conclusions to which he has directed them. In the former there is not enough, to our liking, of the *suaviter in modo;* in the latter, quite enough of the *fortiter in re;* the *re*, in this case, we employ to signify the author's *foregone* conclusions.

The work should, however, be possessed by every naturalist: it includes a very rich collection of scientific facts; many instructive ones derived from comparative anatomy.

Hawkins, T., F.G.S.: Memoirs of Ichthyosauri and Plesiosauri, extinct Monsters of the ancient Earth; with 28 Plates, copied from Specimens in the Author's Collection of Fossil Organic Remains. One volume, folio. London, 1834. 2*l.* 10*s.*

The extraordinary remains of enormous animals, nearly allied to the lizard and crocodile, that occur in the secondary strata of England, above the coal measures, may be regarded as the peculiar treasures of English fossil geology; as these remains occur more abundantly, and in better preservation, in England than in any other country hitherto examined. It was in this country, also, that the true character of the animals to which these fossil remains belong was first ascertained. The beds of dark stratified limestone intermixed with strata of dark clay, called lias limestone and clay, which extend into

many of the midland counties, from Dorsetshire to Yorkshire, are peculiarly rich in these fossil remains; in some parts the animals appear to have perished by a sudden catastrophe, which has broken the bones into numberless fragments, and scattered them through particular strata, as in the cliffs at Aust Passage, near Bristol; in other situations, the remains of nearly entire skeletons have been found, which are evidently near the situations in which the animals expired. The bones are commonly so closely embedded in the stone, that the difficulty of preserving them entire is often very great, added to which, the quarrymen frequently destroy large portions of the skeleton, before they are aware of its occurrence: the vast size of some of these animals is such, "extending many a fathom," that the head may be found in one part of the quarry, while the remote extremities may be buried in another part which may not be wanted for some years to come. Owing to these difficulties it is, that good specimens of entire skeletons or even of large portions of them, are so rare in collections at present. Mr. Hawkins, the author of this work, has for some years distinguished himself as a "mighty hunter," a fossil Nimrod. Unlike, however, to the heroes and hunters of the fabulous ages, whose labours were directed to the destruction of monsters, our modern Nimrod is engaged in restoring their dislocated limbs, and joining heads to their cervical vertebræ again, after having lain dissevered for countless ages. The present volume contains an ample account of the difficulties which Mr. Hawkins has had to encounter among the quarries and quarrymen in the county of Somerset, near Wells and Glastonbury, where his discoveries have been chiefly made. Many persons may deem the conversations with the quarrymen, given in the Somersetshire dialect, more amusing than instructive, and altogether misplaced in a work on science. The author himself confesses that he has, for his own pleasure, departed occasionally from the conventional forms of writing, but we would willingly pardon him on this head, for the very valuable service which he has rendered to the student of fossil geology.

The lithographic plates in the present volume are of large size, and well executed, and display with much clearness the osteology of the several species of fossil Ichthyosaúri and Plesiosaúri in the author's possession; indeed, they convey almost as distinct information as we could obtain from the specimens themselves. The anatomical details given in the description of the plates are good as far as they extend, but we could have wished them to have been more ample. The drawing in plate 3. represents an entire skeleton of the Ichthyo-

saúrus (called by the author chiroligóstinus), except the right fore arm and paddle; the figure measures in the plate 3 ft. 3 in. from the snout to the extremity of the tail: there are in this skeleton about 500 bones, and the spinal column contains 150 vertebræ. Plates 7. and 17. contain figures of skeletons of two other species, nearly as perfect as that in plate 3., but of smaller dimensions. Plate 24. represents a very interesting skeleton of the Plesiosaúrus, entire except one of the paddles: in this skeleton the bones of the sternum and pelvis are beautifully displayed; there are thirty-two cervical vertebræ, and twenty dorsal; the neck of this animal was longer than the whole body, except the tail; the caudal vertebræ amount to thirty-three. Several of the other plates represent large portions of skeletons. The remaining plates display detached bones and heads, with the paddles or hands of these animals. The head represented in plate 13. is truly remarkable for the extreme length of the jaws; it resembles, as the author observes, the head and bill of a snipe. "It possesses 260 long sharp teeth, 140 in the upper jaw, and 120 in the lower jaw."

The author has given a new classification of the species of both the Ichthyosaúri and Plesiosaúri, but we cannot think that he has been happy in his nomenclature, though derived from the Greek; it would scarcely be possible to select terms that are less suited to the English ear. The classification of Ichthyosaúri, which he proposes, is founded on the structure of the hand or paddle. From the Greek *cheir*, hand, and *osteon*, bone, with the addition of the Greek words for, 1. few, 2. many, 3. round, 4. oblong; we have the following names for the four species:—Sp. 1. Ichthyosaúrus chiroligóstinus; 2. chiropolyóstinus; 3. chirostrongulóstinus; 4. chiroparamekóstinus!!!!

The specific characters of the Plesiosaúri, he says, are to be discovered "in the posterior extremity, in the tarsus." Then, from the Greek *tarsos*, heel, and *osteon*, bone, with the Greek numerals for 3, 4, 5, 6, we have the following strange names:—Sp. 1. Plesiosaúrus triatarsóstinus; 2. tesseratarsóstinus; 3. pentetarsóstinus; 4. extarsóstinus.

We could almost suppose that our author intended, by the invention of these terms, to ridicule the absurd fabrication of compound Greek words, such as "pliocene," "pecillite," &c. &c., which have lately been introduced by some geologists; for he cannot expect that the names he has constructed will ever be used by his countrymen. We sincerely hope that good sense will ere long free geology from all such pedantic contamination. In the mean time, we recommend our author

to confine his terms to the exclusive use of the Somersetshire quarrymen, as we have little doubt the pronunciation of them would become more mellifluous by an admixture with the euphonic tones of the western dialect.

Whatever may be the minor faults of the present volume, the plates alone, with the descriptions of them, possess such value as to entitle it to a place in every public library and institution where science is respected; and we are fully persuaded that a correct translation of the anatomical details, in the French language, published with the plates, would be favourably received on the Continent.—*B.*

Hastings, C., M.D.: Illustrations of the Natural History of Worcestershire, with Information on the Statistics, Zoology, and Geology of the County, including also a short Account of its Mineral Waters. 8vo, upwards of 200 pages, with a geological map of Worcestershire. London and Worcester, 1834. 4*s.* 6*d.*

This tells enough of the natural history, and of the Natural History Society, of Worcestershire, to be a book to be desired by those who would acquaint themselves with either.

Anon.: The Analyst, and Monthly Journal of Science, Literature, and the Fine Arts. August, No. I. 8vo, 76 pages, with cuts. London, 1834. 1*s.* 6*d.*

In the general scope purposed to be embraced by the producers of this Review, natural history will not be overlooked; as is evident from the first number, in which Mr. Lees's *Affinity of Plants with Man and Animals*, and some other works on natural history, are noticed. It contains, too, interesting information on the aurora.

Innes, H.: A New Edition of Goldsmith's Natural History, with Notes from all the Popular Treatises that have been issued since the Time of Goldsmith; collected with the utmost care. In monthly parts (and weekly numbers), 8vo; each of 48 pages, with some woodcuts. Limbird, London.

We have seen parts i. and ii. The notes are entertaining and instructive; and the work is cheap.

ART. II. *Literary Notices.*

A HISTORY of British Fishes, by William Yarrell, F.L.S., is in preparation. It is to be illustrated by woodcuts of all the species, and numerous vignettes, subservient to the general subject; representing teeth, gill-covers, swimming-bladders,

and other viscera, occasionally, when interesting in structure, form, or function. The different boats, nets, or other apparatus in use on the coast, will be figured, and the modes of employing them described. The work will form two volumes octavo, uniform in size with Bewick's *British Birds.* We have seen a series of impressions of the cuts executed for this work, and can bear testimony to their accuracy and beauty.

The Third Report of the British Association for the Advancement of Science is published. It contains a Report on physiological botany, by Dr. Lindley; and other communications, of interest to naturalists.

No. viii. of the *Entomological Magazine* sustains the reputation of this most valuable work; which, we trust, will ever henceforth be felt by naturalists to be an indispensable one.

A Grammar of Entomology: being a compendious introduction to the economy, anatomy, classification, and preservation of insects, by E. Newman, F.L.S., is announced. "As it is the author's object to render this work generally useful, it will be published at a very low price; and no Latin or technical terms will be used without explanation." (*Ent. Mag.*)

An Essay on the Indigenous Fossorial Hymenoptera, comprising a description of all the British species of sand wasps extant in the metropolitan cabinets, by W. E. Shuckard, has been announced for publication.

Part iii. of Royle's *Illustrations of the Botany and other Branches of the Natural History of the Himalayan Mountains, and of the Flora of Cashmere,* is published. It is as interesting as the preceding ones. In a continuation of the "Introduction," information is given on the relative heights of the Himalayan Mountains, as compared with each other and the known heights of those in other countries. A treatise on the Indian species of Gossýpium, or cotton, is given in the text, descriptive of the plants; and, in the plates, there are, besides the figures of plants, one plate of "fossil plants from the Burdwan coal formation," and a plate exhibiting figures of Cérvus *Dòdur* and *C. Rútwa* Hodgson; two pretty animals.

A Prodromus of a Flora of the Peninsula of India is in preparation by Dr. Wight and Mr. Arnott. The work is to be written "in the English language, and will be completed in two volumes. The first, comprising from *R*anunculàceæ to the end of *R*ubiàceæ, will be ready in a few weeks."

Part iii. of Hooker's *Journal of Botany,* which has reached us since the publication of our last, is rich in contents of high interest to every technical botanist.

THE MAGAZINE

OF

NATURAL HISTORY.

OCTOBER, 1834.

ORIGINAL COMMUNICATIONS.

ART. I. *Thoughts on the Question, Why cannot Animals speak the Language of Man?* By J. J.

A QUERY to this purport is given in I. 299., and I have not observed a reply to it in any subsequent volume. In order to state the several points of the question fully and explicitly, it may be proper to repeat the words of the querist. "Why," he observes, "beasts do not speak the language of man, is not the question I would propose; but why (as is evident) they cannot? Whether it is owing, to use a musical phrase, to their want of ear; whether, to use a philosophical one, it results from their want of understanding; or whether, as I am apt to think, it arises from the want of a proper conformation of the organs most necessary in speaking?"

It appears to me, from the mode in which this interrogatory is expressed, that the writer is of the class of thinkers who deny to all animals the possession of attributes, or faculties, with which many of them are unquestionably endowed. It might be easily proved that the higher orders of the animal kingdom possess, and some of them in an eminent degree, faculties which they are here said to "want." "Want of ear" is an expression vague and obscure enough when applied to animals; but if it mean, as I presume it does, the want of a capability of distinguishing variations, or differences of sound, it is manifestly false in its application to animals. Were all animals unable to distinguish the difference between one sound and another, how could they ever be taught to comprehend the meanings of various articulate sounds? to understand, partially, the language of man? How could they be subjected to the purposes of domestication? and of what use, indeed, would their ears be to them? How could a dog know his

name, and be taught to go or come at the command of his master? a horse to proceed forwards or turn backwards, to turn to the right or left, at a single word of his driver?

"Want of understanding" must mean want of reason. It has been asserted, and repeated, thousands of times, that reason is the exclusive prerogative of man; that man is the only rational creature. But how has this ever been proved? Assuredly not by facts. I have no inclination to discuss the question, which has already been treated on at great length, and with much candour and ability, in Griffiths's edition of *Cuvier's Animal Kingdom*, iii. 360. et seq.; and I shall merely instance one quality, which, wheresoever it is found, whether in a man or a goose, appears to me to be undeniably demonstrative of the existence of the reasoning principle, and that is, the capability of receiving instruction, or of forming certain conclusions from previous experience. We recognise this quality, in a greater or less degree, throughout the higher orders of animals; and, view it as we will, we can conclude it to be the effect of nothing else than reason: and it is utterly inconsistent with the acknowledged properties of instinct. It is a combined result of memory and judgment; faculties which no one has ever said are not essentially rational, and which are principally effective in rendering the human intellect what it actually is. In short, we cannot deny to animals the possession of that mysterious something which we call mind; of a mind similar to ours in kind, although infinitely inferior to ours in degree.

But to leave this digression, and attempt a direct reply to the question at the head of this article. For this purpose, I cannot do better than quote the observations of Mr. Lawrence (in his *Lectures on Physiology, Zoology, and the Natural History of Man*) on the subject: — "Man," says he, "exhibits, by external signs, what passes within him; he communicates his sentiments by words: and this sign is universal. The savage and the civilised man have the same power of utterance: both speak, naturally, and are equally understood. It is not owing, as some have imagined, to any defect in their organs that animals are denied the faculty of speech. The tongue of a monkey is as perfect as that of a man; yet monkeys cannot speak. Several animals may be taught to pronounce words, and even to repeat sentences; which proves clearly that the want of speech is not owing to any defect in their organs. But to make them conceive the ideas which these words express is beyond the power of art: they articulate and repeat like an echo or machine. Language implies a train of thinking; and, for this reason, brute animals are

incapable of speech: for, though their external senses are not inferior to our own, and though we should allow some of them to possess a dawning of comparison, reflection, and judgment, it is certain that they are unable to form that association of ideas in which alone the essence of thought consists." (p. 199, 200.)

Gelly, Montgomeryshire, March 1. 1834.

ART. II. *Facts and Arguments in relation to the Two Questions, Are all Birds in the Habit of alluring Intruders from their Nest? and, Why do Birds sing?* By C. CONWAY, Esq.

ARE all Birds in the Habit of alluring Intruders from their Nests? — The lapwing will fly round and round, tumbling and tossing in the air, and at the same time making the country resound with the echoes of its endless pee-wit, and thus lead the intruder farther and farther from its nest; the grouse, if disturbed from her nest, will shuffle through the heath in a very awkward manner, and will not take wing until she has proceeded a considerable distance. [The partridge will do the same.] I once found a skylark do the same. Having been informed of the nest, in a corn field, I proceeded thither to see the eggs, but, finding the bird on the nest, and having my butterfly net in my hand, I easily captured her. When I took the bird into my hand, she feigned death, and allowed herself to be handled for a considerable time, and that rather roughly, and when I threw her from me, in the expectation that she would take wing, she fell to the ground like a stone, and there she lay for me to push her about with my foot, until I at last thought that I had injured her in the capture, and that she was absolutely dead. Remaining quiet, however, for a very short period, the bird began moving, and, with one wing trailing along the ground, and shuffling along as if one of her legs had been broken, she proceeded for a considerable distance, and then took wing. Is there not here an evident distinction shown between instinct and reason? Instinct taught the bird to lure all intruders from her nest, but she could not reason that, as I had already discovered her nest and captured her upon it, the lure was, in this instance, useless. But, the circumstance that led to these remarks is the following. In pursuing an azure blue butterfly, I was diverted from my object by the melodies of a nightingale almost close at my side. The singing was in one continuous, incessant, and uninterrupted melody; there were none of

those frequent breaks, which are so characteristic of the song of the nightingale, when heard at a little distance; it was one incessant warble. I can hardly call it a warble either; it was an unceasing effort; so much so, that I stood perfectly astonished, and at a loss to conceive how it was possible for so small a creature to exert herself so mightily. I began, however, to think, that the nest of the melodist could not be far off; and, as I had never yet seen the nest of the bird, I determined to watch her closely, in order to discover it. But, I was nearly giving up the search as useless; for, as soon as I entered the copse, no matter at what part I made my entrance, there was the nightingale close at my side, delighting me with her melody, and hopping from spray to spray, and from bush to bush, and thus leading me the round of the wood at her pleasure. When, however, all hope of finding the nest had nearly vanished, I fell in with it by pure accident, and I then discovered that the singing of the bird had always led me in a direction from the nest. The question with which I began, I would therefore again repeat—Are all birds in the habit of luring intruders from their nests?

Why do Birds sing? — As I have just been speaking of the nightingale, perhaps it is the most appropriate place for offering a few remarks upon the song of birds: a subject, by the way, of some difficulty. The question, Why do birds sing? has never yet been, I think, satisfactorily answered. It was supposed that the male sang to soothe the female during incubation. (Pennant, quoted in Rennie's *Montagu.*) There was plausibility in this; but then the question would immediately arise, Why are some birds denied song? Do the females of some birds require soothing more than others? Besides, birds sit during the night as well as the day, yet no bird but the nightingale sings during the night. The skylark frequently mounts so high that we not only lose sight of him, but we also lose all trace of his song: can the female *then* hear him and be soothed by his notes? Barrington (quoted in Rennie's *Montagu*) supposed the female to be silent, "lest her song should discover her nest." A singular conclusion, certainly, at the same time that it was supposed that the male sang to soothe the female during the period of incubation. If the song were poured forth for this soothing purpose, it must of course have been in the near neighbourhood of the nest, and consequently would be as likely to discover the nest as if the female herself sang; besides, do not the females of some birds sing occasionally, as well as the males? Now comes another theory. "The males of song birds do not, in general, search for the females, but, on the contrary, their business in the

spring is to perch upon some conspicuous spot, breathing out their full and natural notes, which, by instinct, the female knows, and repairs to the spot to choose her mate." (*Montagu.*) The female amongst birds has evidently the advantage over the human species, for she is the chooser, and not the object of choice. The same author tells us, that "birds cannot discriminate the colours by which their species is known;" and this is evidently put forth to account for the male "perching upon some conspicuous spot." But what say others? The nightingale sings "concealed in the thickest part of a bush or small tree." (*Field Nat. Mag.*, i. 201.) Both statements are fact. The nightingale does sing in the concealment of a thick bush, and the song thrush sings, morning and evening, mounted on the highest spray he can find. I cannot suppose that he does this to lure the female to him, for I have never observed it to have that effect; besides, he does it for a very considerable portion of spring and summer; certainly after he is mated. Neither can I suppose that his song is poured forth for the purpose of soothing the female during the period of incubation; for, if that were the case, the soothing would be required as much by night as by day, and as much in the middle of the day as in the morning and the evening: besides all this, he frequently sings at Christmas, when he is neither mated nor seeking a mate. Let us come, however, to a still later opinion. "The songs of birds have given rise to several curious enquiries of no small interest. After investigating the subject with considerable attention for several years, we have come to the conclusion that the notes of birds, which we denominate singing, may all be referred to hilarity and joy, or to rivalry and defiance." (Rennie's *Habits of Birds*, 260.) In making this theory hold good, I think we shall find as many difficulties as in any other. Why is the nightingale more joyous than other birds during the night? Is the redbreast habitually more joyous than other birds? for he sings nearly the whole year round. If it be joy that stimulates to song, why do not the females sing as well as the males: have they no joy? And why are some birds altogether denied song: are they joyless? The thrush breaks forth into song frequently in the winter, and the woodlark makes the December mornings resound with his song. How is it that these birds are so joyous when all others are gloomy? The meadow pipit, again, 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. Is it any source of joy to the bird to be thus disturbed from her nest? This may be said to be "defiance."

To this I have only to reply, it is the usual and general note, and certainly a source of considerable pleasure to the rambler over our mountains, where they abound. But we must, I am fearful, conclude where we began: Why do birds sing?

Pontnewydd Works, near Newport,
Monmouthshire, Jan. 20. 1834.

ART. III. *A Notice of the Imitative Powers of the British Mocking-Bird, or Sedge Bird* (*Sylvia* [*Currùca*] *salicària*), *additional to that in* V. 653, 654. By T. G., of Clitheroe, Lancashire.

I AM surprised that not any other correspondent has noticed the wonderful imitative powers of this bird. So far is my notice in V. 653, 654. (in that notice, "pelting notes," in p. 653. line 8. from the bottom, is a misprint for "fretting notes") from overrating this bird's imitative powers, that I have not enumerated above half the notes which it hits off with such wonderful exactness.

In listening to one the other day for about a quarter of an hour, I heard it give three notes of the swallow, two of the martin, two of the spring wagtail; and, in addition, notes of the sparrow, whinchat, starling, chaffinch, whitethroat, greenfinch, little redpole, and whin linnet (*Fringilla Linòta*); besides the notes of half a dozen birds which I did not know; at least a reasoning from analogy would induce me to think them imitations, and I have no right to suppose that they were not, because I did not happen to recognise them. I was not strictly correct when I said (in V. 653.) that it only imitates the alarm notes (called here the fretting notes) of other birds; for, although this is generally the case, it is not invariably so. For instance, in addition to producing the alarm note of the swallow, *chiz-zee chiz-zee*, it also had the *whit whit* which the swallow uses when flying about, and the chatter of self-satisfaction (not the song) which one often hears in a barn when two swallows are arranging their plan of operations in the spring. Again, in addition to the shriek of the martin, there was the note which it utters when on the wing, in pursuit of its food. There was also the chirrup of the greenfinch, and the *whee whee whee* which is the climax of the linnet's song, by which it is so irresistible as a call bird, and which appears to bring down the flock, in fact, in spite of themselves.

Although the sedge bird imitated all I have mentioned, it made much more frequent use of the notes of some than of others: the sparrow, the whinchat, the swallow, and the star-

ling appeared to be its chief favourites; whilst it only touched once or twice on the notes of the greenfinch and the linnet. It had been very sparing, also, in its use of the chaffinch's note, until one in the neighbourhood had begun to *twink twink twink;* then the mocking-bird took it up, and *twinked* away for fifty times together. In the next morning the linnet's note was much more in request; and it also made more use of notes with which I was not acquainted. On neither day did it touch upon the notes of the redstart or pied wagtail, both of which I had heard frequently used by the mocking-bird before. On the other hand, I had not previously observed the notes of the starling and whin linnet, which this bird gave in perfection; and, therefore, though I have said, in my former communication (V. 653, 654.), that I had never heard it make use of the notes of any of the larks or thrushes, I would not be understood to say that this never happens. It is difficult to say, perhaps, that it has a note which is not an imitation; but there is one which it always makes use of when any person approaches the nest (intermixed, however, with the notes of the swallow, whinchat, and whitethroat): this is something like *chur-r-r chur-r-r*, prolonging the sound of the *r* very considerably, and in a style which would be quite an acquisition to the Northumbrians, if they could attain it.

May 29. 1834.

ART. IV. *A Notice of the Songs of the Bramble Finch, the Mountain Linnet, and the Tree Sparrow; with Remarks on each Species.* By Mr. EDWARD BLYTH.

I AM not aware that the songs of these birds have ever yet been described. Mr. Selby, in his account of the first, observes, that he is "unable to say whether its notes ever vary in the spring, or whether it possesses any proper song." I have repeatedly heard its song in confinement, and have one now in my possession which sings frequently. Its song consists only of a few coarse unmusical notes, generally delivered in an under tone; and not the least resembling the chaffinch's song, nor that of any other bird with which I am acquainted. I hardly know how to describe the song of the bramble finch: if a person were to fill his mouth half full of water, and draw it slowly backwards and forwards through his teeth, the sound produced would not be much unlike it, at least in part. It also utters a kind of *chuck*, analogous to the *twink* of the chaffinch; and sometimes a hoarse jay-like call to its companions.

The mountain linnet's song is chattering and inarticulate,

bearing a harsh resemblance to that of the linnet. Its notes are always hurried and indistinct; and are mostly delivered in successive bursts (if I may be allowed the term), sounding like several birds singing together, and reminding one of the firing of bells. I have never heard the sound *twite*, which it is alleged to utter; but its usual notes upon the furze much resemble those of the common linnet, being either a low *tsu-tsu-tsu*, or a loud *chit chit*. I may take this opportunity to mention, that, with the twite in confinement, the red on its rump entirely disappears on the first moult; as, from analogy with its congeners, might be anticipated.

The tree sparrow (*Pásser arbòreus? P.* montànus *Auct.*) has been usually described to have no song; which is incorrect, for one in my possession frequently sings; and its notes are not altogether despicable, being far superior to those of the bramblefinch. The tree sparrow, like the common species, has a great variety of chirrups; one of which is peculiarly musical and sweet, and may be rendered *pee-eu-weep*. Its proper song consists of a number of these chirps intermixed with some pleasing notes, delivered in a continuous unbroken strain, sometimes for many minutes together; very loudly, and having a characteristic sparrow tone throughout.

This is a wild and untractable species in captivity; and, consequently, as birds always closely depress their feathers when frightened, appears, when looked at, remarkably slender: yet, when at ease, and undisturbed, the tree sparrow always puffs its plumage so as to appear quite as bulky as the common species; and the individual which I have in confinement has generally this appearance, having lost much of its original wildness; still the species is undoubtedly more slender than the *P.* domésticus. The sexes of it may be distinguished easily by the smaller size, in the female, of the black spot on the side of the neck: in both, the bill becomes quite black in summer. I do not know how this bird came to be called "mountain sparrow," and "montànus;" for it appears to me, both from observation, and from what I have read of it, only to inhabit valleys; frequenting low damp situations where willows grow, and being more abundant in the flats of Lincolnshire than in any other part of Britain. The more appropriate term arbòreus, therefore, might as well be substituted for "montànus," if the latter is thus implicatory of error.

Were I to judge of the temper and disposition of the bramble finch from one which I kept in confinement last summer, I should call it one of the most untamable of birds; but, were I to form my judgment from the individual which I

possess at present, I should, on the contrary, deem it to be very familiar and confiding. This I just cursorily mention as a caution to those who would infer the general character and disposition of a species from observation of an individual. Animals of the same kind often differ greatly in individual character; and this is remarkably apparent in a brood of ten young bottletits which I have this season reared: it was observable even before they had left the nest.

The bramble finch, like many other species, but chiefly those which have deciduous terminal edgings to their winter plumage, as the linnets, redstarts, stonechat, pied flycatcher, and some of the siskins and grosbeaks, is very much handsomer when two years old than when in its first summer livery. The tints of all these birds are considerably brighter after they have moulted twice, and then (as is particularly observable in the common redstart) a few only of the new feathers are fringed with winter edgings.

I cannot exactly reconcile the mountain linnet, or twite, which, in these parts, is a regular winter visitant, with Mr. Selby's description of it. That gentleman remarks that "it is rather larger than the common linnet, being bulkier in the body, and having a longer tail." Now, all the twites which I have seen (and they amount to many dozens) have invariably been considerably smaller than the common linnet, being intermediate in size between that bird and the redpole. Farther, Mr. Selby's account of it seems to imply that it exhibits a marked seasonal change in the tints of its plumage; "rendering its summer appearance different from that which it bears through the rest of the year." I have specimens in summer plumage; and the only difference I can perceive is an increased brightness of colour on the rump plumage, the terminal edgings of which have disappeared; but this is by no means conspicuous, being a much slighter difference than is observable in the common linnet and the redpole. In other respects, Mr. Selby's description of the mountain linnet entirely agrees with my birds; only that I see no sexual difference in the colour of the upper parts, the rump excepted. Montagu describes the twite to be "rather larger than the linnet;" and says, also, "the top of the head and rump red." But here he is certainly mistaken as regards the head; for I can say decidedly that the twite (of these parts) has at no time any red upon the crown. These discrepancies almost lead one to suspect that two different species are yet confused together under the name of mountain linnet; as, I am quite convinced, is the case with the redpole. See the *Field Naturalist's Magazine* for April, 1834, p. 172.

Tooting, Surrey, May 29. 1834.

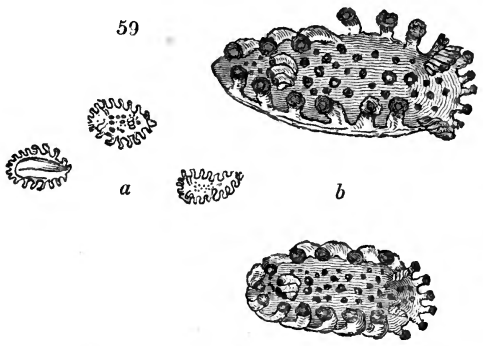
ART. V. *Illustrations in British Zoology.* By GEORGE JOHNSTON, M.D., Fellow of the Royal College of Surgeons of Edinburgh.

22. TE'RGIPES PU'LCHER. (*fig.* 59.)

Cl. Gasterópoda, Ord. Nudibránchia, Fam. Glaúcidæ.

THE Tergipes is a naked sea snail with external branchiæ disposed in two series, one along each side of the back; they are of a cylindrical form, and it is supposed that the apex of each forms a little sucker by means of which the animal can fix itself to the stalks and fronds of seaweed, and walk upon its back. Rang is of opinion that this fact requires new observations to assure us of its certainty; and the species about to be described never performed any such remarkable feat during the few hours it was preserved.

59



Tergipes pulcher: *a*, natural size; *b*, magnified.

One species (Dòris maculàta *Montagu*) has already been described as a native of the coast of Devon, but it differs in so many particulars from ours, that some may deem it necessary to arrange them in separate genera, and we, at all events, may be spared the necessity of elaborating a comparative description to prove their distinctness. Tergipes pulcher was found in Berwick Bay, upon a piece of wood brought up by the line from deep water: its motions were slow and gliding, like the rest of its tribe; but, unlike the greater number of these, it was ornamented with spots of such warm and brilliant colours, that it might possibly have attracted the notice of even those who wonder very much what there is in a snail that it should have admirers.

Tergipes pulcher is half an inch long, ovate, soft, white, ornamented with scarlet tubercles scattered over the back, and with short cylindrical processes tipt with bright orange arranged round the sides: mouth subinferior, terminal, with a linear-oblong membranous tongue, set with minute prickles in close transverse series: tentacula two, dorsal, non-retractile, short, oval, imbricate, orange-coloured: back even, studded with many scarlet unequal tubercles, some of which, when

magnified, appear ocellated: towards the tail are three short white processes placed in a line across the back, which are not retractile; and there are eighteen short obtuse branchial processes placed on the margins, the smallest in front, and all tipped with orange; the apices, perhaps, conformed like suckers: foot oblong, with plain margins: aperture of generation lateral and anterior.

When viewed through a magnifier, this pretty mollusc has a roughish or flocculent appearance. The cloak contains numerous calcareous spicula interlaced in every direction, the spicula of unequal sizes, curved, with a sort of knob in the centre, whence it tapers to each end, the points of some of them being forked. The latter sort are abundant in the branchial processes, and the forked end is always pointed outwards.

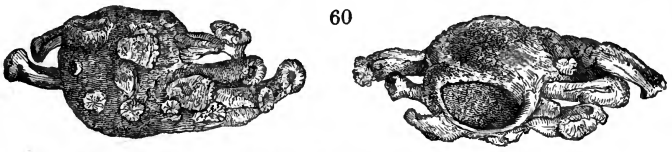
The specific character may be thus expressed: —

Térgipes púlcher. Corpore ovato, albo, supra tuberculis coccineis notato; tentaculis duobus, ovatis, imbricatis, aurantiis; branchiis brevibus, apice aurantiis.

23. ? *Spo'ngia sube'ria.* (*fig.* 60.)

Our figures of this remarkable production are taken from a dried specimen, with the loan of which I was favoured by Mr. Bean of Scarborough. It incrusts a univalve shell,

60



Spóngia subèria, of the natural size.

apparently the Túrbo crássior, and entirely covers it. The zoophytical crust is thin and uniform, and no pores or fæcal orifices are visible on the surface, but the processes are hollow, and their walls, which are smooth and alike on both surfaces, appear to be perforated, in a longitudinal direction, with a circle of small canals which probably open on the rim of the process; but this structure is rather inferred from the appearance presented by the spot from which a process has been broken, and from an obscure vestige of pores on the rim, than from dissection, and remains, therefore, open to correction.

The sponge is apparently composed of fine particles of sand closely compacted, and is of a uniform grey or stone colour; the surface is even and smooth, but large papillary processes, from one to six lines in height, cylindrical and tubular, rise up irregularly from it, the apices of which are circular, cupped,

with a thick somewhat inflected and plaited rim. Where the sponge incrusts the shell it is thin, but the tubular processes are between two and three lines in diameter, and, when removed at the base, they leave a mark exhibiting a circle of cells radiating to the outer edge.

I am of opinion that this is the *S*póngia subèria of Montagu (*Wern. Mem.*, i. 100.), in a perfect state. Montagu seems to have met with specimens only previous to their production of the tubular processes, and, if we subtract these from our description, it will be found to correspond in other respects with the description of this excellent observer. He says that the "sponge is of a corky nature, resembling the close texture of the stalk of some species of *B*olètus. It has rarely any other pores than what are formed by the fibres, which are so extremely fine, as not to be visible to the naked eye, even when broken; and with the assistance of a pocket lens, they are not definable on the surface. Its colour is orange-yellow when fresh, becoming brown when dry: its shape is indefinite, but it has the singular property of being attached only (as far as I have been able to ascertain) to old univalve shells, which it entirely invests. It is also remarkable, that few instances occur where the hermit crab has not formed a lodgement in the nucleus shell, and there appears to be a great struggle between the two parasitical intruders, as the sponge is continually endeavouring to fill up the aperture of the shell, while the crab, by its occasional motion in search of prey, frustrates that natural propensity of the sponge. Notwithstanding the efforts of so active and restless an intruder, the gradual and insensible increase of the sponge gains upon the premises of the crab; it pushes it on all sides, and completely lines the interior surface of the shell, so that the crab soon finds its habitation too small, and is compelled to search for a more capacious house."

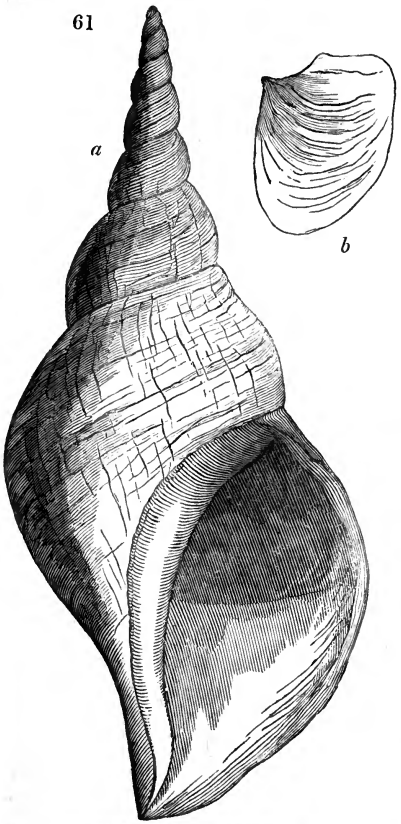
Dr. Fleming has placed this sponge in his genus Halichóndra (*Brit. Anim.*, p. 522.), distinguished from the other genera of the family by the *siliceous* spicula which enter so abundantly into its organisation; and he says that the spicula of the species in question, which he has found "incrusting corallines in the Frith of Forth," are fusiform and slightly curved. Montagu makes no mention of these spicula, which probably require a high power of the microscope for their detection, and hence they also escaped my observation. To any correspondent of this Magazine I should feel much indebted by the communication of specimens of the *S*póngia subèria, either dried or preserved in spirits.

Berwick upon Tweed, June 12. 1834.

ART. VI. *Fùsus Turtòni Bean, and Limnèa lineàta* Bean, *Two rare and hitherto undescribed Species of Shells, described and illustrated.* By WILLIAM BEAN, Esq.

FU`SUS Turtòni Bean. (*fig.* 61.)—Shell fusiform, covered with slightly elevated spiral lines broader than the intervening spaces, and crossed by numerous longitudinal lines of growth. Length 4½ in., and about 2 in. broad; volutions 9, a little raised in the middle, from which they gradually slope to the separating line; aperture ovate, nearly of the same length as the spire; canal wide and short; outer lip a little dilated and very thick; inner lip smooth, glossy, and much spread on the pillar. Colour white, covered with a brown epidermis, and the inside pale violet.

61



a, Fùsus Turtòni; *b*, its operculum.

This noble and probably unique shell we have named after our old and esteemed friend, Dr. Turton. It was found among the rejectamenta of a boat at Scarborough, and is one of the "great guns" of our collection, which contains (we say it proudly) 1050 species and varieties, and above 50,000 specimens of genuine native shells.

Limnèa lineàta Bean. (*fig.* 62.)—Shell oblong-ovate, subventricose, with about 12 long and short (often forked) raised transverse lines on the body whorl, giving it an angular appearance crossed by numerous longitudinal striæ. Length of the largest specimens 6 lines, breadth 4

62

a, Limnèa lineàta; *b*, reversed variety.

lines; volutions 4; spire short and acute; aperture ovate; outer lip thin; inner lip reflected, forming a small hollow behind it.

This remarkable shell is only found in one pond in our neighbourhood; and the reversed variety is of rare occurrence. It differs from our specimens of L. péreger in being thicker and stronger; is of a darker colour, and only half the size: it is certainly very like some of the numerous varieties of this shell, yet most of our scientific friends agree with us in considering it specifically distinct. The raised lines on the body whorl are very variable: in some specimens they are nearly obliterated; but in very few instances are they wholly wanting. Mr. G. B. Sowerby, in his *Genera of Recent and Fossil Shells*, united Phỳsa, Mýxas, and Apléxa to the genus Limnèa. He says, "the only describable difference in the shells, except mere specific differences, consists in the Apléxa and Phỳsa being heterostrophe shells, while the Limnèa and Mýxas are dextral. The reversed Limnèa found at Scarborough will certainly prove the correctness of Mr. Sowerby's views.

Scarborough, July 30. 1834.

ART. VII. *A List of some Land and Freshwater Species of Shells which have been found in the Neighbourhood of Henley on Thames.* By H. E. STRICKLAND, Esq.

I SEND you a list of land and freshwater shells which I found, some years ago, in the neighbourhood of Henley on Thames, a district which furnishes a greater number of species than any other with which I am acquainted. This is doubtless owing to the diversity of hills and valleys, wood and water, which adorn that charming neighbourhood, and supply to each species an appropriate habitat. I have thought it best, in the case of the more rare species, to state exactly the locality or situation where each occurs; as, without this knowledge, a conchologist might search for them a long time without success: *v r* mean very rare; *r*, rare; *f*, frequent; *c*, common.

Mollúsca Gasterópoda Pulmonífera Terrícola. — Cyclóstoma élegans, beech woods, *f.* Carocólla lapícida, adhering to beech trees, *f.* Hèlix aspérsa, *c*; nemoràlis, *c*; horténsis, *f*; arbustòrum, moist plantations, *r*; ericetòrum, dry chalky banks, *c*; virgàta, *f*; caperàta, *f*; ruféscens, *c*; híspida *Drap.* (not of Montagu), *c*; cantiàna (Carthusiàna *Drap.*), hedges and plantations, *c*; fúsca, Fawley Woods, *v r*; alliària, damp

places, *f*; lùcida *Drap.*, *c*; radiàta, *c*; pygmæ'a, roots of grass and wet leaves, &c., *r*; *t*rochiformis (fúlva *Drap.*), osier beds, and in the Thames rejectamenta, *r*; spinulòsa, moss and fir leaves in Fawley Woods, *r*; crystállina, wet leaves, &c., *f*; pulchélla, roots of grass, &c., *c*. Bùlimus lackhaménsis (montànus *Drap.*), on the stems of beech trees; obscùrus, beech woods, &c., *c*; lùbricus, wet places, *c*; fúscus (lineàtus *Drap.*), in moss at Pining Hill, Fawley Woods, *v r*. Achatìna acícula, under stones in chalky and grassy places, *r*. Succínea pùtris (amphíbia *Drap.*), *c*. Vitrìna pellùcida, wet leaves, &c., *r*. Pùpa juníperi (secàle *Drap.*), dry chalky places, *c*; marginàta, grassy places, *f*; pygmæ'a, roots of grass and plantains, *f*; edéntula, under stones, &c., Henley Park, *r*; muscòrum (umbilicàta *Drap.*), among ivy on the arch on the Wargrave road, *r*. Azèca trìdens, at the roots of dog's mercury, at Pining Bottom in Fawley Woods, *r*. Carýchium mínimum, roots of grass, &c., *c*. Bàlea pervérsa (frágilis *Leach*), Thames rejectamenta, *r*. Clausília laminàta, on the bark of beech trees, *f*; nígricans (rugòsa *Drap.*), in woods, &c., *c*.

Mollúsca Gasterópoda Pulmonífera Aquática. — Limnæ'a stagnàlis, in ditches, *c*; frágilis, on weeds in the Thames, *r*; palústris, Thames, *c*; fossària, *c*; péregra, *c*; auriculària, Thames, *r*. Phỳsa fontinàlis, Thames and ditches, *f*. Planórbis córneus, ditches, *f*; carinàtus *Drap.*, ditches near Thames, *r*; complanàtus (marginàta *Drap.*), *c*; vórtex, *c*; contórtus, ditches, *r*; álbus, Thames, *r*; *n*autíleus, in a pond near Bix, *r*; fontànus, pond near the Grange on the Marlow road, *v r*.

Mollúsca Gasterópoda Branchífera Nudibránchia. —Valvàta fontinàlis (obtùsa *Turton*), *f*; cristàta (spirórbis *Drap.*), Thames, *r*.

Mollúsca Gasterópoda Branchífera Pectinibránchia. — Paludìna Achatìna, Thames, *f*; tentaculàta (impùra *Drap.*), *c*, acùta (símilis *Turton?*), Thames, *r*. Neritìna fluviátilis, Thames, *c*.

Mollúsca Biválvia. —A'nodon *a*natìnus, Thames, *c*. U'nio pictòrum (of Turton's *Manual*, fig. 11.), Thames, *c*; ovàta (*Turton*, fig. 12.), Thames, *r*. Cỳclas ámnica, Thames, *f*; Henslowàna, Thames, *r*; pusílla, Thames, *r*; rivícola, Thames, *r*; córnea, ditches, &c., *c*; lacústris (caliculàta *Drap.*), ponds at Fawley, *r*.

Aug. 12. 1834.

ART. VIII. *Information on the Cane Fly of Grenada* (*Délphax saccharívora*) *additional to that given in* VI. 407—413. By J. O. WESTWOOD, Esq. F.L.S., &c.

THE ravages of this minute but destructive species of insect, detailed in VI. 407—413., are continued with undiminished severity in the Island of Grenada. At the July meeting of the Entomological Society, the subject was brought before the notice of the meeting by J. C. Johnstone, Esq., of that island, who entered into various statements relative to the nature of its attacks; from whose remarks it is evident, as I had indeed presumed (VI. 410.), that the great mischief done to plants originates in the constant suction of the plants by myriads of these insects in all their stages. It has been stated [in VI. 407, 408.) that the eggs are deposited in the midrib of the leaves, on the under side, in those plants which had gained considerable height, the spots in which they are introduced being covered with a fine downy white matter. This account, with the drawing given in VI. 413. fig. 54. *b*, of the position of these eggs in the leaf, is calculated to give an erroneous idea; since, from a microscopic examination of some infested leaves preserved in spirits, brought over by Mr. Johnstone, I have ascertained that the eggs are long and kidney-shaped, and are introduced lengthwise into the substance of the midrib of the leaf to a considerable depth. It is, however, upon the young and very tender plants that the greatest injury is inflicted; since, evidently from their affording a more delicious repast to the fly, they are so completely overpowered with its numbers as to be unable to overcome the injury: they bleed to death, and wither into a blackened mass. It is noticeable that the north-east side of the island, which is the most fruitful, and which has acquired the name of the garden of the island, is more especially subject to the fly; which, in some instances, has destroyed two fifths, and even, in some plantations, two thirds, of the entire produce.

It is only within the last few years that this pest has been observed in Grenada; and, indeed, it has not yet made its appearance in some of the adjacent islands. It has been noticed that the first observance of it in the former island was preceded by a very violent hurricane.

A committee has been appointed by the Entomological Society to take the subject into consideration, with a view to the proposal of the most efficient remedies; and a report, containing a great variety of suggestions, has been prepared and sent over to the Agricultural Society of Grenada.

The Grove, Hammersmith, July 30. 1834.

ART. IX. *A List of the more rare of the Species of Insects found on Parley Heath, on the Borders of Hampshire and Dorsetshire, and Neighbourhood not exceeding Five Miles.* By J. C. DALE, Esq. A.M. F.L.S. &c.

THE following list is but a small selection from the entire list of the species captured in the places named. Some of them, though so local, are there in plenty sometimes, as the numbers appended to some of them below will serve to show: these numbers are expressive of fewer than those I have given away. The names are arranged according to Mr. Curtis's *Guide*: —

Coleóptera. — *C*icindèla sylvática, 100; marítima, Bourne Mouth, not found on Parley Heath: *C*árabus arvénsis, 50; nìtens, 200: Pogònus littoràlis, Cálathus angustàtus, Stenólophus vaporariòrum, O'cys cúrrens; Anómala Frisch*ii*, 30, one on Parley Heath, the rest on the sea coast; E'mus hírtus: Cistèla *c*eramböìdes; fúlvipes, 2: Tràchys minùta, 1: E'later ephíppium, 7; æ'neus, 5: Scírtes chrysomelöìdes; Ceutorhýnchus cómari, 20; Sibínia prísmita, 30; Grypídius equisèti, 5; Hylòbius abìetis, 8; Cleònus nebulòsus, 200; A'pion genístæ, 20; Sphæriéstes 4-pustulàtus, 2: Leptùra nìgra, 40; femoràta, 30: Lupèrus flávipes, 10; brássicæ, 20; Háltica 4-pustulàta, 10; Macrocnèma cyànea, 1: Cryptocéphalus bipustulàtus, 5; linèola, 10; pusíllus, 20: Chrysomèla geminàta, 2: Coccinélla 19-punctàta, 5; 12-punctàta, 10; oblóngo-guttàta, 20: Endómychus coccíneus, 10.

Dermáptera. —Labidùra gigantèa, by the late Mr. Bingley, under the sea shore near Christchurch.

Dictyóptera. — *B*látta Páuzer*i*, 100.

Orthóptera. —*A*chèta campéstris: Acrìda Binglè*ii*; grísea, 40; Kírb*ii*, 40; dorsàta, 20: *Loc*ùsta flávipes, 20.

Hymenóptera. — Hylótoma cæruléscens, 10: Selándria ephíppium, 6; ovàta, 4: Crœ'sus septentrionàlis, 3; Némátus grándis, 1; Evània minùta, 3; Peltástes dentàtus, 2; Anómalon obscuratòrius?; *B*ánchus compréssus?; Chelònus oculàtor, 4; Helòrus anomálipes, Hedýchrum imperiàle: Chrỳsis succíncta, 10; rùfa, 10: Mutílla europæ'a, 3: Pompìlus rùfipes, púlcher; Cerópales maculàtus, 6; A'porus bícolor, Lỳrops dimidiàtus, 1; Astàta víctor, 2; Philánthus andrógynus; Oxýbelus uniglùmis, 20; *P*sén *e*quéstris, 1; Cérceris 5-cincta, 20; Eúmenes atricórnis, 40; Collètes fòdiens, 50: Andrèna ròsæ; Schrank*élla*, 10; affìnis, 5; thorácica, 3; nítida, 7: Sphecòdes píceus?: Xalíctus xánthopus; Panúrgus *u*rsìnus, 5; Cœlióxys cónica, 20; Epèolus variegàtus, 30; Nómada solidáginis; Sarópoda *v*ulpìna?, 5.

Neuróptera. — Libéllula conspurcàta, 30; Cordùlia Curtísii, 12; Gómphus vulgatíssimus, 50; *Æ'shna* júncea, 1; A`nax imperàtor, 12; A`grion rubélla, 60: Chrysòpa fúlviceps, 4; víridis, 12; rhomböidàlis: O'smylus maculàtus, 20; Hemeròbius fúscus? 10; Pérla bicaudàta, 5; Nemoúra pilicórnis, 5.

Trichóptera. — Limnéphilus villòsus, 10: Phrygànea grándis, 1; mìnor, 5: Leptócerus ochràceus, 1.

Lepidóptera. — Limenìtis Camílla, 20; Argýnnis Adíppe, 20; Sèsia *b*ombyliifórmis, 50; Deiléphila *p*orcéllus, 5; Lasiocámpa trifòlii, 5; Lària fascelìna, 5; Penthóphora nígricans; Eulèpia crìbrum, 50; Deiopeìa púlchra: A'grotis ocellìna; pyróphila: Caradrìna neglécta, 2; Dipterýgia pinástri, 3; Achatèa sprèta, 10: Leucània cómma, 8; littoràlis, 1: Cucúllia chamomíllæ; Heliòthis dipsàcea, 7; Anárta myrtílli, 20; Stílbia anomalàta, 4; A'lcis cinctària, 13: Bùpalus piniàrius, 30; ericetàrius, 40; favillaceàrius, 100: Hippárchus bajulàrius, 3; *p*apilionàrius, 7: Eubòlia *c*ervinària, 4; Charíss*a* obscurària, 100; Pachycnèmia hippocastanària, 20; Lobóphora sexalàta, 6: Eupithècia strobilàta, 12; subumbràta; succenturiàta, 3; centaureàta, 12; nanàta, 20: Hýri*a* aurorària, 12; Ypsípetes impluviàta, 7: Ptychópoda márgine-punctàta, 3; subsericeàta, 9; contiguàta, 4: Macàri*a* lituràta, 33; alternàta, 4: Hàlias chloràna, 2; Tórtrix galiàna, 10; Spilonòta piceàna, 4; Zeiráphera atromargàna, 1; Anchylópera fractifasciàna, 7; Cnephàsia aurofasciàna; Orthotæ`nia Turionélla; Argyrotòza mixtàna, 40: Peronèa albicostàna, 4; nova species?: Simàëthis Myller*àna*, 20; Scópula sticticàlis, 2; Asòpia flammeàlis, 10: Crámbus argyrèus, 40; latistrìus, 30; genicùleus, 40; haméllus, 30: Oncócera marísci, 4: Phycìta abietélla; *p*alúmbea: Depressària umbellàna, Pancállia Merian*élla*, Glyphípteryx Roesél*la*, Lamprònia bistrigélla, Pteróphorus parvidáctylus.

Homóptera. —A`phis quércus, 2; Ulòpa ericæ, 12; Lèdra aurìta, 2; *A*siràca pulchélla, 30.

Hemíptera. — Corixa lacústris? 50; fossàrum, 20: *G*érris apicàlis, 12; (Novum genus) capitàta; A'radus corticàlis, 30; Aneùrus læ`vis, 2: Acánthia zostèræ, 12; a species allied; marginàlis, 1: Redùvius subápterus, 1: Kleidócerys capitàtus; magnicórnis, 10: A'lydus calcaràtus, 5; Còreus quadràtus, 2: Pentátoma perlàta, 2; cærùlea, 6.

Díptera. — *A*'nthrax flàva, 1; ornàta, 200; Dióctria atricapílla?; Hemerodromỳia Mantíspa, 10; Mícrodon *a*pifórmis, 20; Helóphilus trivittàtus, 3; Erístalis nubilipénnis; Rhàphium longicórne, 1; *C*ònops macrocéphala, Gasteróphilus hæmorrhöidàlis; Sarcóphaga mortuòrum, 4; Cordylùra lìvens,

Tephrìtis stellàta *Rœmer*?; Actòra æ'stuum, 8; Platycéphala plánifrons; Octhèra Mántis, 4.

Omalóptera. — Ornithomỳia virídula.

Of the species enumerated in this list, I believe *C*ònops macrocéphala, Penthóphora nígricans, and Anómalon obscuratòrius? to be unique as British; and Acrìda Binglèi*i*, Cryptocéphalus bipustulàtus, Astàta víctor, Deiopeì*a* púlchra, Leucània littoràlis, and Cálathus angustàtus have been so till lately.

I have, this season, also taken

*Lycæ`n*a *Arìon and A`cis, and Hespèri*a *Actæ`o*n in plenty; especially the last, at Lulworth; and have learned that it has been found also at the Burning Cliff, near Weymouth: and it is remarkable that it should have escaped observation previously. In the end of May, 1833, I took a single specimen, only, of Actæ`*on*; and, had it not been found in plenty at other times, it might have joined company with Hespèri*a* Oíleu*s*, Vitéllius, and Bucéphalu*s*, in the drawers of doubtful and imported species of some sceptical entomologists.

August 5. 1834.

ART. X. *Information on the Habitat of Càrex heleonástes* Ehrhart *in Switzerland, and on the Circumstances connected with the Discovery and Identification of this Species; with like Information on the Càrex Gaudini*àna *Hoppe.* By P. J. BROWN, Esq., Thun, Canton of Berne, Switzerland.

THE discovery of the rare Swedish *C*árex heleonástes (VI. 469.) on the turf grounds of the Schwarzenegg, near Thun, in Switzerland, a spot strikingly similar to many portions of the Scottish Highlands, encourages me to hope that this plant may ere long be added to the British flora: and it has occurred to me that the chances of its being detected may be much increased by my placing at your disposal the few specimens still remaining of those which I brought with me to England. I therefore take the liberty of troubling you with the accompanying small packet, the contents of which you will perhaps have the goodness to distribute among your botanical friends, more especially those resident in the north.

The unexpected discovery of the above plant, in Switzerland, is due to the arrival at Thun of M. Guthnick of Cologne, a zealous and quicksighted botanist. He, being apprised that the same leisure which had enabled me to become better acquainted than any other person with the distribution of plants in our neighbourhood, would also allow me

to lead him to the richest spots, proposed to become the companion of some of my herborisations; and, as the *Cárices* had formed his favourite study, we were naturally led to the peat grounds and marshes. The Schwarzenegg is situated at about two leagues N. E. of Thun, at an elevation of probably 2500 ft. above the sea, and is chiefly covered with fir forests, interspersed with large open spaces of deep wet peat, which is dug for fuel. On this spot the *Càrex heleonástes* was first found on June 1. 1830, covering the bottom of a ditch or drain about 2 ft. wide, and $1\frac{1}{2}$ ft. deep, the soil of which is always saturated with water, the surplus of which passes off to a deep watercourse at a short distance: the ditch in question skirts the edge of a fir forest at the distance of about 30 yds. or 40 yds. Not being satisfied as to the identity of the plant, numerous specimens were distributed, by M. Guthnick and myself, to our various friends in both France and Germany, without any intimation of our opinion as to its species; all those who had access to the chief collections pronounced it *nem. con.* to be *C. heleonástes*; Dr. Hoppe (a botanist of great authority for the genus) confirming his opinion by the transmission of an original specimen from the herbarium of Ehrhart, by whom the species was established. This circumstance is merely mentioned to show that reliance may be placed on the correctness of the determination.

[*Càrex Gaudiniàna Hoppe.*] On June 7. 1830, an unknown *Càrex* was met with near the edge of the small lake of Amsoldingen, about a league from Thun: specimens of this also were distributed, and produced a variety of opinions too long to be detailed: plants in a living state were demanded by many; and, after having been studied from fresh specimens both wild and cultivated, it was pronounced to be an undescribed species, and named by Dr. Hoppe *Càrex Gaudiniàna*, in honour of the late M. Gaudin of Nyon, author of an invaluable *Flora Helvetica*. Dr. Hoppe's notice of the plant was published in the *Flora*, a small periodical work, in German, printed at Ratisbon, and in the number dated April 28. 1832, he gives the following character:—

"*Càrex* (*Vignea*) *Gaudiniàna*. C. stigmatibus binis; spica terminali mascula vel pseudo-androgyna, lineari-oblonga; fœmineis duabus, sessilibus, approximatis, ovatis, paucifloris; fructibus ovato-oblongis, apice bifidis, acuminatis, squama ovata longioribus; caule tereti, glabro; foliis linearibus, canaliculatis; radice stolonifera." The species is inserted by Gaudin in the *Appendix* to his *Flora*, published shortly before his death; and, having two or three individuals still in London,

eg leave to place them also in your hands.

6. *Davies Street, Berkeley Square, June* 21. 1834.

[We have imparted the specimens, a small number of them, to William Christy, jun., Esq., Clapham Road, and the remainder to George Johnston, Esq., M.D., Berwick upon Tweed, who will, we are sure, have pleasure, in sending them farther north, to botanists who may be resident near localities which assimilate to the Swiss one.

Of Scheuchzèria palústris L., of which Mr. Brown has spoken in VI. 469., he has also given specimens. We erred in speaking, in VI. 470., of "its Swiss habitat," as this species has many habitats in Switzerland. The particular specimens given by Mr. Brown have their habitat marked, "Schwarzenegg prope Thun, Junio, 1832."]

Art. XI. *Short Communications.*

Zoology. — *Reason versus Instinct.* — I have never felt convinced, nor satisfied, with the limitation to which the actions of animals are confined by the term instinct, as applied to them. True, a chicken, for example, if hatched by steam, and brought up by an "artificial mother," as Mowbray styles the flannel succedaneum for a hen, would perform its offices of incubation perfectly, and in due season, although it should never have received instructions from its mother, or by communication with any of its congeners: this is instinct. But when circumstances occur which could never have been contemplated as likely to befall it, by what name shall we designate the cause or motive which actuates its movements? A neighbour of ours, on whose word, I believe, I may safely rely, related the following anecdote to me the other day. His amateur farmyard, I should premise, is beautifully arranged, and always reminds me of that belonging to Joshua Geddes, the glorious quaker in *Redgauntlet*. My neighbour's pigsties are railed off on two sides of the yard, where food in abundance awaits the happy *far niente* inmates; but, as it was discovered that the fowls partook too largely of that which was intended only for pigs, their wings were clipped, in order to prevent them from flying over; and the operation produced the desired result. One of the fowls, however, discovered a method by which to baffle the contrivers of its disappointment. Several pigs were loose in the yard, whose movements were watched by the bird, and, as one of them wandered near the intervening rail, it flew upon the back of the animal, and thence easily gained the tops, over which it fluttered into the enclosure, and thus obtained the desired

but interdicted banquet. Was this the result of forethought, combining of circumstances, or, in short, reason? Could it be instinct? — *Campanella. Berkshire.* [*Received, Jan.* 9. 1834.]

Upon this subject, see IV. 498.; V. 276.; VII. 481.; acts of birds, 518.; acts of the hare, 506. I had once a fine young cat, which I had brought up in an uninhabited house, in a garden, whither I, in most mornings, carried from my own place of residence, milk for "Mas" (the name I had given to my cat). A bell was so hung over the door of the private entrance to the garden as to be struck, and made to sound pretty loudly, every time the door was opened. Mas would sometimes be along with my fellow-workmen in the garden at a good distance from the door; but, on the bell's sounding at the usual time of Mas's receiving his breakfast, he would quit my fellow-workmen instantly, and gallop like a greyhound towards the door. — *J. D.*

A Communication of Ideas in Animals of different Genera. — Last spring an old mare (she has, I believe, completed her twentieth year, and has lost an eye), being relieved, in consideration of age and infirmity, from heavy labour, was turned out, in company with a cow and four or five heifers, into a small field at a distance from their former companions. The grass in this enclosure was not very plentiful, and the adjoining pasture being adorned with luxuriant vegetation, and divided by an indifferent fence, they frequently took the liberty of trespassing upon the neighbouring property. This, indeed, occurred so often, that a watch was obliged to be set upon their actions; and one day a singular instance of animal instinct was observed. The mare, doubtless tired of staying so long at home, made the circuit of the field, with a view to escape from her confinement; and, having discovered a place suited for her exit, she returned to her horned companions, who were ruminating at a little distance, and, having approached the cow, she gently struck her on the shoulder, first with her hoof, and then with her head. The cow being roused from her revery, the loving friends advanced together to the gap, and, having jointly reconnoitred it, returned to the rest, and then, the old mare leading the way, the whole company leaped over in succession after her. — *W. G. Barker. East Wilton, near Middleham, Bedale, Yorkshire, Sept.* 14. 1834.

A cat and dog of my father's, brought up together from their infancy, would, when they had grown up, amuse themselves for an hour together in chasing, in company, wild rabbits, which were successively straying into the garden.

The foraging couple would be off the first thing in the morning, and again in the evening; and a near relative, from whom I learn this, has known them, in one instance, to bring home a half-grown rabbit. — *J. D.*

The Communication of Ideas in Animals of the same Species is instanced daily to all observers. I saw a very clear case of it on September 15. 1833. I was crossing two meadows, or paddocks, divided by a hedgerow, but connected by a gateway from which the gate was absent. Several cows were grazing in the farther meadow, from whom a bull was coming into the nearer meadow, to fetch up, as soon appeared, two cows that had strayed behind, and were still grazing in the nearer. He called to them at the gateway, and then walked to them, when they ceased grazing, and walked before him to the main party in the farther meadow. — *J. D.*

Mammiferous Animals. — *Instances of depraved Appetite in Mammiferous Animals.* (135—137.) — I have known a male cat to steal away a young cat two months old, and destroy it, and eat it almost entirely. I know not if this be a frequent occurrence. I have, too, known a bull-bitch to eat every one of her young ones as soon as they were born. — *J. J. Gelly, Montgomeryshire, March* 1. 1834.

The Marten (*Mustèla foina*). — The gamekeeper of Peter Du Cane, Esq., Braxted Lodge, tells me that he has caught several specimens of the marten during the last few years: he captured the last in a trap baited with a young rabbit. — *J. C. Witham, Essex, March* 20. 1834.

In *The Whitehaven Herald* of May 20. 1834, there is, under the title of "A Scrap of Natural History," a delectable description of the "personal appearance and habits" of "the mart, martin, yellow-breasted mart, or sweet mart." The "scrap" occupies nearly a column. We wish the writer would narrate the natural history of all the British animals in like manner. This remarkable fact is mentioned: — "There is at present in the possession of an inhabitant of this town a couple of young marts, to which the cat belonging to the house is performing all the tender offices of a parent... The little creatures were blind, and about the size of kittens of a corresponding age; and, when first caught, sucked milk readily, through a quill, on which they were supported for two or three days, until a cat was found to discharge the office of their hapless parent [which had been chased to her nest or bield, driven out of it with smoke, and killed]. Puss had a kitten of her own at the time, which was taken from her to make room for the intruders, whom she has cherished with true maternal affection. Since their capture, they have

opened their eyes, and are daily improving in size and appearance."

The Stoat (*Mustèla* ermínea). — It seems to have been commonly imagined that change of colour from the usual tint to white is the invariable effect of cold. [V. 718.; VI. 79.] Yet this change occurs in the mild climate of Cornwall as often as in other parts of England; and not always in winter. Mr. C. Jackson of East Looe had, at one time, in his possession, three specimens that were all over white, except on the back of the neck and shoulder, which was brown, and the black tip of the tail. They were proved not to be young by the canine teeth being worn down. — *J. Couch. Polperro, Cornwall, May* 29. 1834. [On the stoat, see, besides, VI. 202., and the references given in VI. 208.]

The Weasel sucks the Blood of its Prey. — Rusticus of Godalming (VI. 197.) denies this, and says that "the weasel only eats the brain." This is a bold assertion, at variance with the opinions of most, if not all, modern (and, as far as I am aware, ancient) naturalists (but no matter for that; they are all mere copyists, at least since the flood, according to Rusticus; Linnæus, Jussieu, Cuvier, &c., are only copyists, in other words, plagiarists): and, before it can be received as a fact applicable to the species generally, it must be ascertained by proofs much more evident and convincing than the single one brought forward by Rusticus. Presumption and invective have little weight nowadays. That the weasel will eat the brain of its prey, I have no doubt; and it will devour the blood, flesh, and all (except the bones), when hungry. When satiated, or little hungry, it will generally only suck the blood; but should it, during the conflict with the subject of its attack, injure the skull so as to cause an extrusion of medullary matter, it will frequently devour this as well as the blood. But the weasel, like the polecat, and the other Pomàrii of Cuvier, is decidedly sanguinary in its habits, and prefers blood to everything else. It generally destroys its victim by attacking it in its head or neck; most frequently in the latter part, when its prey is much inferior to it in strength, and can, consequently, make little resistance; the animal being probably instinctively inclined to attach itself to this part, owing to a large artery (the carotid) being situated there. I have seen the weasel kill four young ducks in just half an hour: it attacked them in the throat, sucked their blood, and afterwards left them. — *J. Jones. Gelly, Montgomeryshire, March* 28. 1834. [To the list of the weasel's objects of prey, the mole may now (see Mr. Couch, in p. 458.) be added.]

White Hares. — I find the following remarks in my journal,

under date of January, 1829: — A gentleman informs me that the hounds with which he was hunting yesterday chased, for a considerable time, a white hare; that one was killed, not long since, near the same place; and that some young ones of the same colour have been seen. It is supposed that there are seven in the same neighbourhood; and it is certain they have been seen in summer as well as winter. Indeed, cold cannot now have caused the change, since we have had none until within these few days. The gentleman upon whose estate they are wishes to preserve the breed; on which account the hounds were drawn off before they had killed that which they had hunted. Again, under the date of February, 1832, I find I have noted as follows: — Many white hares have been seen in the same neighbourhood during several years. One that I have now examined was white, but with a perceptible universal tinge of brown; the ears whitish without black tips; under the feet, brown, as in common hares. Another, examined by Mr. Jackson, was of a pure white; ears of the ordinary length, not tipped with black; lips white. Thus, it appears that these were only specimens of a variety of the common hare; but it is singular that it should have existed and propagated on one estate for several years; and, it would appear, without varying according to the season. — *J. Couch. Polperro, Cornwall, May* 29. 1834.

A dateless scrap lying by us advises us of a fine white hare, shot in Bleasdale, which had been put into a state of preservation for the owner, Mr. Hall.

A Two-coloured Hare was, some years ago, shot upon the lawn, about The Mount, near Bury St. Edmunds, by M. T. Cocksedge, Esq., since deceased, then resident at The Mount, and proprietor of the estate. This was stuffed, and placed in a glass case over the fireplace in his gun-room, where it remained as lately as January, 1834, when I saw it there. As nearly as I remember, the greater proportion of the fore half of the body was white; the remainder, of the usual colour of hares, or, perhaps, rather lighter. — *J. D.*

A very fine Black Hare was killed on January 15. 1833, on the estate of Wm. Selby Lowndes, Esq., called Tuckey Hill Farm, in the parish of Winslow, Bucks. The head and legs were as black as jet, and had much the appearance of black silk velvet. Its weight was nearly 7 lbs. (*Bell's Life in London*, Feb. 10. 1833.) — *James Fennell.*

The fact of the capture of a black hare, in January or February, 1828, at Combe, near Coventry, is registered in I. 84.; and the occurrence of a wild black variety of the

rabbits on the northern coast of the county of Donegal, in Ireland, in V. 579. The editorial query adduced in the latter place, on the wildness of the black variety in this locality, is, doubtless, quite superfluous. Looking on the months in which the black hares were captured, the thought arises that snow was probably on the ground, and gave the blackness of the hares that conspicuousness which led to the destruction of them. — *J. D.*

Sagacity of the Hare. — The French *Manuel du Chasseur*, quoting Jacques du Fouilloux, the author of a celebrated *Treatise on Hunting*, first printed in 1561 (folio, at Poitiers) says, — " I have seen a hare, when meaning to practise a deception, quit its seat without being alarmed by a dog, go to a pond, at the distance of a quarter of a league, wash itself, and pass off again from the water through a quantity of rushes. I have seen a hare, that has been chased for full two hours by the hounds, thrust another hare from its seat, and take its place. I have seen hares swim successively through two or three ponds, of which the smallest was fourscore paces round. I have also seen them, after having been chased for ten hours, creep under the door of a sheep-house (*d'un toit à brebis*), and rest itself among the cattle. I have seen them, when before the dogs, get into the middle of a flock of sheep, and accompany them in all their motions over the field, avoiding to quit them by any means. I have seen them pass forward on one side of a hedge, and return by the other, there being only the breadth of the hedge between the hare and the hounds. I have also seen them, after half an hour's chase, spring on the top of an old wall, 6 ft. in height, and there settle on the narrow covering of ivy." — *J. Couch. Polperro, Cornwall, May* 29. 1834.

Monstrosity in a Hare. — On Monday, a young hare, nearly a month old, was found near the Hay (having been killed by a stone), which presented a most singular conformation. The head and fore feet were perfect down to the back, where two separate bodies commenced, each completed with legs and tails, but separate from the navel, and of the male genus, the two bodies appearing equally strong and perfect. This singular curiosity is now in the possession of Mr. T. Cooke, auctioneer, of Hereford. (*Bath Herald*, quoted in the *Morning Herald*, August 1. 1825.)

The Otter (*Lùtra vulgàris* Flem.). — The *Manuel du Chasseur* affords the following information respecting the habits of the otter: — " It does not dig the hole in which it lives; but occupies the first convenient cavity, among the roots of trees, or crevices of rocks. It feeds on fish and crabs; and when

it is desirable to entrap it, in a river or place where fish are common, but not crabs, the latter should be chosen for bait. A white stone, or some rubbish [of old mortar, plaster, &c.] sufficiently conspicuous, should be placed on the sand; the animal will be attracted to examine this; and it ends by depositing on it its excrement. Within two or three feet of this, a bank of sand should be raised, 1 ft. in width, and 1 in. high; on this the bait is to be set; which bait, whether fish or crab, must be fresh, for if it have been dead but a few hours, the otter will not touch it. If it is found that the bait has been taken, we next proceed to set the trap. This is a common gin; and, if baited with a crab, it should be alive, somewhat crushed, to prevent its struggles, and fastened on its back. [We hope that not any naturalist will practise this.] The gin should be secured, that the otter may not drag it away. This animal has a singular habit of constantly dropping its excrement in the same spot, and commonly near a white stone that chance may have thrown on the shore. The dung may be known by the remains of fishes and of crabs' claws which it contains; and, if it be found fresh, the otter may certainly be taken the same evening. If not, however, a white stone or old plastering should be placed in the road it is known to take. As night approaches, the hunter should silently advance to his station, behind the shelter of a tree or other blind, within fifteen or twenty paces of the mark. A moonlight night should be chosen, as the otter is slow to quit its hole. The sportsman will be informed of the approach of the animal rather by his ears than his eyes; its diving to fish and rising again may be heard at a considerable distance. At this time the eyes must be kept fixed on the white mark on the sand; for to that the animal will come at last. If the creature be only wounded by the shot, so that it retains strength to throw itself into the water, it is useless to search for it in the morning; for it certainly will not be found. If it escape mortally wounded, it gets among the immersed roots of trees or stones, and there continues attached." The following notes are derived from my own observation. The otter occupies, in the summer, and when the weather will permit, a retired and quiet station near where the land stretches into the ocean. Here it is able to discover danger while at a distance, and to retreat in whatever direction it seems fit. It swims low in the water, and will go a mile or more after prey. The neighbourhood of a populous harbour is a frequent station; and I have known it repeatedly pass up the little river at Polperro, beneath my parlour window, undeterred by the numerous noisy children

at play close to its track, but apparently trusting for security to the dusk of a summer's evening. The young ones are playful and active. Fishes seem to have a peculiar dread of the otter; for I am credibly informed that it has been seen to collect into a scull [shoal] a vast number of trouts in a river, and to drive them before it, until the greater part have thrown themselves on shore.

An Individual of the Great Seal? (*Phòca barbàta*) *taken at Padstow, Cornwall.* — The specimen was 38 in. long, and 25 in. round close behind the fore flippers; but the measurements were made after it had been stuffed, and it had shrunk in the drying. From snout to eye, 3 in.; from the front of the mouth to its angle, 2½ in.; teeth conical, pointed, a little curved; front teeth shorter; canine teeth numerous, those of the upper and lower jaw interlocking; the grinders could not be examined. Upper lip broad, rounded, in two lobes. Nostrils separated by a black and naked channel. Whiskers on the lobes of the upper lip, long and numerous; one row contracted in many parts of their course, as I have seen in the sea lion of Tristan d'Acunha. From the snout to the orifice of the ear, 5½ in.; no external ear: from the snout to the shoulder, 14½ in.; consequently the neck is long: from the heel of the hand of the fore flipper to the point of the toe, 8½ in.; tail, 2½ in. long; hind flippers, 7 in. long; breadth of the hind foot at the claws, 8 in.; body, 13 in. round just before the tail. Five claws on each foot, long, sharp, curved. Hair straight, silky, abundant. Three whiskers a little above the hinder angle of each eye. Colour white, with numerous black spots and patches. This specimen was taken in a net, near Padstow, in Cornwall, in January, 1832. The only figure I am able to find is in Gesner, where the likeness is good, except the forehead, which is too high. I suppose the specimen to be of the species *P*hòca barbàta, which Turton says is white when young, and dark when old. It is probable that this specimen is in the intermediate state, with the dark appearing through the white ground. — *J. Couch Polperro, May* 29. 1834. [Mr. Couch has sent us a sketch along with this description.]

Birds. — *Notices on a few of the Birds of Lower Canada.* — The following notices on a few of the birds of Lower Canada were written during a residence at the Ile aux Noix, a small island, containing an English garrison, on Lake Champlain, near the mouth of the river Richelieu, a tributary of the magnificent St. Lawrence, and from personal observation.

The very few birds that pass the winter in this part of Canada, and the difficulty there is in finding them, make the

shooting not so good as is generally imagined; though a good shot may bag his three brace of grouse a day. The only bird here in winter, that can be called game, is what the natives call a partridge; but, in England, we should pronounce it a ptarmigan: it is the wood partridge (*Tétrao umbéllus*) of Wilson's *American Ornithology*. In very severe weather, the birds of this species perch on the tall hemlock spruce trees (*Abies canadénsis*); and, from their white plumage, and their remaining perfectly stationary, are very difficult to see; but, in the evening and early in the morning, they fly to the stunted birches for the buds, which, while the snow covers the ground, constitute their principal food. In moderate weather, and particularly when the ground is free from snow, they fly into the low brushwood, in flocks of five or six; and then, with a good dog to spring them, and back immediately, they will fly to the first tree; when it requires only a sharp eye and a steady aim to transfer them to your game-bag. They are not only splendid birds in appearance, but, when dressed *secundum artem* (with a cook's skill), will tickle the palate of the most determined *gourmand*. The cock bird has a singular call for its mate. Alighting on the stump of a tree, he strikes it violently and quickly with his wings, which produces a loud hollow sound; and, from the noise having some resemblance to that of a muffled drum when beaten, it is called "drumming." This may be heard, on a still evening, at the distance of nearly half a mile. I have said before that these birds are very difficult to see in trees. Shooting one day, I saw, as well as a boy who accompanied me, one of them fly into a fir tree: we looked for a long time without being able to find it; and were on the point of giving up the search, when we fancied we saw it sitting on the flat part of a branch near the trunk. I gave the boy my double-barreled gun, who fired; but the bird never stirred. Feeling satisfied, however, that it was there, I fired the second barrel; when it fell to the ground dead. Like the ptarmigan of Europe, they are but little alarmed at the noise of a gun; and are so stupid, that, if three or four perch in a tree, they may be all shot by simply taking care to fire at the lowest bird first. The cock of this species of grouse weighs 19 oz., and the hen nearly as much. A speckled woodpecker, with a red head, and of about the size of our redwing (*Túrdus ìliacus*); the common blue jay; a tomtit, somewhat larger than our Pàrus màjor; a large brown owl (a singularly beautiful bird); and a bird of the pie kind, constitute, as far as I have been able to observe, the catalogue of birds that pass the winter in this part of

Lower Canada. I should, however, except the snow bunting, or snow flake (Emberìza nivàlis). This hardy little fellow is said to build in Greenland; and is found not only upon the hoary mountains of Spitzbergen, and upon the inhospitable shores of Hudson's Bay, but in the highest northern latitudes that our navigators have reached. It feeds on the ground; and, from having the long claw of the lark (*A*laúda arvénsis), and not perching in trees [see VI. 486.], has frequently been mistaken for a white variety of that bird.

The immense flights of the passenger pigeons that pass over here must be seen to be credited. We are, however, all familiar with Wilson's and Audubon's descriptions of them. They seem to migrate with a south-west wind.

The martins (*H*irúndo úrbica) arrive here about the middle of March; and are soon followed by another and larger species, called here the black martin. This I take to be the *H. mélba*. The inhabitants prepare small houses for them; and they take possession of them as soon as they arrive.

The only humming-bird here or in the States is the red-throated species (*T*rochilus *C*olubris). They come about the end of April, and depart the latest of the summer birds. During the hot weather, they are seldom much about in the middle of the day. From the early part of June to near the end of August, they retire into the most impenetrable parts of the woods, where they breed; and are never seen, except in the morning and evening. One reason of this absence during the day appears to be, that, while the sun is shining hot upon the flowers, very little honey is secreted: and, as their food chiefly consists of honey [see I. 371., V. 473. 475. 675.], they cannot obtain it; but, when the weather is moist and cloudy, they may then be seen busily engaged in extracting their food from the flowers. I have seen as many as eight or ten humming and hovering round the blossoms of the scarlet runners. The young ones fly about the first week in August; and, from that time until the middle of September, they perch in the sticks [placed to support the stems and branches] of the above plants. Here they will remain for hours, being fed by the old birds; whose affection for them is so great, that they will not allow any bird to come near them. The male of this species of humming-bird does not assume its full plumage until the spring; the female is a beautiful bird, but greatly inferior in splendour to the male. By remaining quite still near a flower they frequent, they will come within a yard of you. A friend of mine, on whose fidelity and accuracy I can depend, witnessed the following scene; which I relate in illustration of the pugnacious habits of these birds: — There is,

in the West Indies, a bird called the chicken-hawk: one of them had attempted to carry off a young humming-bird; when the parent bird flew with the rapidity of an arrow, and brought the hawk in agony to the ground, having pierced the posterior part of its body with its bill.

The last bird of passage that arrives here is the goatsucker, which appears by the middle of May. They are very numerous; and resemble the one in England, but are larger. On fine still nights, they fly very high, and make a loud humming noise with their wings as they rapidly descend. They call them in this country the mosquito hawk; a more appropriate name, as relates to the habits of the bird, than that of goatsucker. — *O. Clapton, Feb.* 1834.

Of the Forked-tail Kite, we have a few about us: it is provincially called the "crotched-tail puddock." One flew over the garden a few days ago, mobbed by several rooks. The gardener, on seeing this bird, remarked, "What fierce things they are when they 've got nests! I was along with a boy once, who got up to one; and the old one picked a hole smack through his hat, and scratched his hand properly, before he could make her go off the nest. There used to be a good many of them about here once, but there are not many of them now." The latter part of the last remark is perfectly correct. — *J. C. Witham, Essex, March* 20. 1834.

A Bittern was shot at Maldon, about six weeks ago. Bitterns are not unfrequently met with upon the marshes by the side of the river which runs to that town. — *Id.*

Some of the Habits of the Lesser Black-backed Gull (*Làrus fùscus*)*; as shown by an Individual of this Species in partial Confinement.* — The individual to be spoken of is at present in the grey or immature plumage, which, we are told, these birds retain for several years. He has the full range of a large garden, his escape being only prevented by having his wing cut; but he constantly prefers the neighbourhood of a large network cage, the residence of a pair of silver pheasants: not very congenial companions, one would suppose, for a roamer of the ocean. But such is the fondness of almost all animated beings for society of some kind or other, that, when that of their own species is out of reach, they will often attach themselves to creatures of a very foreign character. Near his gallinaceous friends our gull always sleeps, seldom straying to any considerable distance; though he seems to enjoy, at times, using his wings to the utmost of his ability; half-flying, half-running, in all directions, apparently for mere amusement. He is, however, very tame; and will, when hungry, follow any of the family about the garden, uttering a

peculiar cry, which always means that he is quite ready for a meal. Indeed, he has a most voracious appetite, and the capacity of his throat is truly astonishing: he has repeatedly swallowed, quite whole, with bill, claws, and feathers, various small birds which had been shot and thrown to him. Mice or other small quadrupeds appear equally to suit his taste; and, though he has no objection to butcher's meat, he seems rather to prefer small animals, notwithstanding the hair, feathers, &c., which sometimes give him not a little trouble to dispose of satisfactorily. The way in which he remedies this difficulty suggested itself the first time a bird was given him: I believe it was a skylark. After some ineffectual efforts to swallow it, he paused for a moment; and then, as if suddenly recollecting something, he ran off at full speed to a pan of water, shook the bird about in it until well soaked, and immediately gulped it down without farther trouble. Since that time, he invariably has recourse to the same expedient in similar cases, however distant he may be from the pan when any difficulty arises. He once, by this means, managed to swallow the head of a fowl; bill, bones, feathers, and all. He does not appear particularly to prefer fish, which we may suppose his more natural food; though he will eat it plentifully when hungry; and he is generally by no means nice in his diet, having lately eaten, with apparent pleasure, a putrid weasel, taking, however, especial care that it should not go down "tail foremost." I have some reason to believe that he casts up the bones, fur, and feathers of what he swallows, in the manner of the owls, &c.; as I have occasionally found a little bunch of very white bones, mixed with fur, near his sleeping-place. Whether or not this bird would have had any inclination to feast on his winged neighbours, had they never been given him when dead, I cannot say; but I have frequently observed him not only earnestly watching the small birds as they were hopping near him, but actually pursuing them for some distance: and, in one instance, almost successfully, for a chaffinch had nearly fallen a victim to his predatorial propensity, after he had chased it a considerable way. Altogether, he is an amusing fellow; but, as he has shown no small inclination to mischief, in plucking off the flowers, pulling up the labels, emptying the flower-pots, and scattering the mould over the walks, his fate is somewhat doubtful: and I fear it is more than probable that his life will have to pay the forfeit of his crimes. — *S. K. Sudbury, Suffolk* [*April*, 1834].

An Attack of a large Sea Gull, in the Manner of a Species of rapacious Bird, upon a Kittiwake Gull. — As the following

circumstance seems rather extraordinary, perhaps some correspondent will please to inform me whether it is known usually to occur among birds of the gull kind: — As I was returning from collecting fossils in the neighbourhood of Charmouth, Dorsetshire, my attention was drawn to a large seagull darting down into the river, and taking up in its feet (or bill?) a small gull (which afterwards proved to be a kittiwake) to some height in the air; when it let it drop, and caught it again, several times, till it came at last down towards the river: when I ran to the spot, and shouted as loud as I could; and made the large gull drop the bird, which I secured at last, in a dying state, by jumping into the river; and, having taken it home, preserved it for my brother's collection. The large one, however, hovered over for some time, with the view of obtaining it again. As the captured bird has, instead of a fourth toe, only a small warty protuberance, so remarkable, that we noticed it before we referred to Montagu or Bewick, it is impossible to mistake this for any other species than the kittiwake.

[*The Kittiwake is common on the Coast of Dorsetshire.*] — It is rather remarkable that Montagu should mention the kittiwake as a rare bird in the south of England, he having stated only one instance as occurring, in which three birds of this species were washed ashore in Devonshire. My brother and myself shoot them more commonly than those of any other species of gull. I may also mention

A few rather rare Birds that are met with in this neighbourhood; namely: — Purple sandpiper (Trínga marítima), grey phalarope (Phaláropus lobàtus), bee-eater (*M*èrops apiáster), whimbrel (Numènius mìnor), ash-coloured falcon (*C*írcus cineràrius), merlin (Fálco *Æ*′salon), cirl bunting (Emberìza *Círlus*), red-legged crow (*G*ráculus rùfipes), red-necked grebe (Pódiceps rubricóllis), stone curlew (*C*haràdrius œdicnèmus; and the forked-tail petrel (Procellària Leàch*ii*), which was found dead in a field at Charmouth. All of these, except the *M*èrops, are in our collection. The *M*èrops is now in the collection of Dr. Roberts, at Bridport: it was shot at Chidcock some years since.

In the Sherborne paper, another instance is mentioned of this bird having been shot, somewhere near Plymouth, on April 1. 1818. It is now, I believe, in the British Museum. — *Beverley R. Morris. Charmouth, Dorsetshire, Feb.* 1. 1834.

A common Heron, which I kept for some months in my garden, would, when disturbed, disgorge the contents of its stomach. This is probably a provision of nature to aid the

escape of the bird by flight when pursued.—*J. G. Lexden, Essex*, 3d of 4th mo., 1834.

[The disgorgement may subserve to this effect, but is not fear the operating cause of it? We have been told, or have read of a vulture, or some bird, which, on being carried in the arms of some one, disgorged upon the dress, or person, of the carrier. A heron, disabled of flight, and captured, which we once saw carried in the arms, did not so (its stomach might be empty), but made a somewhat vigorous unexpected peck at the face of the person carrying it.]

The Falcónidæ, all of them, like the Owls, return by the Mouth the indigestible Remains of the Food they have swallowed, and generally just before they go to look for a fresh supply.

Insectivorous Birds also reject or disgorge the indurated parts of coleopterous insects.—*Y. May* 25. 1834.

[*The Gulls, it would seem* (p. 512.), *and the Rook* (244. 460.), *also return by the Mouth the indigestible Remains of their Food.*]

The Eggs of the Carrion Crow are sometimes covered. (VI. 209.)—I am nothing of an ornithologist, and feel by no means inclined to question the allegations of such a writer as Mr. Waterton, but I think the following remark (VI. 209.), in reference to the nest and eggs of the carrion crow, should be received with some qualification:—"Not a single particle of the lining of the nest is ever seen betwixt the eggs and the eye of him who has ascended the tree to take a view of them." This, I am bound to believe, had I no other authority than that of Mr. Waterton, is generally the case; yet, certainly, not universally. I climbed a birch tree last year, on which was situated a carrion crow's nest: it contained four eggs, and of these two only were visible, the others being covered by a quantity of loose moss, and wool, contained in the interior of the nest. This is the only instance I have seen, but I am persuaded that it is an occasional occurrence, or it would not, probably, have fallen under my observation, during the few opportunities I have taken of examining crows' nests. I presume, however, that the nest of the carrion crow is most frequently perfectly smooth, as Mr. Waterton says; but I have observed it in two or three instances to contain more or less loose materials, such as wool, hair, moss, &c.—*J. Jones. Gelly, Llanfair, Montgomeryshire, March* 28. 1834.

A pair of crows take up, generally speaking, a certain district, from which they beat all intruders; and woe betide the unfortunate straggler that chances to search for a dinner upon their domain. If one of the pair that is thus located be killed, another partner is immediately procured, and domi-

nion exercised as before. I once observed a pair of crows using the materials of the nest of a former year, in constructing a new one; and it struck me as a specimen of much forethought, for there certainly must remain a considerable portion of the old nest perfectly efficient for the construction of the new, and in thus using those materials much extra-labour must evidently be spared.—*C. Conway. Pontnewydd Works, near Newport, Monmouthshire, Jan.* 20. 1834. [In IV. 412. the notion that every robin has a distinct range of pasture is expressed. In VII. 245. is an instance, in the redstart, of a parent, widowed one day, having a second partner the next. Do not rooks, every spring, in building their nests, use part of the materials of the old nests?]

A tame Jackdaw so attached to its Protector as to accompany him wherever he may go.—Six weeks or two months ago I attended a coursing meeting, composed, altogether, of at least two hundred persons, where I was very much struck with a tame jackdaw that kept flying one minute close over our heads, the next perching on some bush or tree not ten yards off, and every now and then fearlessly lighting on the ground in the midst of the crowd of footmen and horsemen. Upon enquiry, I found that Jack belonged to a poor boy, six or seven years old, who had come to see the coursing, and who, wherever he went, was constantly accompanied by his faithful follower. Let him wander from home as far as he might, Jack never failed to attend him; perpetually hovering about and repeating his cry of affectionate glee. Others might approach him, but he would suffer none to touch him, save his master only.—*Tiro. March* 6. 1834. [*Post mark, Wrexham.*]

The Song of the Jay described.—Jays are, unfortunately for our pea-growers, numerous in this neighbourhood. I had never, however, heard a jay sing until last April (1833), and had become rather inclined to doubt Montagu's statement regarding its singing. On April 19., I took a walk to the mountain side, and, passing through one of our shadowy overhung mountain lanes, in search of mosses, it led me through a small wood far away from human intrusion. Here my attention was arrested by a rustling in the wood, accompanied by a great clatter, and occasionally interspersed with more sonorous tones. Directing my attention closely to the part of the wood whence the sounds came, I at last descried a jay in continued action, fluttering and shuffling, and leaping from spray to spray in continued motion, and in uninterrupted song. My presence, at first, disturbed the bird, but it soon got the better of its timidity, and again fell to singing. It mocked the greenfinch most inimitably, and it was a consi-

derable time before I could persuade myself that it was an imitation. But what amused me most of all was its production of the neighing of the horse. This was so near the truth, that some companions who were with me were a long time before they would be convinced that the sounds proceeded from the bird. The neighing was very subdued and suppressed, but it bore the most striking resemblance to the neighing of a colt heard at a distance; indeed, so close was the imitation, that, without a sight of the bird, no person could possibly, I think, be persuaded that the sound proceeded from such an agent. These imitations were accompanied, occasionally, with more subdued and very melodious notes. Before I had parted with my mocking friend, I wished to have farther proof of its skill; I therefore whistled in different notes, and was immediately answered in exactly the same strain. I was disappointed in the object of my ramble; but was abundantly satisfied in being so fortunate as to hear the song of the jay.—*C. Conway. Pontnewydd Works, near Newport, Monmouthshire, Jan.* 20. 1834.

Ducks with the Toes not connected by a Web or Membrane, and the Upper Mandible imperfect: presumed to have proceeded from a Union between the Domestic Duck and Domestic Fowl. —The notice on hybrid birds, in p. 153., recalled to my mind the seeing once some apparently hybrid ducks about the aquarium in the Cambridge Botanic Garden, and led me to apply to Mr. Arthur Biggs, the curator of that establishment, for some information on them. He has obligingly replied (in a communication dated April 19. 1834) to the following amount:—"The ducks were three: they were bred at a small farm at Gamlingay, Cambs, and were bought, about seven years ago, by Mr. Bowles, veterinary surgeon, Cambridge, who sent them to the Botanic Garden, and, after they had remained here some time, presented them to the London Zoological Society: they were added to the Society's farm at Kingston, Surrey. I have not heard any thing of them since. All that I can recollect about them is, that they differed from common ducks in the upper part of their beak being twisted and jagged, and so much smaller than the lower part, that it was with some difficulty that they could gather up their food; and in being not web-footed, but having feet like those of a hen. The colour of one of them was a dark brown, like that of some hens; the other two were nearly of the usual colour of common ducks. One of them manifested a dislike to go into water; so much so, that, when driven to the water, it would turn away. The general appearance, and the habits of all were such as to induce many persons to suppose that they

were mule beings which had been produced from a union between the common species of duck and the common species of fowl." It will be observed that it is not intimated of what species the supposed male and female parent were conjectured to be. We have ascertained, however, that at the examination, after death, of one of the specimens sent to the Zoological Society, the form and character of the bones, and of all the viscera, were those of a true duck.]

The Ringdove (*Colúmba Palúmbus*) *in a good Degree domesticated.* (p. 332.)—As it is stated in all the ornithological works that it is impossible to domesticate this bird, I was determined to make the experiment myself, in order to ascertain the truth or falsity of the assertion. I accordingly procured a pair of fledged ringdoves from a nest, confined them in an aviary, and fed them on young peas and barley. When I had kept them about a month, the female died, and I turned the survivor out: he immediately flew to a neighbouring wood, and I expected that I was then seeing him for the last time; but, to my great astonishment, I found him a few hours afterwards, perched upon a box inside an open shed in which my pigeons were kept. This was ever afterwards his favourite station, and he never showed any inclination to repair to his native haunts (as it is said they invariably do, when turned loose), but always remained with the other pigeons, and followed them in all their windings and circuits. On the 12th of January, 1833, he fell ill, and died a few days afterwards: he was in my possession six months.—*W. H. H. Burton on Trent, July* 5. 1834.

Facts on the Quail (*Cotúrnix vulgàris* Fleming).—I found, on August 12. 1833, a quail's nest in the middle of a field which had been of barley, but in which clover was then growing. The nest, placed upon the ground, was made of grass and a few straws and clover stalks; it contained ten eggs, which were pear-shaped, with large and small brown blotches, upon an ash ground. This bird's natural shyness was much diminished during incubation; so much so, that she would almost allow herself to be caught, without quitting the nest; she was, however, so frequently disturbed that she entirely forsook it after sitting about a week. Pennant says that quails resort to Essex in considerable numbers, and remain during the winter; I think, nevertheless, that the bird is rather an uncommon one in this part of the county.—*J. C. Witham, Essex, March* 20. 1834.

An Instance of the Robin's building its Nest in a Festoon of a Bed, and rearing a Brood of Young there.—I have a friend who resides a few miles from town, and during the late fine

dry weather the windows of some of the upper rooms in his house were seldom closed. A robin took advantage of this circumstance to pry into one of the apartments, one which was seldom used, and, finding no opposition here, she began to build her nest in a festoon of the bed. It happened that, during the time of sitting, the gentleman's son came from school on a visit, and the bed was wanted; but this did not in the slightest degree disconcert the robin; she seemed not in the least afraid, kept possession of her nest, and successfully reared her brood. The family, of course, felt interested in the bird's fate, and therefore as little disturbance as possible was given; but one would have imagined that the mere fact of a person bringing a candle into the room, dressing and undressing, would have been sufficient to have effectually driven the creature away.—*William Fowler.* 49. *Poland Street, May* 15. 1834.

The Mountain Sparrow (*Pyrgìta montàna*) has been repeatedly shot here this winter.—*J. G. Lexden, near Colchester, Essex,* 1834.

A Pair of the Greater Titmouse (*Pàrus màjor*) *has built in a Pump* (VI. 34. notes * and †); *exhibited seeming Foresight there* (V. 660, 661.); *and has had, there, a Nest of Young and a Nest of Eggs at the same Time.*—A pair of this species occupied, last summer (1833), for the purpose of incubation, a pump standing in my yard. Their *nests* were placed between the barrel and the outside casing, and, as the pump was not in use during the summer, the birds were very rarely disturbed. The edges of the nests being on a level with the rim of the barrel of the pump, these little birds exhibited a degree of foresight equivalent to that which is related of a pair of this species in V. 660, 661., by filling the barrel with a mixture of moss, hair, &c., to prevent, no doubt, their young from precipitating themselves into it. Some time previous to the first brood being able to fly, in fact, only a few days after they were hatched, the old birds commenced building a second nest on the opposite side; in which, in due time, were deposited nine beautiful eggs, on which the female began to sit a day or two previous to the other brood leaving their domicile. From daily observation, I found that there was always an additional egg deposited early each morning, and although I often visited the old bird during the period of incubation, still she never offered to leave her nest, but merely puffed herself out, and exhibited every appearance of great irritation. This is the first instance of a pair of birds having a brood of young ones, and a nest of eggs at the same time, which has come under my observation, except the instances of this in the do-

mestic pigeon.—*J. D. Salmon. Stoke Ferry, Norfolk, May* 28. 1834.

Reptiles.—*The Fascination of Birds by Reptiles* has often been heard of. A curious instance of it was witnessed by a friend of mine, an officer in the Madras army (Lieut.-Col. Ross, then captain in the 10th Native Infantry), where the operator was not a snake, as is usual in such cases, but a crocodile, or, as we improperly call it in India, an alligator. My friend, while taking a stroll round the works at Vellore, had his attention attracted by the strange restlessness and apparent distress of a kingfisher bird (*Alcèdo smyrnénsis*), perched upon one of the pinnacled battlements of the fausse-braye: on his cautiously approaching near enough to ascertain the cause, he observed in the ditch immediately underneath, a crocodile lying perfectly quiet in the water, and intently watching the bird with open jaws: in the mean time the victim's agitation continued to increase: it fluttered down to a projecting point of the works, then rapidly again and again farther and farther down, till at last it actually dropped into the gaping mouth waiting ready to receive it. Although I had this account at second hand only, I have not the slightest doubt of its truth. —*A Subscriber. Vale of Alford, Aberdeenshire, Nov.* 20. 1833.

Toads have the Power of compressing themselves so as to pass through a small Aperture.—Staying some time since with an acquaintance, his servant one day brought in, from an outhouse in the garden, an old tin canister which had been used for containing gunpowder, in which was composedly seated a very large toad of dimensions thrice the size of the aperture through which he must have entered. From his appearance, we concluded that he had located himself there in his younger days, and was now too large to extricate himself. The canister was placed carefully by, as an interesting exhibition to future visiters; but, on an inspection of the canister in the following morning, the prisoner had made his escape; and, as the mouth of the canister was in the same state as before, we could only account for the toad's absence on the supposition of the animal's being able to squeeze itself through. Has this fact been noticed before? It may, perhaps, help to explain some of the well-known instances of the occurrence of toads in apparently close prisons either of trees or rocks. [Some instances are given in VI. 458, 459.]—*A. Bloxam. Rugby, Warwickshire, Jan.* 1834.

"A toad in a hole," is a proverbial expression, of which literal instances are not, I believe, rare in upland pastures. One was once, in 1832, and, I believe, in July, shown to me, the circumstances of which were these:—There was a circular

aperture in the turf, scarcely 1 in. in diameter, below which the head and eyes of a toad were observable: its body was too much in the dark to be readily seen. This, it now occurs to me, was a very pleasant cool grot for a place of residence at this season. How long had the creature been there? and upon what did it subsist? As the earth and turf would yield to pressure, the toad could scarcely have, in this instance, squeezed itself in and out occasionally. Enough, possibly, of insects to sustain it might attempt to pass over the aperture and fall in. Earwigs, I have been told, are eaten by the toad. From what I learned from the companion who showed this instance to me, it seems to be the practice of the boys to irritate the toad which they find thus circumstanced by applying to it the end of a stiff straight straw, and provoking the toad to grasp it in its mouth, when they lift it up, although not, so far as I understood, out of its hole.—*J. D.*

Fishes. — *The Salmon enters and ascends Rivers for other Purposes besides Propagation.* (p. 211.) — In addition to the objections which I have offered, in p. 211. *, to the seeming doubt of Dr. Fleming, whether salmon enter rivers for any other purpose besides propagation, the following have come to mind; and, though they do not apply to the salmon, they confirm me in the opinion that there are reasons, of which we know nothing, for fish ascending rivers, and others not at all connected with propagation. One is the habit of (what is here called) streaming. In the winter, the fish not engaged in spawning (I speak of trouts, grayling, chub, dace, &c.) leave the streams, and go into deep water; either because the water is warmer there, or because they there find more food: and it is well known to fly-fishers that they do not catch many fish in the streams if they begin early, say in February. It is proverbial here, that fish begin stream when the great grey (in other districts, the *devil* dule crook, March brown, or brown drake [an insect]) comes upon the water; and I have seen trout by scores leaping at a weir at the beginning of May. Whether this is in search of food, or an instinct implanted in them to keep all parts equally stocked with them, I do not know; but it had certainly nothing to do with

* In p. 213. line 15. for "to the side" read "to side." The phrase "to side" is a local one, probably, and ought to have been explained. It means that the salmon endeavours to conceal itself under a large stone, root, or any object which appears to offer it a shelter from its pursuers; and it may be either at "the side" or in the middle. If there is no place of concealment in the pool, the poacher provides one, by placing the branch of a tree, well covered with leaves, or with the rubbish left by the floods; and the silly fish, seeing this, darts there for security, and is easily leistered [speared].

their spawning. Is it presumptuous to suppose that God, in his providence, has implanted this instinct in the salmon for our good? that we might have a supply of excellent and wholesome food; which, without this, would be in a great measure unattainable. Whether this is the true cause, and the only one, I am unable to determine; but this is the effect produced: and, in the absence of other reasons, it is, in my opinion, one that ought to be admitted.

Another reason why fish ascend rivers is, their impatience of heat: I speak now more particularly about grayling. If the weather is very hot at the end of May or the beginning of June, the grayling in the Wharfe (they are almost unknown in this part of the Ribble) ascend the mill-streams by hundreds, and go up the wheel-races as far as they can get; and stay there until the stoppage of the wheels (many a ducking have I had in pursuit of them), when they are obliged to beat a retreat: and this often proves a disastrous one to many of them. The ascent of young eels by millions, and the ascent of the flounder, are neither of them connected with the propagation of their kind; and, though I cannot say for what purposes they do ascend, I am, I think, justified in doubting assertions which seem to have nothing to support them but the positive manner in which they are made. — *T. G. Clitheroe, Lancashire, May* 29. 1834.

The Salmon Par is neither a Hybrid, nor a distinct Species, of the Genus Sálmo, *but a State of the common Salmon*. (p. 204.) — The author of *Wild Sports of the West* says, of the par (as I have noticed in p. 204.), that it has very much the appearance of a hybrid between the salmon and the trout; and (in a note) that the natural history of this fish is doubtful. Some conjecture that it is a hybrid between the salmon and the trout, because it is only found in rivers frequented by salmon; others think it a cross [breed] between the sea [trout] and river trout: and he speaks of this "hybridous diminutive" as if he thought one of these opinions correct. That the par is not the result of a cross between the sea trout and river trout is proved by the fact, that there are no sea trouts in the Wharfe; the salmon, par (admitting it to be a distinct species, which I do not), and trout being the only kinds of Sálmo which are found in that river, at least where I am acquainted with it. If the par be the result of a cross between the salmon and the trout, what becomes of it in the spring? and where are all the par, which were so abundant in October, gone to in April? Did they migrate to the sea, the shoals would be met with by somebody; and, did they stay in the river, they would be caught at one time or other. As, however, it is well

known that neither of these cases is ever realised, we must suppose another, which I have already done in my former communication. (p. 202—217.) In fact, in angling in the beginning of March, fish are often caught, which it would puzzle the most experienced fisherman to determine whether they are par or smelts, especially after they have been caught some time; and, in a large number caught at that time, there are all the intermediate shades of appearance between the perfect par and the real *blue* smelt. — *Idem.*

Insects. — *Extreme Cold does not destroy the Life in the Eggs, &c., of Insects; with some Facts on Lycæ̀na díspar.* — Mr. Browne relates some interesting facts (p. 246.) in proof of the little effect produced by extreme cold in destroying life in insect eggs.* The vulgar notion is (and *à priori* it seems a probable one), that a severe winter is destructive of insects; and, consequently, that there will be fewer than usual during the succeeding summer. Experience, however, shows that this is not the case; and that the scarcity or abundance of insects has little or nothing to do with the severity or mildness of the preceding winter. The fact is, insects, either in the egg, larva, pupa, or perfect state, are, in the ordinary course of things, *liable* to be exposed to severe cold; and, therefore, nature has provided for them accordingly, endowing them with constitutions calculated to endure the degree of cold which they will have to encounter. It may be added, that these little creatures seem to be proof also against some other vicissitudes of nature less regular in their occurrence than the periodical returns of winter's cold. The following fact, communicated to me by the late Mr. Haworth, may serve as an illustration: — Some entomologists once made an excursion into the fen countries, for the purpose of taking the beautiful Lycæ̀n*a* díspar, or large copper butterfly; which, it is well known, frequents low marshy grounds. The coppers were captured in good abundance. It so happened that the following winter proved to be a wet one; and the entire tract of land where the coppers had been found was completely inundated, and actually lay under water for a considerable time. The entomologists deemed that the flood would certainly destroy the coppers, and that the race would become extinct in that part of the country. The next summer, however, the butterflies were found again, in the very same spot, as plentifully as before. Subsequently, as Mr. Haworth in-

* [In giving Mr. Brown's communication, we have blundered, in p. 246, 247., by omitting the minus mark from the statement of the compared degrees of temperature indicated by the thermometers of Reaumur and Fahrenheit: the cited temperatures were all below zero. — *J. D.*]

formed me, the tract of land was submitted to the action of fire, and the whole surface burnt with a view to agricultural improvement. I need hardly add, that, after this operation, the coppers were no longer to be met with in that particular locality. I am not sufficiently acquainted with the natural history of the insect to say in what particular state the insect passes through the winter; probably in the egg or larva state, as the butterfly appears in July.

The earliest Vernal Appearance of certain Species of Butterfly in Britain. (p. 249.) — Mr. Brown alludes (p. 249.) to my having instanced the 18th of March as the earliest date at which I had ever known a papilio issue from the chrysalis. This year an earlier instance presented itself. A small specimen of Póntia ràpæ (P. Mètra Stephens) was discovered in my scullery window on the 27th or 28th of February, evidently fresh from the chrysalis. Being introduced into the drawingroom by a very young entomologist, it was lost sight of for a few days; so that I did not myself see it till the 3d of March, when it was again discovered and turned up. The same individual specimen, known by a peculiar mark on the wing, was observed flying about at large, in the garden, on the 15th of March.

With respect to the Butterflies which appear in the early Spring (p. 247.), I am disposed to think that, with *us*, the majority of them are such as have been produced late in the autumn, and have survived the winter in the winged state. Mr. Brown is led to the conclusion that, in Switzerland, at least, "the early flight of Gonépteryx rhámni consists entirely of newly excluded males." I am not prepared to say that the case may not be the same also with this species here in England. Possibly, however, some of our early specimens may be such as have hybernated; while others may have burst from the chrysalis in the spring. The earliest specimen of G. rhámni I observed in 1833 was on the 31st of March; a female, which, from its worn condition, I should not judge to have been a newly excluded fly. I feel confident that Vanéssa Io, c. álbum, Polychlòros, and urtìcæ hybernate, at least in this country. A winter seldom passes without an example or two of the latter insect being found in a half torpid state in our windows. If these insects be in good condition when they retire to rest in autumn, there will be but little wear and tear to injure their wings during their brumal retreat, and prevent them appearing fresh when they come forth again in spring. So far as my observation goes, the early specimens of Vanéssæ generally seem somewhat faded in their colours, and to want the exquisite freshness and brilliancy of newly excluded

flies. Hippárchi*a* Ægèri*a*, Polyómmatus Argìolus, Póntia brássicæ, ràpæ, nàpi, and cardámines, which appear in April, and some of them occasionally earlier, all assume the winged state in spring. But, with the single exception of Gonépteryx rhámni, the Vanéss*æ* are the *first* butterflies that present themselves in the season. Còlias Edùs*a* is said to hybernate (see *Lepidoptera Britannica*); and I think it highly probable, as well for other reasons as from having taken it in a perfectly fresh state so late as the 1st of October. But the species is so rarely met with in this part of the country, that I cannot speak, from my own experience, to its vernal appearances.

Mr. Brown would be conferring a favour on myself, and, perhaps, on some other of your readers, if, through the medium of your Magazine, he would give a list of the papilios of Switzerland; noting the times and places of their appearance, and their comparative scarcity or abundance. It happens, I believe, with insects, as with plants, that some of the European species are less known in this country than those of South America, the West and East Indies, China, the Cape, &c. —*W. T. Bree. Allesley Rectory, May* 12. 1834.

[The conductors of botanic gardens on the continent of Europe, in the interchange which they practise with the conductors of botanic gardens, &c., in Britain, say, in effect, "Accept from us seeds of the plants of Europe: return to us seeds of plants of the two Indies, the Cape of Good Hope, Australia, and South America, &c.; for your easy acquisition of these, by means of your extended facilities, renders it more practicable for us to obtain them intermediately through you, than immediately from the native countries." This state of things is in accordance with Mr. Bree's view.]

Malàchius bipunctàtus Babington *is a distinct Species.* (p. 378.)— Messrs. Babington and Westwood have given, in p. 378., figures, &c., of Scólytus æ`neus *Pz.*!, Malàchius *ruffi*cóllis *Pz.*, and M. bipunctàtus *Bab.* ♂ and ♀? for which I am much obliged, as other entomologists probably are, as they tend to remove *all* doubts on the subject. From the figures 49. *b* and *c*, they certainly appear distinct from *d*; although Mr. Stephens (who multiplies species on less characters than these) does not consider it so *in the last* edition of his *Guide*, genus 280. sp. 10., by putting bipunctàtus *Bab.* between brackets. The reference made by me, in *MS.* to Panzer, was copied from Stephens's *Catalogue*, viz., f. 2. pl. 8.*; which is merely changed by [J. D., he] thinking f. meant fig.

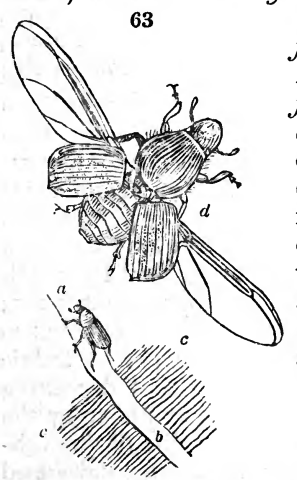
* And in Panzer's *Index Systematicus* to his *Faunæ Ins. Germ. Initia*, in p. 9., under Malàchius, is 7. *ruficóllis* ii. 8. (not 10.)

instead of fauna. It is well that Mr. Babington has called fig. 49. *a* Scólytus æ`neus, otherwise tyroes might have thought he intended it for the *true ruficóllis*; as Mr. Babington, in V. 330., describes the red part of the elytra as *exceeding* one half, which is not the case in his figure of *ruffic*óllis *d.* Mr. Babington also describes bipunctàtus *Bab.* as having, near the apex of each elytron (V. 329.), "an *impressed* slightly lunate black spot;" but, Mr. Westwood (VII. 379.) says, "of the extremity of the elytra, which thus appear to be *appendiculated* in both sexes of this species," as in bituberculàtus. I have taken four individuals of a species nearer to *ruffic*óllis *Pz.* than the others, at different times, near the Meres; one last year, near Ugg Mere. They all appear to be ♀: but the red part of the elytra is *scarcely so much* [large] as in Panzer's figure; and at the extremity of one of them is a dusky spot, which approaches so near Mr. Babington's description, except the impression, that I had thought [VII. 178.] it was the same; but I now find it to be distinct. I have taken three of M. bituberculàtus in the New Forest: one in May last. — *J. C. Dale. Blandford, Aug.* 3. 1834.

*Helòbia Marshall*àna. — Specimens of this species were found under stones, on the summit of Skiddaw, in great abundance, on Aug. 27. 1832, by our correspondent E. Wilson, jun. For the state of the weather at the time, see p. 539.

Scólytus destrúctor Olivier (*fig.* 63. *a*, natural size; *d*, magnified) *is not a Destroyer of healthy Trees. The Trees into whose Bark the parent Scólytus perforates to deposit her Eggs, that the Larvæ hatched from those Eggs may feed upon that Bark, are diseased dying Trees.* — The grounds of this opinion are detailed in IV. 153. (Letter B.)—156. An opportunity for testing it now offers itself to any entomologist of London, in a case to which the following circumstances appertain. On the north side of Hyde Park, a belt of trees is situate alongside the boundary fence in the Park, and of the length of it. This northern boundary fence was, so lately as 1832, constituted in a certain part by an old brick wall, now removed. The point atwhich the old wall commenced may be stated at about 300 yards west of Park Lane, and it

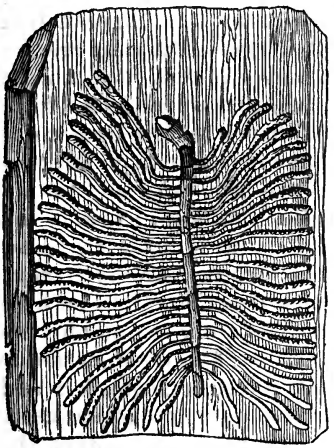
63



extended farther west, a length of about 150 yards: it was opposite the interval included between the street which leads off the Oxford Road into Connaught Square, and the Hanover Square burying-ground, and extended, perhaps, even a little farther west than the frontage of the burying-ground does. This length of wall was, in about August, 1832, taken down; the foundation of it was cleared away, and a new wall, dwarfer, and surmounted by an iron palisade, has been erected in its site and stead, and uniform with the fence (using this term to imply both wall and palisade) which had been previously erected at each end of it. Of the trees contiguous to the specified length of wall, there are twenty-two (twenty elm trees, one oak tree, one ash tree), standing within from 5 ft. to 8 ft. of the foot of it. In digging out scope of access to the foundation of the old wall, in removing the old materials, and providing scope for the foundation of the new wall, it will be plain, on reflection, that no small injury must be occasioned to trees growing so near as this, from both the exposure and the mutilation to which their roots must be subject. The erection of the new fence was completed in about October, 1832; when I presume that the soil was levelled down at its foot, and all left finished as we now find it. Of the twenty-two trees standing so near to the wall as I have stated, fourteen are now (Sept. 1834) so mortally affected that most of this number will, when their present leaves have fallen, never more bear others. The crop of leaves which they this year bear is a full one; and to the passing eye their leafy heads exhibit so little dissimilarity to those of the neighbouring trees, that, up to August 22., I had not observed, in passing them occasionally, any difference in their condition. On this day my attention was drawn, in passing, to first one, and then another of them, by the buzzing and the bustling of numerous large flies upon and about the stems of some of them. Since that time I have examined the trees several times, and acquired the following facts and notions respecting them. The bark of fourteen of them (all elm trees) has been perforated by the Scólytus destrúctor; the perforations in some of them are rather numerous, but in nearly all of them have been made by the parent female Scólyti, to effect their ingress for the purpose of depositing their eggs. The holes of ingress made from without by the entering female Scólyti are usually most readily distinguishable from those made from within by the Scólyti developed from the introduced eggs in gnawing their way out; those made by the former are larger, less uniform in figure, and less definite in outline, than those made by the latter: the

former have, too, not rarely a powdery matter, derived from the gnawed bark, discernible near them. I premise this for the sake of stating that the perforations observable in nearly all the fourteen trees have been made this summer by entering parent Scólyti; and I say "nearly all the fourteen," to preclude it being objected that a few of the perforations to be found upon two or three of the trees have been made by Scólyti making egress from within in a previous season. About fifty larvæ it seems (*fig.* 63. *b*, *c*) are hatched from the quantity of eggs introduced by a single parent Scólytus, and as every perfect Scólytus which is developed from these larvæ gnaws, for its own egress, a distinct hole, plenty of these holes may be expected to be visible after May, in 1835. (*fig.* 64.)

64



Seven of the fourteen trees, besides being perforated by the parent Scólyti, have been subject to a considerable extravasation of sap: this, one is led to perceive, by observing the actions of the flies so abundant, as noticed above, upon the surface of the bark of the stems and larger branches. Those of the flies which are alive are busily occupied in licking the sap from the natural fissures of the bark, from larger openings in it occasioned by past wounds or defects, and some, also, it is right to state, from the orifices of the perforations made by the parent Scólyti. Those of the flies which are dead are, however, more numerous than the living ones, and they adhere, in the posture of life, over all parts of the bark of the trees, here scatteredly, there in clusters in the neighbourhood of some opening which had yielded an effusion of sap, and they are in all stages of decay, from those fresh dead, to those with loosened wings shaken by the breeze, to those without wings, and those a mere whitened mass, in which scarcely the form of a fly remains. There were some dead flies attached to the under surface of a few of the leaves. The flavour of the sap is, to my taste, much that of slightly sugared water, and it is probable that the great number of flies which have died here have died of repletion, rather than of any poisonous property in this sap taken by them as food. Of the clusters of flies, it should be observed, that there were also some clusters or

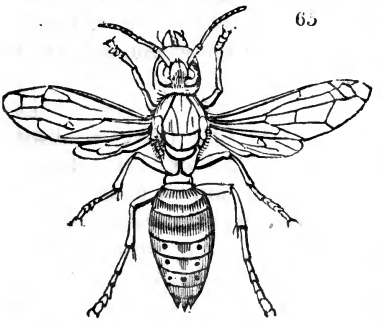
groups of living ones, where the wound in the bark was large enough to admit a group to pasture together. Nearly the whole of the flies were of the common blow-fly species (*Músca vomitòria*), but a not uncommon brassy-green species was there, and another small species or two, and a few wasps, and always one or more hornets: at one time I saw three, and I think four, of the latter animal. Of the seven trees into which the parent Scólyti had perforated, out of which the sap had extravasated, and upon which the flies, wasps, and hornets have been and are (Sept. 10.) feasting, I think I may state that, although their leaves are not, as I have already stated, strikingly dissimilar to those upon neighbouring healthy trees, they yet, to a close inspection, seem somewhat flaccid and drooping, and as if tending to earlier sereness than those of their neighbours.

To return to the Scólytus. Those who will have it that this poor pretty little beetle is the formidable foe to healthy living trees, and to the interests and wishes of man, that it is represented to be, have now, to account for the facts I have stated, it seems to me, only to say, that "the perforations of the Scólytus induced the extravasation of the sap, and the perforations and the extravasation have brought the trees into the dying condition in which you describe them to be." To this conclusion, should any one incline to it, there are these objections:—First, as to Scólytus perforating healthy trees at all; none of the healthy trees neighbouring to those whose roots have been, as I have argued, injured, are at all perforated. And, were it admitted that the Scólytus does perforate into healthy growing trees, and occasion their death, it would surely be too much to admit that the symptoms of mortality would be induced, in trees healthy and growing, within the very same year or season in which the perforations were made. The erosions of the numerous larvæ (which, it is said in IV. 152., are hatched, in September, from the eggs introduced by the perforating parent in June and July) subsisting upon the inner bark, and, perhaps, alburnum, of the tree, and eating their way out, might induce, in the year following, death indeed. Under this view, the particular trees I have cited, should live through, at least part of, 1835, which I anticipate they will not. Next, as to the perforations of the Scólytus inducing the extravasation of sap. The period at which the parent Scólytus bores into trees is intimated, in IV. 152., to be June and July. From the decayed state of the remains of some of the dead flies observed on August 22., it is not too much to infer, that the flies had drunk of the sap of the trees by about this time, and that, this admitted, it was effused

to them, independently of the effects of the perforations of the Scólyti. Again, of the fourteen trees perforated by Scólyti, although seven show extravasation of sap, the remaining seven do not show it at all.

"Give a dog an ill name and hang him." I cannot help thinking that the Scólytus is deserving of much more respect than is bespoken for it in the epithet destrúctor; and I had, in this belief, called it, in my own vocabulary, ínsons, as early as in the index to Vol. IV.—*J. D.*

The Hornets (*Véspa Crábro, fig.* 65.), spoken of above, fed upon the sap with diligence and earnestness. One, that I observed more than once, kept its head partly immersed in a crevice for a long time together. The wedge-shaped figure of the lower part of the head causes it to fit a crevice aptly; and then the lateral action of the mandibles, if these be used in feeding upon sap (some of the sap was of a pulpy consistence), in such a situation, must be very convenient indeed. Of the flies, eager to share every good, some would gather about any of the hornets to partake of the feast it had found, and, in their eagerness, prove too intrusive; when the hornet would lash them with its antennæ to drive them off (and, thought I, this is at least one use of antennæ, about the office of which entomologists have never been agreed). When this would not do, the hornet would leave off feeding, and run a few steps at the flies, open-mouthed: the flies scampered away quickly. The hornet's mouth almost frightened me, and well it might the flies. I found, too, that the flies had real reason to be a little fearful; for I saw two instances of a fly being in the jaws of a hornet. In one, the hornet was alighting, I think, with the fly in its mouth (if not, it captured it on alighting); and, curving its body round the fly, as if to prevent its escape, and while itself hanging but by a single toe (as one might say), bit off the fly's head, whose body fell to the ground. It may be right here to note, that the heads and bodies of flies were somewhat numerous upon the ground, at the foot of the trunks of the trees; but I suppose that these, or most of these, were fallen portions of some of the numerous dead flies which were sticking over the surface of the bark. The other instance was this: — A hornet flew down



65

with a fly in its hold; and, after standing still a moment, then walking over the grass with it, mangling it the while, it flew off with it. The hornets seemed to be on good terms with each other: it was a clear case of "parcit cognatis maculis similis fera." Of

Wasps here, although there were some, there were scarcely so many as one might expect to find at such a banquet. It is not unlikely that, had an entomologist been present, he would have noted more species than one. I observed one small one with its abdomen so pubescent as to seem almost hoary with it. As a wasp flew round a tree, the flies flew up; and I thought that they did this more to a wasp than a hornet. Was this from fear? Had it been from the vibration caused by the wasp's or hornet's wings, it would have been done most to the hornet; but my observation did not extend to a sufficient number of instances. — *J. D.*

The Dung Fly dead in the Posture of Life. (61.) — I have, for many years, observed, in August and September, flies of this species fixed in the manner Mr. Fennell mentions, in p. 61., upon the leaves of a lilac tree near to the door of a convenient outbuilding in my garden. They are, however, invariably fixed by the proboscis alone, which seems to be agglutinated to the leaf: every other part is free. I have never found one so fixed which had any life remaining in it. They are all precisely in the same attitude; and are covered with the mould Mr. Fennell mentions. I have at times removed all I could discover; but found them replaced, on the morrow, by others equally mouldy, and in similar attitudes. Although I have watched, I have never been able to discover one in the act of affixing itself; and have often puzzled myself with attempting to discover the object nature has in view by causing this fly to terminate its existence in so singular a manner. As nature does nothing without an object, I should presume that there is some reason why this particular fly should die, and be fixed, in this manner, instead of terminating its existence like other flies. — *Thos. Thompson. Hull, Jan.* 9. 1834.

[*Flies, of various Species, dead in the Posture of Life.* (61.)] —This condition is not peculiar to the dung fly. I have often seen the house fly in its natural posture, on the windows, dead, and covered with the same sort of white substance as that to be found on the dead dung flies. This last does not, under the microscope, present any peculiar appearance. I have not been able to quite satisfy myself whether it is a fungus growing on the dead animal, or is produced by disease. — *E. T. S. Feb.* 17. 1834.

E. T. S. seems not to have observed the dung fly's being affixed by its proboscis only, as Mr. Thompson has. In Kirby and Spence's *Introd.* (ed. 1826), iv. 203., mention is made of "several specimens of a fly related to Eúmerus pípiens *Meig.*," which, dead, adhered by their proboscis to a panicle of grass. I know of one fact, which may or may not have a relation to the explanation of this: — Among the flies which I have noticed above (p. 527.), as abounding dead upon the bark of the elm trees, I noticed, at two different times, two live flies (it might, possibly, be one seen twice), whose condition may afford some relevance of this question: perhaps, however, none at all. Though alive, they seemed in an incipiently morbid state; but were capable of flying off when approached very close. At the tip of the proboscis of each, there was a globule of transparent whitish fluid; the globule was not larger than the head of a pin, and appeared, disappeared, and reappeared at least once, perhaps more. I leave this fact without an attempt to account for it; but have cited it, in the thought that cases may happen where this regurgitated fluid may, in the fly's dying, and the proboscis falling into contact with an object, gum it to that object. It is, however, right to state, that, in the countless instances of flies dead in the posture of life, adhering to the surface of the bark of the elms, I did not see one attached by its proboscis only; and, I think, not one with its proboscis attached at all. They all rested upon their legs and upon the terminal half of their abdomen, which was, in some degree, and by some means, affixed to the bark; and, in cases not a few, plainly by means of a whitish matter that seemed to have erupted from the last few rings of the body on the ventral surface. Fibres of mould seemed, in some cases, to have farther affixed the abdomen to the bark; and the dorsal surface of the posterior part of the abdomen wore, at least, in some points of light, a glaucous hue. In other dead flies, in a more advanced state of decay, increased degrees of whiteness were obvious; produced either from an increase in the quantity of mould or of the erupted matter: and this was accompanied by some distortion of the component parts of the fly, which were enlarged, and made to seem farther asunder and less compactly connected. See farther in p. 527.

In the latter part of 1833, Mr. Fennell sent us two flies, found dead, I think in the posture of life, upon a plant; and these, Mr. Westwood informed us, were individuals "of a species of Anthomyia;" and that they had "died of the disease which Messrs. Kirby and Spence call plethora. (*Introd.* [ed. 1826], iv. 202.) The circumstance is of very com-

mon occurrence." In these flies there was not (so far as I remember) any sign of transfusion or eruption of juices; and, perhaps, as flies are sometimes poisoned, it may not be very unreasonable to suppose symptoms of an eruption of juices to mark death from plethora; and non-appearance of eruption, death from poison. The following case, judged by this assumed rule, may be one of death from poison: — Mr. Godsall, nurseryman, of Hereford, has observed the pavement, under a blooming plant of Periploca græca, to be literally covered with dead flies, of the species of *M*úsca doméstica; and, at the same time, a great quantity of the same species swarming and settling on the blossoms of the same plant. He attributes, in consequence, some quality deleterious to flies to the flowers of this plant. (*Gardener's Magazine*, ix. 586.)

Timárcha coriària F. — The dates and places of capture which I have, in VI. 533., ascribed to Timárcha tenebricòsa *F.*, belong to T. coriària *F.* — *James Fennell. May*, 1834.

Polyómmatus Aléxis. —My remarks, in V. 768., on "Polyómmatus Argìolus double-brooded," belong, not to P. Argìolus, but to P. Aléxis, as a better acquaintance with natural history has convinced me. — *Id.*

The Colour of the Eggs of the Puss Moth (*Cerùra vínula*). — Professor Rennie has stated, in his *Insect Transformations*, p. 35., that Cerùra vínula lays "shining brown eggs." I have twice found them, and, on each occasion, of a pale green colour; and have observed that they do not become of a "shining brown" colour until they are near hatching. — *J. H. F.*

The Moth Aglàia taú is of active Habits. — "Moths are always indolent." (Author of *The British Naturalist* as quoted by A. R. Y. in V. 60.) From this remark I presume that the author had never had what the schoolboys call "a regular chevy" after Aglàia taú. – *P. J. Brown. Thun, Canton of Berne, Switzerland, April*, 5. 1833.

[*Habits of the Macroglóssa stellatàrum observed, July*, 1833, *at Little Hampton, on the Coast of Sussex.* (475.)] —There is, in front of the beach houses, a piece of sandy heath, of some acres in extent, which forms a very agreeable promenade for the visiters. I here observed the humming-bird hawk moth; not one only here and there, but numbers dashing about in various directions. The first I captured was hovering over a flower, and extracting the nectar from it with its curiously long tubular proboscis. They frequented much a stone wall at the end of Lord Surrey's grounds, along which they were constantly flying, and apparently examining it with great attention. As there were no flowers there, I was at a loss to

discover what their object was in so industriously haunting this spot. They were not depositing eggs; for this operation I saw the female moth perform in a different place. On the heath there are many heaps of stones, and the insect, poising itself on its wings over them, with a slight bend of the body, deposited her eggs on a species of *Gàlium* (probably the *G.* saxátile) which springs up between the stones, and on which plant the larvæ feed. This moth, from its restless habits, is not very readily caught; it dashes off the instant you approach; but, by stationing yourself near a flower it frequents, and, remaining perfectly still, it will come close [see VI. 223.], and enable you to see its long proboscis, which, except when feeding, is always curled up. Like many other insects, it counterfeits death; but, the instant an opportunity offers for escape, it never fails to take advantage of it. — *O. Clapton, January,* 1834

Tórtrix viridàna on the Foliage of Oak Trees. (V. 669. 753.) — The oak woods in the Beulah grounds at Norwood have, for the last three years, suffered from this insect; and, besides the beauty of the foliage not being restored until past midsummer, the growth of the oaks has, of course, been greatly retarded. — *J. D. Smith. Beulah Park, Norwood, Jan.* 9. 1833.

A writer in the *Gardener's Magazine* (v. 610.) describes the ravages, in June, 1829, of an immense number of insects of this species, on the foliage of a fine coppice of natural oak, in the mountains beyond Machynlleth in Wales.

Sir William Jardine, in his edition of White's *Selborne*, p. 114., states that this insect, "while in the larva state, does considerable damage to the young oak copses in Scotland;" and he names, as places, "about Inverary, and near Loch Katrine." White himself has accurately spoken on this insect and its habits and ravages, but by the name of *P*halæ`na quércus. Markwick, in his notes on the *History of Selborne*, has shown the identity of the *P*halæ`na quércus of White with the *P*halæ`na (Tórtrix) viridàna of authors. He supplies, too, additional facts on the insect's habits. In Brown's edition of White's *Selborne* (noticed VI. 133.), Markwick's identification is printed in p. 311., and not disputed; and yet a cut (not a good one) of the *P*halæ`na quércus (Lasiocámpa quércus) is introduced into the text (in p. 310.). A cut of the Tórtrix viridàna would surely have been more judicious, useful, and correlative, either alone, to the exclusion of that of the *P*halæ`na quércus, for the sake of illustrating the text and note, or in company with that of the *P*halæ`na

quércus, both for the sake of illustrating the text and note, and of exhibiting the two insects contradistinctorily.

These remarks on synonymy adjusted, it will be fair to exhibit the question, which arboriculturists have not omitted to propose, — By what means can the extensive and injurious ravages on the leaves of oak trees, &c., of the larvæ or caterpillars of the Tórtrix viridàna be prevented? A question worthy of answer. With regard to the perfect insect, White observes, "I saw a flight of swifts busied in catching their prey near the ground, and found they were hawking after these phalænæ;" that is, moths of the Tórtrix viridàna.—*J. D.*

The Five-spotted Burnet Moth (*Zygæ'na lòti*). — The specimens sent were taken, last summer (1833), near Thorparch. In a field near that place, so plentiful was this insect, that almost every prominent stalk of grass, &c., had a cocoon upon it. — *E. Wilson, jun. Chapel Allerton, May* 5. 1834.

The Lacefly (*Chrysòpa Pérla* L.) *attaches its pedunculated Eggs to almost any Object.* — Many years since, I met with a group of them on a twig, cut off, dead, and lying on the ground, of a gooseberry bush. In the summer of this year (1833), numerous groups of the eggs have been disposed upon the leaves and branches of a large hop plant growing by my place of abode. One group was affixed to the painted surface of a wooden eaves' water-spout; another to the under surface of the leaf of a plant of passion flower. I did not happen to see (for I did not search) any egg before about July 4., although I had seen a pair of perfect chrysopas on about June 26. The eggs were to be met with through July and August. The first hatched eggs which I saw were seen on July 15. For information on the habits of the insects of this genus, see Samouelle's *Entomological Cabinet*, No. ii.; and Rusticus of Godalming, in *Ent. Mag.*, i. 223. — *J. D.*

The preceding paragraph, (which has been long in type) does but tell a fact probably most familiarly known to those experienced in the ways of insects. We may perhaps safely connect with it a general inference to the extent that all insects employ, indifferently, any mechanical object for a merely mechanical end. A Sýrphus, most probably S. balteàtus, as it is near the same hop plant off which we obtained this species in 1833 (see p. 184.), is now sticking to the inner face of the door of an outbuilding close by the hop plant. Six cocoons of the Zygæ'na lòti, kindly sent us by E. Wilson, jun. (see above), are attached, three to portions of the stem of an umbelliferous plant; two, each to the branch, near the flower-head, of Centaurèa nìgra; and one to the culm of a *Brò*mus.

SHELLS. — *A List of Species of Land and Freshwater Shells collected, during the Summer of* 1833, *at Witham, Essex.*—They are named according to Turton's excellent *Manual.* In the river: Cyclas córnea, ámnica; A'nodon cýgneus; Phỳsa fontinàlis, hypnòrum; Paludìna impùra, víridis; Neritìna fluviátilis; A'ncylus fluviátilis. In ponds and ditches: Cyclas lacústris, calyculàta; *Mỳsca* pictòrum; Succínea amphíbia, oblónga; Planórbis marginàtus, vórtex, córneus, contórtus, spirórbis; Limnèus auriculàrius, péreger, frágilis, palústris. Brought up by floods: Hèlix pulchélla, Bùlimus lùbricus, Cyclóstoma élegans, Vertìgo sexdentàta, Valvàta obtùsa. In hedges and gardens: Limacéllus Párma; Hèlix nemoràlis, horténsis, arbustòrum, carthusiàna, ruféscens, caperàta, aspérsa, ericetòrum, nìtens, híspida, pùra, radiàta; Carocólla lapícida; Clausília rugòsa; Bùlimus obscùrus. Upon the bark of old trees: Bàlea frágilis. I also found one specimen, a dead one, of a shell very much resembling Paludìna símilis; but it had several more whorls, and, consequently, was longer. — *J. C. Witham, Essex, March* 20. 1834.

BOTANY AND GEOLOGY. — *Affinities between Plants and subjacent Rocks.* (VI. 335. 424.; VII. 274.) — Mr. Cautrell (VII. 274.) says that he believes the foxglove (Digitàlis purpùrea) never grows upon limestone; and from this I presume that he infers the affinity between geological stratum and botanical productions. Before I refer to the second part of this subject, however, it is necessary that I should say, that *here* the foxglove grows abundantly upon the limestone. I am situated just on the verge of the great South Wales coalfield: in the hills to the west that coalfield terminates, bounded by a very narrow band of mountain limestone, to this succeeds the old red sandstone, which I call the strata of the district; and a mile or two to the east, the transition limestone shows itself, running nearly north and south, from within a few miles of Caerleon to Clyther House, a distance of about fifteen miles. When I read Mr. Cautrell's remark, I determined to put the fact to the test, and consequently took a day's walk over a part of this limestone district; and I can now assert, that, in this limestone district (transition limestone), the foxglove grows luxuriantly and abundantly, as it does likewise in every other part of my neighbourhood.

With regard to the peculiarity of certain botanical productions to certain geological districts, I think that this must be a matter of some doubt; at least, the evidence which I at present possess is not sufficient to confirm me in the belief of the fact. For instance, I call my locality the old red sandstone district; and, undoubtedly, that rock is the substratum

of the whole neighbourhood; but it is traversed by innumerable little rivulets, whose valleys are formed of the alluvium which they bring down. Again, some of the eminences which divide these valleys are evidently formed of diluvial gravel, bearing indubitable traces of having been transported to their present positions from the rock that overlies the coal. Then we have abundance of cold, wet, spongy bog, which lies upon a yellow, sandy, stiff, and, as the farmers argue, poisonous clay: and, finally, we have considerable quantities of peat. Now, in arranging a flora of my neighbourhood according to its geological strata, I should find some difficulty; for, surely, I am not to reckon all those flowers which grow in the bogs, on the peat, upon the gravel, and in the rich alluvial meadows, as belonging to the old red sandstone formation. Bog plants, peat plants, and meadow plants are, I presume, nearly the same, whatever may be the substratum upon which those bogs, meadows, or peat districts may rest; and if this be the case, then it is the superincumbent soil, more than the substratum of rock upon which that soil rests (modified, of course, and considerably affected, by elevation and climate), that gives the character to the botanical productions of any district. The old red sandstone also forms considerable hills, in fact, mountains. Am I, therefore, because these mountains are formed of the old red sandstone, to call the alpine plants, which grow upon them, the productions of the old red sandstone?

As I am upon the subject of plants, I would say a few words upon

Plants with White Flowers, lists of which have been given in many parts of this Magazine [I. 392, 393.; II. 268.; III. 161. 190.], and which lists I could augment, by the account of the like productions in this locality. Mr. Edwin Lees (III. 190.) endeavours to account for the deviation in colour, from a variety of soil or shade, or from accidental manuring of the root of the plant. That these circumstances may affect the colour of flowers, I will not deny; but I think they are not sufficient to account for the white blossoms which sometimes appear. Last year, for instance, I found but one hyacinth (*Scilla nùtans*) with white blossoms; this year I found twenty-four specimens, in less than half an hour, without scarcely giving myself the trouble of looking for them. Indeed, the present season, as far as it has already advanced, has been unusually rich in flowers with white blossoms. The hyacinths of which I have spoken were, in every instance, surrounded with a profusion of others of the usual colour. But what has decided me in rejecting the explanation offered, as

an insufficient cause for the effect produced, is, that I last year gathered specimens of ling (Callùna vulgàris), some of which I have still by me, in which the flowers on one part were white, while, on other parts, they were of the usual colour; and these various-coloured flowers grew upon different branches of the same plant, the produce of one root. This specimen was exposed to the same light and shade, and to the same degree of drought and moisture, as all the other ling, which grew so abundantly about it; and, certainly, I think it is impossible that any accidental manuring, which would affect its root, could cause the flowers of one part of the stem to take a different hue from those of another: any such cause must have affected the whole plant alike. — *C. Conway. Pontnewydd Works, near Newport, Monmouthshire, May* 16. 1834.

A Search for a reported curious Plant which grows in the Level that conveys the Water from Auchenbowie Coal Works, and from the old Coal Workings of Bannockburn. — At the time we set off on our journey, the sun was glancing from behind the Ochils, and with his fiery rays making darkness retreat to its gloomy caverns. We bade a temporary farewell to the glorious luminary, lighted our lamps, and descended to the regions below; not where Orpheus went in search of his Eurydice, but only to the secondary formation of the earth. To give, however, an account of all the strata we passed through, the angles of the rocks, and the point of the compass they dip to, and of the dikes, troubles, and faults that are met with in the coal formation, would be to write an article on geology. We descended a pit fifty-five fathoms deep; and when we had arrived at the bottom, we

> " Glower'd about wi' canny care,
> Lest bogles catch us unaware."

The passage for our feet was sometimes rough, sometimes smooth; that for our back and head, sometimes high, sometimes low. In some places, as we went along, we saw

> " Where, gloomily retir'd,
> The villain spider lives, cunning and fierce."

with his net spread out to entrap his unsuspecting victims. We think the spider was of the species *A*ràne*a* labyrínthica. We thought that it had " come to the goat's house to thig woo';" but, as we proceeded, several species of *T*ipùlidæ were seen: these would, no doubt, occasionally come into the net; and the fine feeling of the *A*ràne*a* would, in the dark, be as good as eyes. We met with beautiful specimens of the Racòdium cellàre, as white as snow: whether this was owing to

the want of light, or whether it was, rather, a different species; we will not venture to determine. Several of the Polýpori were seen on wooden posts which supported part of the roof. Having proceeded about half a mile, we came to the banks of a beautiful stream, clear as crystal, cool, and refreshing; and, although its banks were not adorned with velvet moss and fragrant flowers, they were far from being unadorned; for there the lichens were spread in pleasing forms, intermixed with the oxide of iron oozing from the metallic stratum. We were much in need of ablution, after passing through such a blackened region. We were now to travel up the stream; but, before entering it, it was thought necessary to rest a little, that our bodies might acquire a cooler temperature; for the sweat was pouring copiously off us. We supplied our lamps with oil, and trimmed their wicks. The light had a pleasing effect upon the numerous water-drops suspended from the roof: these, mingling with the iron pyrites, had the appearance of diamonds set in gold. When we went into the water, it felt very cold; but, after wading for a quarter of an hour, we began to be more reconciled to it, and to resume our observations. In some places the water was contracted, and ran with great force; in other places it was more shallow: it appeared as if it had its floods, like other streams; for there were large sandbanks in several places, on which could be seen the recent footsteps of the otter (*Lùtra vulgàris Flem.*). How otters manage to procure their food in the dark, we know not; but one thing is certain, there are fish in the stream, particularly the eel (*Anguílla vulgàris Flem.*). The otter had fled at our approach; for the noise that we made was tremendous; our plunging in the water echoed through the gloomy wastes, like the roar of the ocean in a storm. In some parts, the roof rose to the height of 20 ft., and from it hung beautiful stalactites; in other parts its height was only from 3 ft. to 4 ft.; and, in one place, which was about 60 ft. or 70 ft. long, we had to proceed on all fours, with scarcely room for our head between the water and the roof. Our lights, during our passage through this part, were placed upon our heads, to preserve them from being extinguished. After clearing this narrow passage, we soon arrived at the place where the plant which we were in search of grows. We got it in tufts attached to old wood in the water. After procuring some fine specimens of it, we began to retrace our steps, well pleased with our journey, and hoping, at some future period, to make more extensive researches in these interesting excavations. By the help of the *Encyclopædia of Plants*, we

have, we think, identified the plant as the Vauchèr*ia* dichótoma. Some of the specimens measured between 20 ft. and 30 ft. M. Vaucher, I dare say, would not have shunned such an immersion as we got, to have seen such fine plants. —*Peter Mackenzie, Gardener to Robert Lowis, Esq., of Wester Plean, Stirlingshire. Nov.* 7. 1833.

The Soils which form the Bed of the Shannon, a little above Killaloe Bridge; a Notice of them, and the Fact of Bones being found in them: connexible with the notice that "several skeletons of elks have been found in the neighbourhood of Killaloe," published in VI. 462. — In sinking for a dock on the Shannon, a little above Killaloe bridge, the workmen have, from time to time, dug up bones; I cannot now say, for certain, of what animal. They lie in a stratum of white marl, containing shells, which is from 2 ft. to 3 ft. thick, and above it is a layer of bog of the same thickness, and over that several feet of alluvial soil. Under the white marl is a stratum of grey marl, of the texture of pipe clay, of a violet grey colour, not containing any shells, but mixed with small pebbles, of what depth is not yet known. The bones are probably those of the fossil elk (*Cérvus megáceros*): among them there is a small jawbone containing grinder teeth, besides several detached teeth, of a much larger size. — *T. K. Toomavara, Ireland, Oct.* 4. 1833.

Meteorology. — *The Temperature of the Atmosphere and Earth, in Britain, relatively to Elevation above the Sea Level.* (p. 443—448.) — In ascending Skiddaw, on August 27. 1832, I observed the range of the thermometer. At the bridge over the Greta, which flows at the foot of Skiddaw, at 8 o'clock in the morning, the mercury stood at 58°. At the well on the side of the mountain, where refreshment is usually taken by lakers in their ascent, I found that it had fallen to 47°, while the temperature of the water in the well was 50°. When the thermometer was hung upon the flag-pole upon the summit of the mountain, it stood at 40°. This was at noon. The day was most beautifully clear and fine. Otley says, in his *Guide to the Lakes*, that Skiddaw is 3022 ft. above the level of the sea: he also observes that the average temperature at its summit is 12° lower than that in the valley. —*Edward Wilson, Jun. Chapel Allerton, May* 5. 1834. [See p. 445.]

Adages on the 2d of February. (IV. 264. 469., and VI. 570.) —The popular opinion, in this part of the country, is expressed in the following couplet, which is almost a translation of the Latin couplet quoted (in IV. 469.) by Mr. Bree: —

> "If Candlemas day be clear and fair,
> Half the winter's to come and mair."

—*A Subscriber. Vale of Alford, Aberdeenshire, Nov.* 20. 1833.

MISCELLANEOUS INTELLIGENCE.

Art. I. *Queries and Answers.*

Cats possess the Faculty of imitating the Voice of Birds, for the Purpose of Enticement.—This is an interesting fact; which, as far as I know, has not been noticed in any work on natural history. It has been previously observed during my life; but I have at present a young cat, which, placing herself on the window-seat, and watching intently the birds, utters a chirping chirruping sound, bearing a close resemblance to the note of the sparrows, accompanied by a peculiar tremulous motion of the under jaw. It is undoubtedly one of those marvellous methods which the wisdom of the Creator, who "gives to all their meat in due season," has devised for bringing the prey within their reach. That it has not been commonly remarked, may be ascribed to the successful ventriloquism of the performer. Although some highly accomplished cats have been lately exhibited in the metropolis, people are sceptical as to their musical talents; so I should be glad to have my statement corroborated by some correspondent.—*A Bachelor. Lincolnshire, March* 24. 1834. [We have noticed, in young cats pursuing a bird in a tree, &c., a tremulous motion of the under jaw; accompanied by the utterance of a faint cry, yet one denotive of intense anxiety, and, with the gesture, expressing the sentiment, "Come, let me clutch thee!" In the cry, however, we have never been struck with a resemblance to the note of a bird.]

The Water Ouzel. (II. 301. 400., V. 734.; and its song, VII. 183.)—The water ouzel does sing very frequently, and as much in the winter as at any time. Perched on a stone or a piece of ice, it chirps away at a famous rate; but its song consists almost entirely of its note *zeet zeet*, which it hashes up in all sorts of ways: lengthening and shortening; now a crotchet, then a semiquaver; raising an octave or so, and then descending again; it makes as much of it as can be made. But, with all its efforts, its song is a very so-so affair; all its syllables beginning with *z*, and almost ending with it too. Yet, although it is not much of a songster, it is almost a sacred bird with me, in consequence of the associations connected with it. A pair built for forty years, according to tradition, in a wheel-race near to where I was born; and had never been molested by any body, until a gentleman in the neighbourhood, who was a great ornithologist, employed his

gamekeeper to shoot this pair. I think that the natives of Calcutta were not more indignant when an unlucky Englishman got one of their sacred bulls into his compound, and baited him, than was our little community at what we considered so great an outrage. The gamekeeper narrowly escaped being stoned by myself and some more lads; any of whom would have shot fifty blackbirds or fieldfares without any misgivings.

Mr. Dovaston's remark, in II. 400., that this bird resembles the wren in its habits and motions, is strikingly correct: it nods and curtsies, and cocks its tail, in exactly the same manner. Its nest, also, is similar in form to that of the wren.

As some correspondents say that it is impossible for the water ouzel to walk at the bottom of the water, owing to its being of less specific gravity, I will not argue the point with them; but, disbelieving my own eyes, endeavour to submit with a good grace: otherwise, I should have said that I have repeatedly seen it doing so from a situation where I had an excellent opportunity of observing it, the window of a building directly over the place where it was feeding. It walked in, began to turn over the pebbles with its bill, rooting almost like a pig; and it seemed to have no difficulty whatever in keeping at the bottom, at all depths where I could see it: and I have frequently observed it when the water just covered it, and its head appeared above every time it lifted it up, which it did incessantly; turning over a pebble or two, then lifting its head, and again putting it below to seize the creepers [larvæ of insects] it had disturbed. Besides, its speed was too slow for diving. Every aquatic bird with which I am acquainted moves much faster when diving than when either swimming or walking, and its course is generally in a straight line, or nearly so; but the water ouzel, when feeding, turns to the right or left, or back again to where it started; stops and goes on, just as it does when out of the water. Yet, when it wished, it seemed to have the power of altering its own gravity; as, after wading about two, or perhaps five, minutes, where it could just get its head out, it would suddenly rise to the surface and begin to swim, which it does quite as well as the water hen. The awkward, tumbling, shuffling wriggle, which Mr. Dovaston speaks of [II. 400.], is occasioned by the incessant motion of its head as it turns over the gravel in search of creepers; which, it appears to me, form the whole of its food.

Sir George Mackenzie says, or seems to think, that these birds destroy salmon spawn; which, if correct, would go far towards putting an end to my partiality for them: but I rather

think that they are unjustly accused in this instance, and believe that they were catching creepers when he supposed they were eating spawn. If this were the case (and it is a fact well worth ascertaining), they were rendering an essential service to the fisheries, when he supposed they were injuring them, because these creepers (the larvæ of the May fly, bank fly, and all the *drakes*) are exceedingly destructive to spawning beds: and, as the water ouzel feeds on them at all other times, and as they are more abundant in the winter than at any other season, I think this is the more probable supposition. Of course, if he has shot the bird, and speaks from knowledge after dissecting it, there can be no doubt of the fact; but, if he merely supposes it so, because the water ouzel feeds in the same streams where the salmon are spawning, it is very probable that he is mistaken, for the reasons before mentioned. — *T. G. Clitheroe, Lancashire, May* 29. 1834.

The Water Ouzel; its Song (VII. 183.), *and Nest* (II. 400.): in reply to the query in VII. 183. — I answer, unhesitatingly, that it has a very sweet song. I live in a neighbourhood where water ouzels are common; so common, indeed, that it would be difficult to pursue any stony streamlet a couple of miles, without observing several of them. Their song is rapid and vigorous; continued often two or three minutes at a time; and, to my ear, resembling a good deal, *in its execution*, the song of the wren; from which it, however, differs materially in this respect, that it is not characterised by a loud shrillness, but by a certain subdued and warbly richness. The water ouzel never sings more sweetly than on a bright frosty-aired morning in January or February.

A word or two on its nest. This is generally affixed to some rough moist rock or bank, rising perpendicularly from a river's margin. In bulk, I should say, it was nearly the size of a hat; in shape, more or less semicircular, with a firm compact sloping roof made of moss; beneath which, as under eaves, and completely concealed from the sight, is the entrance, a hole just large enough to allow the bird free ingress and egress. The apartment within is domed and commodious; and invariably lined with withered oak leaves, in which I find deposited commonly five white eggs, remarkable for their brittleness, transparency, and purity. Once I found a water ouzel's nest among some slender boughs overhanging a stream; and once beneath a waterfall, at a point where the rock retreated a little in the middle; the water falling in a sheet just over the nest, and forming, as it were, a kind of crystal veil to it. Indeed, the eaves of the nest (as I call them) were always *dripping wet;* whereas the oak lining

within remained always perfectly dry. The art with which this nest was accommodated to its situation was consummate: no one could have possibly discovered it but by the bird. — *Tiro. March* 6. 1834. [*Postmark, Wrexham.*] The water ouzel or dipper occurs about Dundee. — *W. Gardiner, jun., 1833.* The water ouzel is plentiful among our little brooks; but has been driven from my more immediate neighbourhood by the ceaseless persecution of wanton sportsmen. — *C. Conway. Pontnewydd Works, near Newport, Monmouthshire, Jan.* 20. 1834.

A succinct and clear account of the nest and eggs, and something of the habits, of the water ouzel, are given in Hewitson's *British Oology*, t. 72. An ample account of the bird's habits, and a figure of it and of its nest and eggs, are given in Mudie's *Feathered Tribes*, vol. i.

REVIEWS.

ART. I. *Catalogue of Works on Natural History, lately published, with some Notice of those considered the most interesting to British Naturalists.*

KING, Thomas, M.D., M.R.C.S., &c. The Substance of a Lecture designed as an Introduction to the Study of Anatomy as considered as the Science of Organisation; and delivered at the Reopening of the School founded by the late Joshua Brookes, Esq., in Blenheim Street, Oct. 1. 1833. 8vo, thirty pages. London, 1834. 1*s.* 6*d.*

The relations of anatomy are herein mapped, as it were, and shown to be most comprehensive; and are defined and denominated, and in some instances farther explained. The book is one of ordination and definitions; and these have been carefully considered, and are cautiously and clearly expressed. Some of Blainville's views and definitions are exhibited.

The Committee of the Doncaster Agricultural Association: A Report on the Turnip Fly, and the Means of its Prevention: founded on Returns received to the Questions of the Committee, from 102 Correspondents in different Parts of England and Scotland. 8vo, 89 pages. London, Ridgway, 1834.

Interesting to the agriculturist: to the naturalist, scarcely at all so. Next to nothing, we believe quite nothing, on the turnip beetle, that was not known before, is told us. More is taught us, as we think, in three pages by the recently deceased

Mr. G. Sinclair, in a detail of some experiments on the habits of the beetle, made by himself, published in *The British Farmer's Magazine*, vii. 496—498. Mr. Sinclair had never witnessed the flight of the insect. Mr. Main has: see his *Illustrations of Vegetable Physiology*, p. 297. The Doncaster Agricultural Society deserves, we think, great credit for one thing, and that is, instituting so comprehensive a method of learning what was known on this subject: it is useful to have shown what is not known.

Transactions of the Literary and Historical Society of Quebec. 8vo. Vol. III. Part I., July, 1832; Vol. III. Part II., April, 1833.

The treatises contained are, Dr. Kelly on Mirage; Dr. Kelly on the Climate of Canada; Rev. Dr. Wilkie on Parallel Lines; Wm. Shepherd Esq., on some of the Plants of Lower Canada; Reports on the Magdalen Islands, by Lieut. Baddeley, with a chart, and a geological outline; W. Green, on the Pigments of Canada.

ART. II. *Literary Notices.*

A MANUAL of Mineralogy, by Robert Allan, F.R.S.E., F.G.S.L., &c., comprehending the more recent discoveries in the mineral kingdom, was announced on Sept. 1., to be that day published: its price 10*s.* 6*d.*: illustrated by 174 figures.

Of Lyell's Principles of Geology, a new (the third) and cheap edition is announced for publication. It is to consist of 4 vols. 12mo., illustrated with 147 woodcuts, and 13 plates and maps: price 24*s.*

"Since the publication of the former editions of this work, the author has travelled over a large part of the Continent of Europe, for the purpose of verifying facts, and collecting new materials. In the present edition he has embodied all his own observations, together with a vast quantity of new facts, brought to light since the first appearance of the work, which has been most materially improved by these corrections and additions. Several new illustrations have been added, and the glossary at the end of the fourth volume will considerably assist those readers who are unacquainted with the elements of geology."

An Alphabet of Electricity, by our correspondent W. M. Higgins, F.G.S., Lecturer on Natural Philosophy to Guy's Hospital, is announced as in the press: it is to be published by Orr and Smith.

THE MAGAZINE

OF

NATURAL HISTORY.

NOVEMBER, 1834.

ORIGINAL COMMUNICATIONS.

ART. I. *Notices of certain Omens and Superstitions connected with Natural Objects.* By the Rev. W. T. BREE, M.A.

OBSERVING, in a former Number (V. 209.), an essay of Mr. J. C. Farmer's, entitled, "Contributions towards an account of omens and superstitions connected with natural history," I venture to add a few similar instances, which have come under my own observation, in the hope that they may prove not unacceptable; and the more so, as Mr. Farmer invites others to follow his example. Many of these superstitious fancies are, I take it, of great antiquity; and, of some of them, it is, perhaps, next to impossible to trace the origin. But I am not going to write a treatise on the subject, but merely to give a few examples in point.

*The Cat.** — Sailors, as I am informed on the authority of a naval officer, have a great dislike to see the cat, on board ship, unusually playful and frolicsome: such an event, they consider, prognosticates a storm; and they have a saying on

* "The cat is the *sine quâ non* of a witch." Warburton, on the passage in Macbeth,

"Thrice the brindled cat hath mew'd,"

observes, that a cat, from time immemorial, has been the agent and favourite of witches. This superstitious fancy is pagan, and very ancient; and the original, perhaps, this: —When Galinthia was changed into a cat by the Fates (says Antonius Liberalis, *Metam.*, c. xxix.), by witches (says Pausanias, in his *Bœotics*), Hecate took pity of her, and made her her priestess; in which office she continues to this day. Hecate herself, too, when Typhon forced all the gods and goddesses to hide themselves in animals, assumed the shape of a cat. So Ovid,

"Fele soror Phœbi latuit."

[The sister of Phœbus lay hid under the form of a cat.]

See Brand's *Observations on Popular Antiquities*, by Ellis, ii. 394, 395.; a work which may be usefully consulted, as containing a great fund of curious information on the subject of omens and superstitions.

these occasions, that "the cat has a gale of wind in her tail." There may, in this, be something better than mere superstition. The fur of the cat is known to be highly electrical: possibly, therefore, the change which takes place in the state of the atmosphere, previously to a storm, may have some powerful effect on the animal's body, and elate her spirits to a more than usual degree. The playfulness of the cat, therefore, may, perhaps, be a natural sign of the coming weather, and to be accounted for on just and philosophical principles.

The Horseshoe Superstition, alluded to by Mr. Farmer [V. 212.], as practised by sailors, is not confined to men of that profession; I believe it obtains universally, more or less. Hence, we continually see horseshoes nailed over the door, threshold, or fireplace, &c., in cottages.* Some years ago, I happened to pick up a spare horseshoe on my premises; and, thinking that it might possibly be employed again as a useful shoe, I hung it *loose* over the top bar of a wicket-gate leading from the foldyard to the orchard, in order that it might be seen, and converted to whatever purpose it would serve. In this position (though the gate was constantly used by people passing through it) the horseshoe hung undisturbed for several years. I think I am within compass when I say four or five at the least: indeed, it is only within these few months that I have missed it; and I dare venture to say, that, had any other article, not regarded with any degree of superstitious veneration, been so deposited, it would scarcely have remained in the same place for as many weeks.

Weasel. — In some parts of the country, it is looked upon as an unfavourable omen for a weasel to have crossed one's path †; and ill success, on any particular occasion, is some-

* See Brand, ii. 379. It is esteemed good luck to find old iron generally; and, in particular, a horseshoe.

† Brand observes, that the meeting of a weasel is a bad omen; also, on the authority of older writers, that "it is very ill luck to have *A Hare cross one in the Highway.*"

> "Nor did we meet, with nimble feet,
> One little fearful *Lepus;*
> That certain sign, as some divine,
> Of fortune bad, to keep us."

See Brand, ii. 518, &c., where several other curious instances of the same kind are recorded; as, e. g., that "it is accounted good luck if *A Wolf cross our Way.*" The following explanation is thus given from *A Helpe to Discourse:* — "Our ancestors, in times past, as they were merry-conceited, so were they witty: and thence it grew that they held it good lucke if a wolf crost the way, and was gone without any more danger or trouble; but ill lucke, if a hare crost and escaped them, that they had not taken her."

times absurdly attributed to this cause. On the other hand, I have lately been informed, that, if the first time you see *A Lamb in the Spring*, it stand with its head towards you, it is considered a lucky circumstance; and still more so, if it happen to be a black one. Black lambs, indeed, I find, have a sort of superstitious preference sometimes shown them; and, on account of their colour alone, are often reserved to form part of the flock, instead of being disposed of to the butcher.

The Raven and the Owl have been regarded as birds of ominous portent, time out of mind.

> " Is it not ominous, in all countries,
> When crows and ravens croak upon trees?"
> *Hudibras*, part ii. canto iii. 707.
>
> ——— " The raven himself is hoarse,
> That croaks the fatal enterance of Duncan
> Under my battlements." *Macbeth.*
>
> " Came he right now to sing a raven's note,
> Whose dismal tune bereft my vital powers."
> *Henry VI.*, part ii.
>
> ——— " O! it comes o'er my memory,
> As doth the raven o'er the infected house,
> Boding to all." * *Othello.*

So harsh and mournful is the ordinary voice of the raven, that this alone may, perhaps, be sufficient to account for the bird's being looked upon, by ignorant and superstitious minds, as presaging ill. It has often occurred to me, when exploring the more inaccessible parts of the British mountains (though without feeling any superstitious dread on the occasion), that the ravens, whose " ancient solitary reign " I had invaded, uttered their harsh croak, as they soared over my head, in expectation, as it were, of my falling down the ravines and

* See Brand, ii. 527.; where several other passages relating to the raven are quoted.

It is essential that we do not confound the raven of the poets with their *Night Raven;* although they attribute enough of nocturnal bodings to the former. The night raven (Mr. Dovaston tells us, in VI. 9.) is the bittern; and the nightly " boomps " of this bird agree very well with the " *trompe of doleful dreere* " of Spenser: —

> " The ill-fac'd owle, death's dreadful messengere,
> The hoarse *night raven*, trompe of dolefull dreere." SPENSER.

Is the night *crow* another name for the night *raven?* or is it merely a bird of the poets?

> " Now croaks the toad, and *night crowes* screech aloud."
> Second part of *Antonio and Mellida* (Marston's Works, quoted by Brand, as above).

precipices, and of their chance of becoming my "executors,"* and having to feed on my lifeless carcass. Pennant tells us that "a vulgar respect is paid to the raven, as being the bird appointed by heaven to feed the prophet Elijah, when he fled from the rage of Ahab." (1 Kings, xvii. See Brand, vol. ii. p. 526.) From whatever source the notion may have derived its origin, I find that it is considered bad luck to kill a raven. I happened once to be in conversation, on this subject, with a countryman, who seemed to regard the perpetration of such an act in a very serious light. On my questioning him farther, he told me that a friend of his once shot a raven, and that, "somehow or another (he did not know how it was), his best cow died within a week after; and he had made up his mind that nothing should ever induce him to shoot another." This instance affords an apt illustration of one of the fallacies enumerated by Sir Thomas Brown: "collecting presages from voice or food of birds, and conjoining events unto causes of no connection." (See *Vulgar Errors*, book i. chap. 4.)

[*The Owl.*]—From a similar cause, perhaps, to that just mentioned in the case of the raven, the discordant screech of the owl has probably come to be regarded with no little superstitious dread, as foreboding evil; and the more so, perhaps, from the circumstance of its being heard only in the dark or twilight.

——— "The obscure bird
Clamour'd the livelong night." *Macbeth.*

"Deep night, dark night, the silent of the night,
. . . . . .
The time when scritch-owls cry, and ban-dogs howl,
. . . . . .
That time best fits the work we have in hand."
Henry VI., part ii.

"The owl shriek'd at thy birth, an evil sign."
Henry VI., part iii.

"The Roman senate, when within
The city walls an owl was seen,
Did cause their clergy, with lustrations
(Our synod calls humiliations),
The round-faced prodigy t' avert
From doing town or country hurt."†
Hudibras, part ii. canto iii. 709.

---

* ——— "Their executors, the knavish crows,
Fly o'er them all, impatient for their hour." *Henry V.*

† Quoted by Brand, ii. 523., along with other passages. See, also, Mr. Waterton's amusing article on "the habits of the barn owl" (V. 9., &c.), for classical quotations.

So well known and established was the character of the owl as a bird of omen, that Shakspeare uses the term metaphorically, applying it to inauspicious persons: —

> " Thou ominous and fearful owl of death,
> Our nation's terror, and their bloody scourge!"
> *Henry VI.*, part i.

Again, in the Third Part of *Henry VI.*, Edward, speaking of Clifford, says: —

> " Bring forth that fatal scritch-owl to our house,
> That nothing sung but death to us and ours."

Speaking once, in defence of these birds, to a very respectable man-servant, who disliked them so much as to express a wish that they should be destroyed, I said I thought them very inoffensive and amusing, if not useful, creatures. " I don't know, Sir, for that," he replied; " but I know I find them very bad company, when I get up at four or five o'clock on a winter's morning to brew." [See Mr. Bree in continuation, in p. 593.]

[*Rooks are reputed to leave a Rookery at the Death of the Owner of it, &c.*] — A medical friend has lately informed me that a notion prevails with some, that the rooks will leave the rookery on the death of the owner or other member of the family. Being, on one occasion, in professional attendance on a lady during her last illness, he tells me, that, shortly before her dissolution, when it became apparent that she could not survive many hours, it was remarked to him by some one in the house: — " I wonder whether the rooks will leave the rookery on this occasion: they did so on the decease of the late —— (the former possessor); and likewise on that of his brother, who preceded him." The birds in the present instance, I am told, were only a trifle out in their calculation: they quitted the next morning; though the patient, contrary to all expectation, lingered through the day, and was not released (if I rightly remember) till the evening of the day following. I do not know at what period of the year the above-mentioned circumstance took place: and this is an important point in the present case, as the rooks (except, perhaps, in very large rookeries), do not abide constantly in their breeding-places, but merely pay them occasional visits.

[*Toads found incarcerated.*] — We are for ever seeing accounts in the newspapers, and elsewhere, of toads being found alive embedded in solid wood or stone, or even in blocks of marble [see VI. 458—459.]: it is not for me to say that such reports are altogether without foundation, or unworthy of credit. [See in VII. 519.] In felling a tree, when the axe comes in contact (as it frequently does) with a more than

usually tough and gnarled portion of timber, it will sometimes rebound at the stroke, without making any incision. On such occasions, the woodmen in this part of the country say the axe "buffs;" and they have, some of them, a sort of floating traditionary notion, handed down to them from their forefathers, that this rebounding of the axe is attributable to a toad which lies enclosed within the root of the tree, and which, accordingly, they may expect to find there. I remember an old woodman, the father of a man who now works for me, who seemed to entertain a more than half belief in this notion; though, upon enquiry, I could not learn that he had ever known it verified by fact. The similarity in sound between the verb "buff," and "bufo," the Latin for a toad, is here remarkable; and the coincidence might induce some etymologists to derive the one word from the other. But it strikes me as hardly probable that these simple woodmen should be indebted to the learned languages, and should have borrowed their provincial term from the Latin; still less do I suppose that they have ever read the line in Virgil,

"Inventusque cavis bufo." *Georg.* i. 184.

"And toads in crannies found." Trapp's *Translation.*

Superstition and credulity are by no means confined to the vulgar and illiterate; the minds of the better informed are often powerfully biased by such influence. I knew a gentleman of liberal education, who maintained that it was

Easy to foretel what Sort of Summer it would be by the Position in which the Larva of Cicàda (*Aphróphora*) *spumària was found to lie in the Froth* (*Cuckoo-spit*) *in which it is enveloped.* If the insect lay with its head upwards, it infallibly denoted a dry summer; if downwards, a wet one! * An old lady of my acquaintance entertained an opinion that

The Jelly-like Substance (*a Species of Tremélla?*), which is frequently to be found, after rain, upon turf or neglected pathways, was the remains of a fallen star; the snuff, as it were, of the extinguished luminary! † The same lady also deemed it hazardous to walk abroad in the shrubbery or the garden after dusk, for fear of

The Bats; which, she maintained, had a villanous propensity of striking at people's eyes! I need hardly observe,

* Is there any foundation in fact for the following proverbial saying, which is common in this neighbourhood, viz.:—

"A good bark harvest, a good corn harvest?"

This year (1832), the two seasons have certainly corresponded pretty accurately: the earlier part of each was very favourable; afterwards, in both cases, came heavy rains.

† For "spittle of stars," and "shot stars," see Brand, ii. 684.

that the bat evinces admirable dexterity and adroitness in *avoiding to come in contact* with any moving object, like the human figure, &c.; though it will flutter close around us as we pace the avenue or the more confined and closely shaded walk.

Anglers, when they have baited their hook, have a superstitious practice of spitting upon the worm, &c., for good luck, before they lay it in the water.*

"*In setting a Hen*," says Grose, "the good women hold it an indispensable rule to put an odd number of eggs. This predilection for odd numbers is very ancient; and is mentioned by Virgil in his eighth Eclogue: —

"——— Numero Deus impare gaudet." †

"Heav'n uneven numbers loves." Trapp's *Translation.*

The Reformation of the Calendar, in the Year 1752, *or the Change of Style*, as it is called (an event which we of the present day are sometimes apt entirely to overlook ‡), was long recollected with much dissatisfaction by many among the lower orders. It appeared to them to be a sort of sacrilegious interference, a profane attempt to alter the course of nature. In perilous times, and in the hands of artful and designing men, such an event might have been employed too successfully as a powerful engine for promoting all kinds of political discontent. By the help of that most common fallacy, *post hoc, ergo propter hoc;* according to which, whatever happens *after* this or that circumstance is therefore said to have hap-

* See Brand, ii. 570., lustrating children by spittle. † Ibid., 574.

‡ An instance in point came under my observation very lately. Application was made to me for some extracts from the parish register, of about the date of 1742, i. e. ten years previously to the change of style. Among other entries, of which I was requested to furnish copies, were the marriage of A. B. and C. D., which took place on April 20. 1742; and the baptism of the eldest son of the same parties, which took place on Jan. 27. of the same year. Shortly after I had furnished the above extracts, I received a second visit from the applicant, with a request that I would reexamine the registers; for that there must be some mistake in copying the extracts, since, according to them, it would appear that the child was illegitimate, as the baptism took place three months before the solemnisation of the marriage. Had this gentleman borne in mind, that, previously to the alteration of the style, the year commenced on the 25th of March, and that, accordingly, January came towards the latter end of the year, not (as now) at the beginning, he might have saved himself the trouble of a second perusal of the parish documents: they, and the extracts made from them, were quite correct, and as they should be, and the child no bastard; for the marriage was solemnised on the 20th of April, and on the 27th of January *following* (i. e. nine months *after*) the child was born, or at least baptised. The same blunder, and with reference to the selfsame entries, I recollect to have been made by a solicitor in the time of my predecessor, who received a second application to reexamine the registers after he had furnished copies of the entries above mentioned.

pened *on account* of it, there is scarce any conceivable public evil, such as unfruitful seasons, pestilential diseases, bad government, disastrous warfare, &c., &c., which might not have been attributed to this innovation as the cause; and the minds of many would have been amply prepared to give credence to such absurdities. I knew an old labourer, a native of an obscure village in this county (Warwickshire), who recollected the alteration of the style; and who, to the last, was never reconciled to it: he stoutly maintained that the nation had never prospered since. "I did not wish," said he, "to make mischief; so I never said anything about it to my son: but you may depend upon it, Sir, the nation has ne'er prospered sin' the style were changed. If you 'll observe, Sir, the cuckoo and the swallows, and everything else, they don't care for the change: they all come and go by the *old* time, not by the *new*. I don't know," continued he, "what use it were of, unless it were to make the parson tell lies on a Sunday." "How so, Master Caister?" "Why, Sir, he says it is the tenth day of the month, when it is n't the tenth." He assured me that the inhabitants of his native parish were so disgusted with the change, that they were at the pains of procuring a minister, at their own private expense, to perform divine service upon *old* Christmas day; and that they made a point of going about their ordinary occupations, and setting their servants to work, on the *new*. Moreover, a deputation, consisting of two of these simple villagers, was actually sent down to Glastonbury for the purpose of consulting the holy thorn * upon the occasion: a sprig of which, gathered on old Christmas day, in leaf (or else in flower, I forget which), was brought back in triumph to the village.

The old adage,

> "Better, better ne'er be born,
> Than on the Sabbath pare the horn" (i. e. the nails), †

was probably invented with the view to discountenance the desecration of the Lord's day by the performance of a variety of little odd jobs; which, however improper an occupation

* *Pilgrimages to Glastonbury, upon a like errand*, were, it seems, by no means unusual. "Certain it is that the Glastonbury thorn has preserved its inflexibility, and observed its old anniversary. Many thousand spectators visited it on the Parliamentary Christmas day; not a bud was to be seen! On the true nativity it was covered with blossoms. One must be an infidel indeed to spurn at such authority." "A vast concourse of people attended the noted thorn on Christmas eve, new style; but, to their great disappointment, there was no appearance of its blowing; which made them watch it narrowly the 5th of January, the Christmas day, old style, when it blowed as usual." See Brand, ii. 663.

† Brand mentions Friday also as an unlucky day for this purpose. (ii. 500.)

they may constitute for the Christian Sabbath, do not strictly come within the literal meaning of the word "work." In like manner, the practice, among schoolboys, of always

Giving away One of Two Kernels, which are occasionally found within the Shell of the same Nut, because it is unlucky to eat both, may have originated from a desire to inculcate the moral lesson of liberality, and the duty of imparting to others a portion of what one possesses. But I know not how to account for the belief in the efficacy of

Swallowing the Germ of a Walnut, and, at the same Moment, wishing for some desired Object, in order to its attainment. Hence the germ, or vital apex, of the walnut is sometimes called "the wish;" and, unless it be swallowed entire, the charm is broken, and the thing wished for will not be accomplished.

A Peascod, with Nine Peas in it, is supposed to be of potent efficacy in discovering a damsel's matrimonial lot in life. The peascod is to be placed over the door; and the man who first takes it down, if single, is to become the husband of the fair depositor. This practice, though somewhat varied in particulars, is mentioned by Gay in the following lines * : —

> "As peascods once I pluck'd, I chanced to see
> One that was closely fill'd with three times three;
> Which, when I cropp'd, I safely home convey'd,
> And o'er the door the spell in secret laid:
> The latch moved up, when who should first come in,
> But, in his proper person, — Lubberkin!"

The country youths, of both sexes, adopt the following method of ascertaining whether the objects of their affections entertain for them a mutual regard: —

The Flower of Centaurèa nìgra, or Knapweed † (here called hard-head), is gathered, and the entire upper portion is shaved off with a knife or scissors, exactly on a level with the top of the calyx; the calyx, together with the remainder of its contents, is then put in the pocket: if, by the following day, the stumps of the florets (as I may call them) shall have shot out, so as to protrude beyond the extremity of the calyx (as they are almost certain to do from the warmth of the pocket), it is regarded as a favourable omen, a sure sign that love is reciprocal. This is one of those instances in which the mind readily lends itself to a manifest self-deception, and is willing to believe in the truth of what it hopes for. It were to be wished that the same kind of delusion never ope-

* Quoted in Brand, i. 303.

† A similar method of divination by bachelor's buttons (*Lỳchnis dìoìca*) is mentioned by Brand, ii. 629.

rated in cases of greater importance. In Cornwall, I have heard a proverbial saying, of a nearly opposite tendency to the superstition just mentioned: — "If rain fall upon the clothes which women hang out to dry after a wash, it is a sign that their sweethearts do not love them." Let me not be suspected of treason or disloyalty for narrating another absurd notion: —

"*If there are no Keys* (*i. e. Seed-vessels*) *upon the Ash Trees, it is a Sign that, within a Twelvemonth, there will be no King.*" —William the Fourth and his royal successors need be under no alarm on this account. The proverb supposes two events which never take place: for as, according to the genius of our constitution, the king never dies; so, no season, I believe, ever occurs in which the ash trees are wholly destitute of keys. The vulgar saying, that

"*When Gorse* (*Ulex europæa*) *is out of Blossom, Kissing is out of Season,*" I should suppose, is only a proverbial mode of expressing the length of time which gorse continues in bloom.

[*Plants of the Fennel, if we would have them grow in a Garden, must be stolen.*] — Some of our horticultural friends may, perhaps, be surprised to be told, that, "if they want fennel to grow in their gardens, they must *steal* it; for, if it be either given or bought, it will not grow." Of a like character is the old distich relating to marum (*Teucrium Mar*um), for which cats are known to have so strong a partiality [they have, too, for *Valeriana* officinalis, and for *Nepeta Cataria*; to which last I have known the lines applied, perhaps by mistake]: —

> "If you set it, the cats will eat it;
> But if you sow it, the cats wo'n't know it."

Formerly, it used to be considered that the Efficacy of many Recipes was the more powerful and certain, where something of Mystery was employed in the Manner of preparing them. —An old man in this village (a former parish clerk) possessed a really valuable (I believe, infallible) recipe for the cure of that loathsome disease the itch; one ingredient of which was the root of the common dock. I well remember to have heard, as a boy, that, the better to effect a cure, it was thought (if not indispensable, at least desirable) that the dock roots should be gathered in the *night;* or, at all events, that the person gathering them should not be observed while so employed. The reader will at once call to mind one of the ingredients of the witches' caldron: —

> "Root of hemlock, digg'd i' the dark." *Macbeth.*

The present possessor of the receipt, however, I find, on enquiry, knows nothing of any necessity or virtue attached to

the nocturnal culling of the simples: and it is not improbable that the secrecy, formerly supposed to be requisite, was, in this instance, adopted in order to obviate the chance of any one discovering the ingredients of a nostrum from which the proprietor derived considerable profit.

[*Superstitions connected with Plants: with the Cyclamen.*] — Of the supposed virtues which, in the olden time, were superstitiously attributed to plants, it would be tedious to enter into a minute description.* They who are curious on such subjects, may be referred to the quaint pages of our old herbalists. (See Gerarde and Parkinson, *passim.*) As a specimen, however, I extract the following salutary caution, relative to the virtues, or rather dangers, of the cyclamen, from Gerarde's *Herbal;* just remarking, by the way, that the extreme absurdity of attributing such extraordinary properties to plants may possibly, and very naturally, have brought their real properties somewhat into disrepute: and, accordingly, while our forefathers undoubtedly attributed far too much efficacy to various articles of the vegetable kingdom, it may admit of a question, whether we of the present day do not incline rather to the opposite extreme, and attribute to them too little. "It is not good," says this grave disciple of Æsculapius, "for women with childe to touch or take this herbe (cyclamen), or to come neere unto it, or stride over the same where it groweth; for the naturall attractive vertue therein contained is such, that, without controversie, they that attempt it in manner above said, shall be delivered before their time: which danger and inconvenience to avoid, I have (about the place where it groweth in my garden) fastened stickes in the ground, and some other stickes I have fastened also cross-waies over them, lest any woman should, by lamentable experiment, finde my words to bee true, by their stepping over the same." † In Johnson's *Gerarde* is appended the fol-

* The following passage occurs in Sir Thomas Brown's works: — "We omit to recite the many virtues and endless faculties ascribed unto plants, which sometime occur in grave and serious authors; and we shall make a bad transaction for truth to concede a verity in half. To reckon up all, it were imployment for Archimedes, who undertook to write the number of the sands. Swarms of others there are, some whereof our future endeavours may discover; common reason, I hope, will save us a labour in many; whose absurdities stand naked unto every eye; errors not able to deceive the embleme of justice, and need no Argus to descry them. Herein there surely wants expurgatory animadversions, whereby we might strike out great numbers of hidden qualities; and, having once a serious and conceded list, we might, with more encouragement and safety, attempt their reasons." (*Vulgar Errors*, book ii. ch. 7.)

† The same property has been ascribed to "brake, or female fern" (*Ptèris aquilìna?*). See Brown's *Vulgar Errors*, b i. chap. 8.

lowing editorial note: — " I judge our author something too womanish in this; that is, led more by vain opinion than by any reason or experience, to confirme this his assertion; which frequent experience shews to be vaine and frivolous, especially for the touching, striding over, or comming neere to this herbe." (Johnson's *Gerarde*, p. 846.)

Charms or Superstitious Ceremonies for the Cure of the Ague were much employed of old; and " ABACADABRA," or similar gibberish, written in fantastic shapes, and with much formality, constituted, with our ancestors, most potent remedies.* Another infallible remedy was as follows: — A lock of hair was to be cut from the nape of the patient's neck, which he was himself to take to a particular aspen tree, pointed out for the purpose. An incision was then made in the bark, under which the severed lock of hair was to be left deposited, and the bark closed up, and restored to its natural position. All this (as I have said) was to be performed by the patient himself; and it is not for me to say that the exertion occasioned by the performance of this ceremony might not induce perspiration, e. g., or other salutary effects, having a natural tendency to mitigate the disorder; or, what is, perhaps, still more probable, the disorder abated of itself, and not so much *in consequence* of the treatment as *in spite* of it. The aspen tree (*P*ópulus trémula) was, of course, selected on these occasions on account of the trembling propensity of its leaves, between which and the quaking and shivering of the patient it was obvious to trace a fanciful analogy.

To cure the Hooping-Cough, we are recommended to meet with a man on a skewbald horse, and to enquire of him what is good for the complaint†; the remedy, whatever it may be, which he recommends, will prove infallible. Within my recollection, a near relative of my own, out of pure curiosity, put the question to an honest countryman mounted on a horse of the above description: the answer was returned off hand, and without hesitation: — " Give them sugared bread and butter, Sir." The readiness of the man's reply was proof sufficient that the question had been often put to him, as, indeed, he acknowledged it had been, and that he had always given the same inoffensive answer. For the same complaint in a child, it is recommended that the little suf-

* See Brand, ii. 579. " In the Diary of Elias Ashmole, Esq., April 11. 1681, is preserved the following curious incident: — 'I took, early in the morning, a good dose of elixir, and hung three spiders about my neck, and they drove my ague away.'" — *Ibid.*, p. 590.

† This superstition is mentioned by Brand as still remaining in Devonshire and Cornwall. (ii. 581.)

ferer be drawn, nine mornings, fasting, through the arch formed by a briar that is rooted into the soil at both ends; i. e., the young shoot of a bramble (*Rùbus*), which, when it comes in contact with the ground, usually takes root again at the end, like the runner of a strawberry.

[*A recent Instance of constituting a Rupture-Ash.*] — One other instance of credulity and superstition I must mention, which fell under my own observation within these few years. In a plantation which I had made and nursed with some interest, I observed a thriving young ash plant carefully lapped round with a taching end, i. e., a shoemaker's waxed string. On closer examination I perceived that the tree had been cut through in a horizontal direction to the centre, and then split upwards perpendicularly to the length of about 2 ft. I was not a little puzzled even to conjecture for what purpose the tree had been subjected to such severe treatment. The injury sustained, it was plain, could not have been done accidentally; and, had it been done for mere mischief's sake, the perpetrator, I thought, would hardly have been at the pains carefully to lap the injured stem round with a taching end. After some enquiry, the whole history came to light: a neighbouring shoemaker had a child badly ruptured; and, in order to effect a cure, the tree had been split, and the infant passed between the two halves thus separated for the purpose; these were then bound together, as already described; and if the parts finally united (so the belief goes), the child would recover! * With the knowledge of so ready and effectual a remedy, who need ever again apply to Sir Astley Cooper, or any of his fraternity, in a case of strangulated hernia?

Such are among the superstitious usages and opinions which obtained in former times, and which, it seems, even yet, in these enlightened days, have not quite lost their influence over the minds of men. While we smile, however, as well we may, at the ignorance and credulity of past ages, and plume ourselves, perhaps, with no little self-complacency, on our own superior knowledge, it becomes us not to sit down lazily satisfied with present acquirements, as if we ourselves had already attained the very pinnacle of wisdom. The advance of knowledge should only stimulate us to farther exertions.

* According to Brand, "this is a very ancient and extensive piece of superstition." See Brand, ii. 591., where an account is given from the *Gentleman's Magazine*, for October, 1804, of the ceremony having been practised in the parish of Solihull, in Warwickshire. See also Gilbert White's account of this superstition, and of the "shrew-ash." (Letter 28. to Daines Barrington.)

If it be the first step to distinguish the false from the true *, there still remains, when this is done, a wide and immeasurable field open before us for diligent research and investigation. The mine we work in is inexhaustible; and immense stores of rich and unwrought ore yet await and solicit the labours of our hands. "Multum adhuc restat operis, multumque restabit: nec ulli nato post mille sæcula, præcludetur occasio aliquid adhuc adjiciendi." Much work remains to be done, and will remain; nor will any one, born after the lapse of a thousand ages, be precluded from the opportunity of adding something to the general stock.

Allesley Rectory, Sept. 1832.

[*The Anatomical Treatise of M. Lyonnet on the Caterpillar of the Cóssus lignipérda* has, from the period of the publication of it, 70 years ago, been considered as a production quite unrivalled for minute and accurate research. (From a mention of the works of Lyonnet in I. 282.)

The late Rev. Lansdown Guilding had connected the following forcible remark with that mention, in a collection of notes which he had made in relation to subjects contained in Vols. I. and II. of this Magazine, and had sent to us before his death (see p. 355.). (There is but one date to the whole collection; it is at the end, and is, "St. Vincent, May 1. 1830.")]

How many thousands of animals are there equally worthy of an anatomical treatise as the *C*óssus described by Lyonnet: but were all the inhabitants of our globe employed in the task, when would they furnish illustrations of the countless works of nature, in their various stages of growth and perfection? In a higher and nobler sphere of existence, all that is now hidden, or beyond the industry of man, may be made known to us.

> "O Nature! how in every charm supreme!
> Whose votaries feast on raptures ever new;
> Oh for the voice and fire of seraphim,
> To sing thy glories with devotion due!"

[*L. Guilding. St. Vincent, May* 1. 1830.]

* "Primus sapientiæ gradus est, falsa intelligere."— Quoted by Sir T. Brown at the conclusion of his *Vulgar Errors*.

ART. II. *A short Sketch of the most remarkable of the Vulgar Prejudices connected with Objects of Natural History.* By W. G. BARKER, Esq.

IT is surprising that, in all ages, some birds and quadrupeds have most undeservedly fallen into an almost general dislike, while others have been elevated, with as little reason, high in the regard of the vulgar.

The Nightjar (*Caprimúlgus europæ'us*) has been peculiarly unfortunate in the former of these respects: its common names, "goatsucker," and "puckeridge," have been given to it in consequence of its supposed evil habits. It is accused, in Italy, of sucking the teats of goats: hence the origin of the appellation *C*aprimúlgus [goat-milker]; and this term has, in consequence of the imagined crimes of an individual species, been foolishly applied to the whole genus. It is unaccountable how such a charge could arise. The other accusation against the nightjar is, that of its inflicting upon weanling calves the disorder known by the name of puckeridge; and this it is supposed to do by striking at them. The absurdity of this makes any refutation of it unnecessary.

The Hedgehog (*Erinàceus europæ'us*) has been charged with sucking the teats of cows and sheep; a charge as unfounded, and as unjust, as that against the nightjar. The sages by whom the alleged guilt of the hedgehog, in this particular, was discovered, had forgotten to examine the mouth of this animal: had they only taken the trouble to do this, they would have found that it is utterly impossible for so small an animal to take the teat of a cow, or even that of a sheep, between its jaws; and, without this means of contact, they would not, surely, assert that the deed could be possibly committed. The hedgehog is, too, accused of ascending trees for the purpose of carrying off fruit on the points of its spines. Persons who have kept these animals in gardens deny the charge, and say that they have never seen them attempt to climb into fruit trees, or to even carry off fallen fruit upon their spines. Indeed, if the hedgehog ever did the latter, it is to me a mystery how it would act to disengage the fruit again. Count de Buffon kept a litter of young ones, with their mother, for some time, and these refused to touch cherries and fruit when offered to them. In the summer of 1830, a great many carnations withered away and died. A gardener, the greater portion of whose stock had perished in this manner, observing that a number of hedgehogs frequented his grounds, immediately fixed upon them as the depredators, and, communicating the idea to others, who, like himself, had been sufferers, a general

persecution against these animals was commenced. I was not very well pleased with this, and endeavoured to persuade a person, who was thoroughly convinced of the guilt of the hedgehog, that these creatures did him, in reality, more service than injury; and that the true motive of their visiting the garden grounds was to feed on the slugs, which abounded that year, and did great injury to the vegetables, flowers, &c. Argument was, however, useless. He assured me that *hedgehogs had actually been caught in the carnation beds;* and this, though far from satisfactory to me, was in his mind at once a proof of their guilt. Finding it hopeless to convince him of his error, I gave up the attempt as useless. [Had the contents of the stomachs of a few of the killed hedgehogs been shown to him, he might, it is not very improbable, have been convinced. See on the hedgehog, farther, in No. 44.]

The hedgehog and nightjar are disliked on account of their supposed evil habits; but the antipathy entertained in America by some towards a bird which inhabits there, of the same genus,

The Whip-poor-Will (*Caprimúlgus vocíferus*), seems to have originated in superstition. This bird is never seen during the daytime. Its chosen haunts, like those of the nightjar of Europe, are in the most retired, solitary, and deep-shaded parts of the woods, and here it reposes in silence till the dusk of evening calls it out to the more cultivated parts of the country, in search of its food, which consists of moths, grasshoppers, and ants [and coleopterous insects: see in No. 44.]. Such being its habits, no wonder that it should be regarded by the ignorant and unlearned as the dread concomitant of supernatural beings. Wilson thus describes its visits:—"At first it issues from some retired part of the woods, the glen, or the mountain; in a few evenings, perhaps, we hear them from the adjoining coppice, the garden fence, the road before the door, and even from the roof of the dwelling-house, long after the family have retired to rest. Some of the more ignorant or superstitious consider this near approach as foreboding no good to the family; nothing less than sickness, misfortune, or death, to some of its members: these visits, however, so often occur without any bad consequences, that this superstitious dread seems on the decline." It is to be hoped, indeed, that, as science advances, these foolish notions will be entirely eradicated. [For Mr. Waterton's account of the goatsuckers in Demerara, and the superstitions there connected with them, see his *Wanderings;* or see this account quoted by Dr. Drummond, in his delightful *Letters to a Young Naturalist*, p. 129. For a description of some of the habits of a species of nightjar

which inhabits near Lima, see in our Number for December.]

The same Dread has been entertained towards the Owl, and has been extended to all nocturnal Birds.—They appear only at dark and twilight, when the feathered choir, which during the day made the woods and vales reecho to their cheerful notes, are slumbering in the recesses of the grove; when

> " The seafowl is gone to her nest,
> And the beast is laid down in his lair;"

the flowers, whose rising incense had perfumed the air, have closed their petals and are at rest; the frolicksome lamb sleeps by its parent; and nature is hushed to universal repose; night moths flit shadowy through the silent air; and the bat on leathern wing glides by: this is the calm, the silent, hour, when imagination sees the forms of bygone years pass dreadful before her view; superstition adds terror to the darkness, and beholds, horror-struck, the spirits of the departed glide by: then it is that the nocturnal bird, which wanders lonely for its food, is linked as the partner of those tremendous beings. The owl flitting by the ivy-mantled tower of the village church, and haunting the cemetery in the hours of darkness, is regarded with suspicion and awe; and hence it is detested as the omen of sorrow, and is feared as the forerunner of the death of men. If Mr. Waterton's example (V. 12.) were followed, the dread of the owl, which is still entertained in remote places, would be entirely removed. His sketch of the habits of this bird, his plea in defence of it, and his evidence of the benefits man receives from it, in V. 9—15., have done so much to explode the vulgar notion, that all addition here would be useless.

[*The Yellowhammer* (*Emberìza Citrinélla*).]—There is a bird universally disliked by the British countryfolk, and, as far as I can discover, without any reason; I mean, the yellowhammer. Many persons who would not molest or injure the nest and young of other birds, will invariably take, and even ill-use, those of the yellowhammer. This prejudice appears to be utterly unfounded. It is one of the prettiest of the English birds, and at the same time one of the tamest. In its appearance there is nothing to excite disgust, nor in its conduct any thing that deserves punishment: its familiarity with man seems the only cause of the unjust persecution of it; for it will be found that in all ages the birds which have excited man's admiration are those which, by their lofty port and their high and uncontrolled spirit, have prevented his too near

approach, and scorned the benefits of civilisation. The little yellowhammer, on the contrary, flies not from our presence; it rather seeks it; it is the companion of our walks, and flits from branch to branch beside us; it is generally to be seen in the hedges by the roadside, and I think is not often to be met with in retired fields, at least, I have never observed it in such situations. With these habits, it might be reasonably expected to be a favourite bird with the generality of people; but, unfortunately, it is quite the contrary, and I cannot discover any reason for so foolish a prejudice. [Mr. Barker has, since writing the preceding, sent us the following:—According to Mudie's *British Naturalist*, the reason why the peasantry dislike the Emberiza Citrinélla is on account of three drops of the devil's blood which they suppose it receives on the morning of May-day. I can only say that I have never met with any traces of this folly in Yorkshire.—*March 22.* 1833.]

The Catbird of America (T*úrdus lívidus*) may be adduced as another instance of the folly of prejudice. This species is very common and numerous in Pennsylvania. "In spring or summer," says Wilson, the self-taught and elegant historian of the birds of America, "the first salutation you receive, on approaching thickets of bramble, is from the catbird; and a stranger, unacquainted with its note, would instantly conclude that some vagrant orphan kitten had got bewildered amongst the briers, and wanted assistance; so exactly does the call of the bird resemble the note of that animal. With every amiable quality to recommend him, few people in the country respect the catbird: on the contrary, it is generally the object of dislike; and the boys of the United States entertain the same prejudice and contempt for this bird, its nest and young, as those of Britain do for the yellowhammer, and its nest, eggs, and young. I am at a loss to account for this cruel prejudice. Even those by whom it is entertained can scarcely tell you why, only they 'hate catbirds,' as some persons tell you they hate Frenchmen, &c.; expressions that bespeak their own narrowness of understanding and want of liberality. Yet, after ruminating over in my own mind all the probable causes, I think I have at last hit on some of them; the principal of which seems to me to be a certain similarity of taste, and clashing of interest, between the catbird and the farmer. The catbird is fond of large ripe garden strawberries; so is the farmer, for the good price they bring in the market. The catbird loves the best and richest early cherries; so does the farmer; for they are sometimes the most profitable of his

early fruit. The catbird has a particular partiality for the finest mellow pears, which are also particular favourites with the farmer; but the catbird has frequently the advantage of the farmer by snatching off the first-fruits of these delicious productions, and the farmer takes revenge by shooting him down with his gun, as he finds old hats, windmills, and scare-crows are no impediment in his way to these forbidden fruits; and nothing but this resource, the ultimatum of farmers as well as kings, can restrain his visits. The boys are now set to watch the cherry trees with the gun, and thus commence a train of prejudices and antipathies that commonly continue through life. Perhaps, too, the common note of the catbird, so like the mewing of the animal whose name it bears, and who itself sustains no small share of prejudice; the homeliness of its plumage; and even its familiarity, so proverbially known to breed contempt, may also contribute to this mean, illiberal, and persecuting prejudice: but with the generous and the good, the lovers of nature and of rural charms, the confidence which this familiar bird places in man, by building in his garden under his eye, the music of his song, and the interesting playfulness of his manners, will always be more than a recompense for any little stolen morsels he snatches." (Wilson's *Amer. Ornith.*, Professor Jameson's edit., ii. 100.) [The amiable feeling expressed in the latter of these remarks of Wilson's is quite kindred to that breathed throughout that delightful poem, "An Invitation to the Feathered Race, by the Rev. Mr. Graves:" of this poem the last stanza is,

> "Let then this league betwixt us made
> Our mutual interests guard,
> Mine be the gift of fruit and shade;
> Your songs be my reward."]

The Storm Petrel is one of those luckless birds which, having been once associated with superstitious ideas, can never afterwards regain the good name they have undeservedly lost. Storm petrels are generally seen either during the continuance of, or immediately previously to, a storm. Their low and wailing cry of *weet, weet*, mingled with the dashing of the wild and foaming surges, and the roar of the rushing blast, inspires the minds of the hardiest seamen with a momentary awe. Termed emphatically the bird of storm, it faces the northern tempest when raging with its utmost fury, and seats itself on the agitated crest of the mountain wave as calmly as if resting on the surface of an untroubled lake. This harmless bird is universally regarded by sailors with distrust and

dread: far from considering it as a friendly monitor, whose approach forewarns them of the coming storm, they absurdly imagine that it possesses the power of raising the tempest, and delights in overwhelming in the depths of ocean the helpless wanderers of the deep. "As well might they curse the midnight lighthouse, that starlike guides them on their watery way, or the buoy that warns them of the sunken rocks below." (*Wilson.*)

The curing of Rupture in Children was formerly attempted by passing the affected children, naked, through the two split portions, held open by a wedge, of young living ash trees. For the details, see White's *Natural History of Selborne*, letter to Daines Barrington, dated Jan. 8. 1776. [See also Mr. Bree, in the preceding communication, in p. 557., where he relates a recent instance of the practical observance of this superstition.]

The Field Shrew (*Sòrex aràneus*) was formerly accused of injuring horses, either by *biting or running over them;* and whenever a horse in the field was seized with numbness in the limbs, he was immediately judged by the old farriers to be either *planet-struck* or *shrew-run.* The mode of cure they prescribed, and considered as in all cases infallible, was to drag the animal through an arch of a bramble, formed by a shoot which had rooted into the ground at the extremity: a method, I am told, formerly practised, and even now occasionally made use of, for the purpose of *curing children of the hooping-cough.* [See Mr. Bree in p. 556.] Another mode of curing shrew-run animals was applying gently to the part of them affected the twigs or branches of a shrew-ash. Respecting this superstition, and the mode of constituting a shrew-ash, see White's *Natural History of Selborne*, in the letter before cited. The shrew-ash at Selborne seems to have been cut down about the year 1758; so that we may refer the superstition relative to it to the time when bezoar stone [see IV. 285.], theriace, unicorn's horn, and bone of a stag's heart pounded small, were held in high repute for curing disorders.

The more we look into the present subject, the more objects we find against which superstition and folly have directed their deadly shafts; and were I to bring forward all those animals which, from the earliest records, have been so unfortunate as to fall into this class, I must trespass still farther upon the space of the Magazine, and the reader's time. I would incidentally add, in relation to Mr. Farmer's notice of *Superstitions connected with the Magpie*, in V. 210., that I have never heard this bird styled either piannet or pianne:

in Yorkshire it is generally called nanpie, which name is also applied to the pæony.

East Wilton, Yorkshire, May 7. 1832.

[The word "piannet" is given, in Bailey's *Dictionary*, as a name of "the lesser woodpecker."]

Additional Superstitions. Love-fortune ascertained by Means of the Leaves of the common Ash Tree (*Fráxinus excélsior* W.).—Mr. Bree has informed us, in p. 553., that the lads and lasses of Warwickshire ascertain their love-fortune by the growth of the shorn florets of *C*entaurèa nìgra. In Cambridgeshire, I remember that the same end was attained playfully, and seemingly by much younger parties, by the help of the leaves of the common ash. Such leaves were sought, and sought till found, as consisted of as many leaflets as the boy was years of age; and the first lassie met, or perhaps seen, after the leaf had been acquired, was to be the future partner. The leaflets of the leaf of the ash vary in number, from five to eleven, and, upon quite young vigorous-growing ash trees (ashlings) to even thirteen; and very rarely the number is an even one, from one of the last pair of leaflets and the terminal leaflet having been produced grown together. The search for the required leaves was at least amusing, and not uninstructive. The children of Suffolk have, I have been told, several playful phrases which they, in their sports, recite in application to

The alternate Spikelets of the Perennial Darnel (*Lòlium perénne* L.): the issue of the recitation depends on the word which happens to correspond, in the order of succession, with the terminal spikelet of the spike.

A home-made Kind of Salve was, as lately as within the first fifteen years of the present century, in use with some of the good grandmothers in Cambridgeshire for curing burns or scalds, it is not unlikely for curing both. One of the ingredients in this salve was

"*Grave-stone Moss*," that is, moss off grave-stones; and I believe that, in collecting it, less heed was paid to the species of the moss, or even to whether it were a moss or a lichen, than to the condition that it was taken off a grave-stone or grave-stones. I remember one young woman who wore unseemly scars after, although I cannot say assuredly in consequence of the use of this salve.

Witch-Stones were once in use. These were stones naturally traversed by a hole through which a string could be passed; such as one now at times sees appended to a bunch of keys.

A string was passed through the hole of such a stone, which was tied by the string to some part of the bedstead, and deemed adequate to preserve the occupant of the bed from visits from any witch.

A "Lucky Stone," with the boys of Cambridgeshire, is the lower or curved half or valve of a fossil species of Gryphæ`a, a genus of fossil bivalve shells: see II. 31, 32. Instances of the occurence of this valve in the gravel used for the roads and other purposes are not very rare; and when a boy meets with one, the practice is this: to spit into it and throw it behind him, over his shoulder, without looking what becomes of it: and this to the end of promoting good-fortune to himself. I think that this ceremony is done, however, by the boys, more "according to custom" than in deference to any serious belief in good results from it. "The devil's toe-nail" is a name for this valve of the Gryphæ`a, either in Cambridgeshire or Suffolk *, probably in both, and this name itself implies a superstition.

A Species of Belemnites, a genus of multilocular univalve fossil shells (see II. 35.), occurs not very rarely among the gravel in Cambridgeshire; the individuals of which species the boys call "thunderbolts;" and have in this case, I believe, some real credence of their having been derived to the earth from thunderstorms. *For Notices of Superstitions of a higher order connected with Recent, not Fossil, Shells*, see III. 256—261.

The Nest of the Robin sacred even to Boys.—Of the boyish superstitions which I remember, that with the best tendency (all superstitions are bad in themselves, as they afflict the mind with an enslaving fear) was one enjoining the leaving unrobbed the nest of the robin: whatever boy robbed a robin's nest would be punished by having an arm or a leg taken off him; and this, one "Tom Moody," or somebody who came occasionally with powers irresistible, would effect.

A Superstition connected with the Ass.—The neck, withers, and ridge of the back of the ass are traversed by a black line of sufficient breadth to make it very obvious, and this line is crossed by a similar line which is extended some distance down each shoulder; so that from the two lines the figure of a crucifix is fairly presented: this, I was told in boyhood, has been the case with the ass, in all individuals of the species must be meant, ever since Christ rode upon one, on his entry into Jerusalem. (*Matthew*, xxi.)

* A cartload (perhaps several cartloads) of fossil shells of a species of Gryphæ`a, were found, in about 1825, in a pit at Chedberg, Suffolk: we wish some Suffolk correspondent would enable us to register authentic particulars respecting them.

The Milky Thistle.—The fable which accounts for the origin of the milky way has been oft admired for its beauty; and those of rural observers,

> " Whose souls proud science never taught to stray
> Far as the solar walk, or milky way,"

associate a similar idea, and one of equal interest to them, with the milky thistle, or Virgin Mary's thistle (*Cárduus Mariànus* L., *Sílybum Mariànum* Gærtner): its leaves exhibit a beautiful tracery of milk-coloured marking, and the plant is reputed to have derived this condition of its leaves from an accident assumed to have occurred to the person of the second fable, like to that which has been assumed to have happened to the ideal person of the first.

The Leaves of Polýgonum Persicària, a plant common in most damp ground in which the soil is stirred occasionally, are usually marked towards the centre with a dark-coloured spot, and those of the *P. lapathifòlium* sometimes are; and I have been told that, in Scotland, a traditionary legend prevails regarding one of these species, most probably it is the *P.* Persicària, which ascribes the origin of the spot-mark in its leaves to the accident of a drop of blood having fallen, at the crucifixion, upon a plant of this species which was then growing near to the foot of the cross.

Of Superstitions relative to the Application of the Human Spittle, there are many, as is shown in the *York Courant* newspaper of Sept. 11. 1834, in an extract from " Dalyell on the Superstitions of Scotland." Reference is made to those recorded by Pliny and other ancient writers, and it is added, that, " with equal confidence, the moderns spit into their hands when they fight, and spit under the humiliation of discomfiture; they spit on money received in traffic, on throwing aside the combings of their hair, on wounds in the flesh, and on the bite of venomous snakes to cure it; they spit as a token of the most sovereign contempt; and, in one of the remotest Scottish islets, spitting into the grave forms part of the funeral ceremony." — *J. D.*

ART. III. *Thoughts in relation to the Questions on the Mode of Origin of Song in Birds* (III. 145. 447.; IV. 420.; VII. 245. 484.). By W. H. Y.

THE Song of Birds is innate.—I am surprised to find (III. 447.) that Mr. Sweet is of opinion [as are Bingley and other naturalists] that the song of birds is acquired, and not innate: if he were a phrenologist, as well as an ornithologist,

he would know that birds have an innate organ of tune, which will, of course, lie dormant when the bird is not excited to exercise it, as in the case of the nightingale mentioned by Mr. Sweet, and as shown in the experiments of Daines Barrington (Pennant's *British Zoology*, vol. ii. Appendix) on the sparrow and linnet, which were put into rooms where they neither saw nor heard *any* other bird: no wonder if they did not sing! A man who had been shut up in a room by himself from his infancy, as in the case of Caspar Hauser [see *The Penny Magazine*, Nos. 118, 119, and 120.: the case of "*Peter the Wild Boy, caught in the Woods near Aveyron*," as detailed in a work of this title, may be added], would, of course, not be able to speak a word, having no occasion for language: but place several persons together in a similar situation, and there is no doubt that they would make out a language of some kind or other, as they would have the desire of communicating, and possess the necessary organs for accomplishing it, within themselves. It is the same with birds; the parents do not sing: while the young remain with them, nor are they taught by their parents. They are first invited to sing by the genial warmth of spring, as well as for the purpose of attracting a mate; and emulation and an innate organ of imitation doubtless assist in giving the bird a desire to sing. The first of these makes them cheerful; the last two give them the desire of doing as the other choristers of the woods do; and an innate organ of tune dictates their song. In the experiments before alluded to, none of these could be felt. If birds only learn to chirp and sing by hearing their parents chirp and sing, how does it happen that the duckling and chicken are able to chirp, which they begin to do even before the shell is cracked. Surely it will not be maintained that their mother taught them! As Mr. Thugarton very justly remarks (III. 145.), "if birds were not 'true to their song,' we might hear strange anomalies. The chattering starling might entrance us with Philomela's strains, or the hoary-headed daw might, in midwinter, surprise us with 'the welcome voice of the harbinger of spring.'" But it is now time to finish these observations, which may, perhaps, be tiresome to your correspondents, as what I have endeavoured to prove may have been long familiar to most of them: but, in this as in many other cases, phrenology clears up every thing; whereas, without its aid, the dispute might be maintained on both sides with apparently equal plausibility. For farther observations on this subject, see Mudie's *British Naturalist*, i. 28.—*Sept.* 10. 1834. [*Postmark, Burton on Trent.*]

ART. IV. *Facts on Humming-Birds, their Food, the Manner in which they take it, and on their Habits; with Directions for preserving the Eggs of Humming-Birds, and the Forms of the Bodies of Spiders, and Pupæ and Larvæ of Insects.* By the late Rev. LANSDOWN GUILDING, B.A. F.L.S. &c.

[IN the collection of notes by Mr. Guilding, which we have spoken of in p. 558., there are the following, in relation to Professor Rennie's remarks on the "Food of the Humming-bird," published in I. 371.]

By far the greater portion of the food of the *T*rochílidæ consists of honey. I have often shot humming-birds, through whose beaks, when not wounded in the throat, I have sucked a teaspoonful of the purest nectar. When the fluid is hard to reach, as in the flowers of the *H*ibíscus *R*òsa sinénsis, I have known the calyx pushed aside or perforated; or the tongue passed along the calyx through the petals, when the corolla is large and deep, or closed up by the internal organs. They do sometimes, indeed, feed on soft insects; but it must be a food rarely sought for. In twelve years, I have only seen a single instance of a *T*rochilus poised in the centre of a dancing swarm of gnats; which, for a considerable time, it continued to peck at and devour, though my garden had the blossoms in perfection about which it is commonly found.

Mr. Rennie asserts that birds have little power of suction, in consequence of the rigidity of the tongue: he will be surprised to find how differently constructed is that of the humming-bird. I am preparing a drawing to represent the details of this organ (so beautiful, complex, and perfect in this family); which I must send to the Linnæan Society, as it cannot be well represented by a wood-engraving.

The tongue is long, sublinear, and capable of considerable protrusion. Its principal *free* portion consists of two diaphanous united tubes (fistulæ vel tubi nectariferi [Mr. Guilding has added, in a footnote: like the tubes in the antlia of lepidopterous insects]), pouring the nectar, by suction and capillary attraction, through a common aperture (foramen nectariferum), into the œsophagus. At the apex, the tubes terminate in two distinct, flattened, acuminate, elastic processes, cut into liplets (labrella), by which the nectar is wiped up from the vegetable organs which contain it.

It may not be improper to add here a few observations which occur to me when writing of these splendid ornaments of the tropical landscape.

The spider sometimes proves an enemy to the humming-

bird. I have seen the small *T*róchilus cristàtus caught, and nearly perishing, in the nets of a spider (which I purpose to describe, from its pretty coat of burnished silver, and the singularity of its characters). This bird, though remarkable for strength of wing, was unable to extricate itself: indeed, the yellow threads of this spider, pressing across the face, or touched by the finger, afford a resistance which would hardly be credited by those who have only noticed [the nets of] the smaller species of Europe. [The net of the European Epeìra diadèma has the spiral lines of it studded with globules of gum: see V. 691, 692. This gum contributes very much to the detention of objects which have come in contact with the net: the nets of some tropical species may be similarly gummed.] Small birds are sometimes, also, held in captivity, as well as hosts of insects, by the seeds of various plants furnished with pedunculated glutiniferous glands; or those singular microscopic multiform prickles and hooks by which nature has intended they shall adhere to passing animals, and be thus scattered over the earth.

It has not been noticed how these humming-birds connect their nests. These ingenious mechanics would find it impossible to construct their egg-shell nidus, as other birds do, from grasses and sticks, on account of its minuteness; but in stolen cobwebs an admirable substitute is found. The interior is softened with the silken pappus [down] of the *A*sclèpias curassávica, and the exterior defended by a coating of moss and lichens: the whole being bound together by the webs of spiders. In my stable, I often see the bird poised in the air, and collecting these necessary materials.

*T*róchilus cristàtus sometimes deviates from its usual habits. In general it is remarkably wild, and soon disturbed; when it darts away through the air with the velocity of an arrow. I once, however, saw a pair of this species almost domesticated, in the house of a gentleman, whose kindness and humanity had brought round him many a lizard and winged pet. They built for many years on the chain of the lamp suspended over the dinner-table; and here they educated several broods, in a room occupied hourly by the family. I have been seated with a large party at the table, when the parent bird has entered; and, passing along the faces of the visiters, displaying his gorgeous crest, has ascended to the young without alarm or molestation.

Mr. Rennie's supposition [I. 372.], that all nectariphagous birds will be found, on proper scrutiny, to feed on insects *exclusively*, is equally void of foundation. The tongue of the

Nectarineæ, though much more simple, is well adapted, from its expanded, ciliate, or spinose tip, for taking up the nectareous juices, which are yielded by plants much more profusely than Mr. Rennie supposes [I. 371.].

[*St. Vincent, May* 1. 1830.].

[Mr. Sells has related, in V. 473, 474., two instances of humming-birds nidificating in domestic situations. He has also presented, in p. 474., facts, and argument from them, in proof that the humming-birds feed on the nectar of flowers. Mr. Waterton has remarked, in his *Wanderings in South America* (see an extract from them in our V. 475, 476.), that "it seems to be an erroneous opinion that the humming-bird feeds entirely on honey-dew," that is, the nectar of flowers; and that, "on opening the stomach of the humming-bird, dead insects are almost always found there." Mr. Waterton, besides using, in these remarks, the words "entirely" and "almost," has also this observation, quoted in our V. 475.: — "See it [the humming-bird] darting through the air almost as quick as thought! Now it is within a yard of your face: in an instant, gone! Now it flutters from flower to flower, to sip the silver dew," &c. From these expressions, we may learn that, while Mr. Waterton has taught that the humming-birds feed on insects, he has not denied that they also partake of the nectareous juices of flowers.

Wilson, also, according to Professor Rennie, in our I. 371., "found, upon repeated dissection, that the *Tróchilus cólubris* had a quantity of insects in its stomach, either whole or in fragments."

Our correspondent O. has communicated, in VII. 510., some facts on the habits of the *Tróchilus cólubris*, as observed by him in Lower Canada. We believe, with him, "that very little honey is secreted in flowers while the sun is shining hot upon them;" but the absence of the humming-bird during the middle of the day, which he has attributed to this cause, is ascribed to another by Mr. Waterton: see in V. 476.

Other information on humming-birds will be found in V. 676., VII. 71. 90. For notices of Sir William Jardine's *Natural History of Humming-Birds*, in two volumes, with coloured figures of many of the species, see VI. 259., VII. 90.

Humming-Birds perforate Flowers to obtain the Nectar they include, when this is not otherwise accessible. See in p. 569.

Insects perforate Flowers to obtain the Nectar they include, when this is not otherwise accessible. See in IV. 93. 479.; V. 74. 86. 753.; VI. 469.; and *The Entomological Magazine*, ii. 328. The perforator in this last case was "the great humble

bee (Bómbus terréstris)," "the nectaries of the common columbine" were the subject of its perforations, and the mode in which it perforated them, this:—"The bee settles on the outside of the flower looking upwards, then bites a small hole in the nectary with its mandibles, and instantly thrusts its proboscis into the aperture." The observer of this fact has added:—"On examining a number of flowers, not less than 250, I found that at least two thirds of them were thus perforated."]

[*PRESERVING the Eggs of Humming-Birds and those of other Birds.*]—The eggs even of the smallest humming-birds cannot be long kept in hot countries. They retain for some time in our cabinets their natural colour, but afterwards become discoloured, and burst: they should all be emptied, and injected with plaster of Paris, or chalk made into a paste. Small perforated brass or silver points of this shape should be always at hand. [The drawings represent two miniature funnels; one about an inch long, with the upper or receiving part cylindrical, but the greater portion of its length composed of the conducting part, which is gracefully tapered to a fine point; the other funnel is shorter, less slenderly tapered, and its point not so fine: each is represented as banded with a ring in relief round the centre of the cylindrical portion of its length, as if to render holding by the finger and thumb more ready.] A small aperture is to be made at each end of the egg, rather laterally, and, one of the tubes being fixed on a goose quill, the contents are to be expelled by blowing. A common pewter syringe is then to be filled with the paste, and, the tube being pressed on its point, the egg is filled in a moment. Any ingenious silversmith could make them neatly: the only difficulty is in filing away the metal carefully from the point. They are very useful at all times; in

The Injection of Pupæ and Larvæ, the Bodies of Spiders, and other fleshy and perishable Objects. [Mr. Guilding has, in another note relative to the query on preserving spiders, in II. 291., pursued this subject.]

Spiders, I find, are easily preserved by means of the perforated pointed tubes I have above alluded to. Sand, or any heavy substance, should be avoided in distending them. Process:—Puncture the abdomen rather laterally beneath; gently press out the contents on a rag, and with the forceps remove the remaining viscera: place the pin in the thorax on the right side; take the tube on a quill, and distend the abdominal skin with air: fill the syringe, with its tube, with any size-preparation (see Pole's *Anatomical Instructor*) used

for fine injections, or with thick flour-paste, or even [paste of] pounded chalk, and inject gently till every part is plump and well extended. Let the specimen hang up to dry for a few hours till the injection is firm; then clean the aperture with a penknife, and extend the legs as you would those of insects. I have minute spiders as well as the giant *A*ránea *a*viculária *L.* [*My*gale *a*viculária *W.*]; dull-coloured kinds, as well as those clad in robes of gold and silver [see in p. 570.], so well preserved, that they could not be told from living specimens; and all is done in less time than is taken to describe the process. In my case of preserving instruments, I have coloured powders to tinge the injections: but they are seldom used. A small portion of corrosive sublimate or arsenic mixed with it would expel mites, but this would not be necessary in well-kept camphorated cabinets.

St. Vincent, May 1. 1830.

[*On preserving the Shells of Eggs for Cabinets,* see, besides the advice above by Mr. Guilding, that of Mr. Waterton in V. 515.: see, also, in IV. 145., An Observer of Nature's figure and description of an instrument (similar in principle to that of Mr. Guilding) which he had had made for withdrawing from egg-shells their contents: see in VI. 171., Mr. Murray's suggestion of the employment of the air-pump for this purpose: see in I. 492.

On the Preservation of the Colours of the Fleshy Bodies of certain Insects, see Mr. Waterton in VI. 90. On the preservation of dead insects generally, see V. 495. 683. 746.; VI. 90, 91. 554, 555.]

ART. V. *The Accumulation of all possible Information respecting the Habits of the Rock Birds of Britain, by the cooperative Agency of Naturalists residing near Headlands on the Coasts, suggested.* By J. D. SALMON, Esq.

IN the notices with which naturalists have favoured us of the arrival in, and departure from, Britain of the birds of passage, they have confined themselves, for the most part, to the species which visit, for the purpose of incubation, during summer, the interior of the country; while scarcely any information has been published on the migratory movements of the equally numerous species of rock birds; although some of these, like a greater part of the others, leave, on the approach of autumn, their place of nidification, to migrate to other countries, from north to south, or *vice versâ*.

I wish to draw the attention of those who reside nearest

the different headlands along the coast to this latter subject, as these are the places usually resorted to by these birds. To this end I have drawn up, from Martin's *Voyage to St. Kilda*, the annexed statements; and, although I am aware that they may be very imperfect, I am induced, by the reflection that no other work offers so much information upon the subject proposed, to submit them; and I hope that they will prove a means of inducing a contribution of much information, additional, and, where necessary, corrective.

It will be perceived that the inhabitants of St. Kilda consider the state of the wind and weather as having a great influence on the arrival, &c., of some of the birds.

In relation to the subject generally, I may quote as follows, from a letter received, this summer, from a friend at the Isle of Wight: — "The birds never leave the cliffs altogether, but keep coming, through the winter and spring, *at short intervals*, up to the time of breeding. The first eggs taken this year of the guillemots and razorbills were obtained on May 1.; eggs of the herring gull, on May 4. On May 13., I procured eggs of these in abundance, quite fresh. Puffins and shags sitting, the former having ceased laying." Is it not probable that these *short intervals* are caused by the state of the weather, which may more or less affect their acquisition of food?

Many species that are supposed to inhabit only the sea shore are to be found in other situations: the ring dottrel (*Charàdrius hiatícula*), provincially called the stonehatch, is to be met with abundantly on all the rabbit warrens in the interior of this county [Norfolk] during the breeding season, usually making its appearance in the middle of February, and taking its departure in about the end of August. The first appearance of birds of this species, last spring, upon an adjoining warren was on Feb. 16.; they were sitting on March 30.; and had all taken their departure previously to August 25., to the sea coast, I presume.

Thetford, Norfolk, Sept. 10. 1834.

DATES of the Arrival, Breeding, and Departure of the Rock Birds at the Island of St. Kilda, with some other Facts relative to them, as ascertained by M. Martin, Gent., during a Visit to that Island, in the Spring of 1697.

Fulmar (*Procellària glaciàlis* Lin.). — *Arrival.* In November; the sure messenger of evil tidings, being always accompanied with boisterous west winds, great snow, rain, or hail. *Breeding.* Commonly lays its egg about the 1st, 2d, or 3d day of May. The young ones are hatched in the middle of

June, and are ready to take wing before July 20. *Departure.* Stays there all the year, except the month of September, and part of October. *Remarks.* A sure prognosticator of the west wind. If it comes to land, no west wind is to be expected for some time; but if it keeps at sea, or goes to sea from the land, whether the wind blows from the south, north, or east, or there is a perfect calm, its keeping the sea is always a certain presage of an approaching west wind.

Lavy, or Foolish Guillemot (U`ria Troïle *Lath.*). — *Arrival.* With a south-west wind, if fair, Feb. 20. *Breeding.* No remark. *Departure.* Depends upon the inhabitants' taking or leaving its first, second, or third egg. *Remarks.* If it stays upon land for the space of three days without intermission, it is a sign of southerly wind and fair weather; but, if it goes to sea before the third expires, it is then a sign of a storm.

Falk, or Razorbill (A'lca Tórda *Lin.*). — *Arrival.* No remark. *Breeding.* Lays its egg in May; its young take wing in the middle of July. *Departure.* No remark.

Solan Goose (Pelecànus Bassànus Lin.). — *Arrival.* About the middle of March, with a south-west wind, warm snow or rain. *Breeding.* They continue to pluck grass for their nests from their coming till the young fowl is ready to fly in August or in September. *Departure.* According as the inhabitants determine the time, i. e., by taking away or leaving its first, second, or third egg. *Remarks.* There is a tribe of barren Solan geese, which have no nests, and sit upon the bare rock; these are not the young fowls of a year old, whose dark colour would soon distinguish them, but old ones, in all things like the rest.

Bowger, or Puffin (A'lca árctica Lin.). — *Arrival.* With a south-west wind, about March 22. *Breeding.* Lay their egg April 22., and produce a fowl May 22., if their first egg be not taken away. *Departure.* No remark.

Scraber, or Shearwater (*Procellària* Puffìnus *Lin.*). — *Arrival.* In March, and in the nighttime, without regard to any wind. *Breeding.* Its nest is very far under ground, whence the bird never comes in daylight. *Departure.* Goes away in August, if its first egg be spared. *Remarks.* It is never to be seen but in the night, being all the day either abroad fishing, or upon its nest.

Assilag, or Storm Petrel (*Procellària pelágica* Lin.). — *Arrival.* About March 22., without any regard to winds. *Breeding.* Produces the fowl towards the middle of October. *Departure.* Goes away about the end of November.

Reddag, (*supposed*) *Kittiwake* (Làrus Rissa *Lin.*). — *Arrival.* April 15., with a south-west wind. *Breeding.* Lays its egg

about the middle of May. *Departure.* Goes away in the month of August. *Remarks.* There are three sorts of sea malls (gulls) here; the first of a grey colour, like a goose; the second considerably less, and of a grey colour; and the third sort white, and less in size than a tame duck, called reddag.

Gair Fowl, or Great Auk (*Alca impénnis* Lin.). — *Arrival.* May 1., without regard to any wind. *Breeding.* Lays its egg upon the bare rock; and, if it be taken away, it lays no more for that year. *Departure.* Goes away about the middle of June.

Jirma, or Oyster-Catcher (*Hæmátopus ostrálegus.*).—*Arrival.* In May. *Breeding.* No remark. *Departure.* Goes away in August. *Remarks.* If it comes the beginning of May, it is a sign of a good summer; if later, the contrary is observed.

The inhabitants observe, that, when the April moon goes far into May, the fowls are ten or twelve days later in laying their eggs than they usually are. Every fowl lays an egg three different times, except the gair fowl (great auk) and fulmar, which lay but once. If the first or second egg be taken away, every fowl lays but one other egg that year, except the sea malls (gulls), and they usually lay the third egg, whether the first or second egg be taken away or not.

[In V. 415—425. there is a communication of much interest by Mr. Salmon himself, consisting of " Observations on the Eggs and Birds which were met with in a Three Weeks' Sojourn in the Orkney Islands."]

[The state of weather must much influence the movements of the rock birds. Mr. Macgillivray (in his account of the Outer Hebrides in *Cheek's Edin. Journ. of Nat. and Geograph. Science*, i. 249.), in a sketch of a winter tempest witnessed from a headland of the west coast of Harris, has these words: — " No sign of life is to be seen, save when a gull, labouring hard to bear itself up against the blast, hovers overhead, or shoots athwart the gloom like a meteor. Long ranges of giant waves rush in succession towards the shores. The thunder of the shock echoes among the crevices and caves; the spray mounts along the face of the cliffs to an astonishing height; the rocks shake to their summit, and the baffled wave rolls back to meet its advancing successor. If one, at this season, venture, by some slippery path, to peep into the haunts of the cormorant and rock pigeon, he finds them huddled together in melancholy silence. For whole days and nights they are sometimes doomed to feel the gnaw-

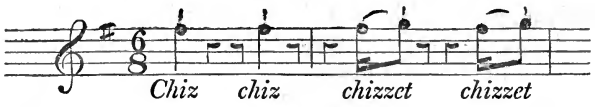
ings of hunger, unable to make way against the storm; and often, during the winter, they can only make a short daily excursion in quest of a precarious morsel of food."

Similar storms may obtain at the time and place of the intended departure of any species of bird, and cause it to defer its migration until a more conducive state of weather is established.]

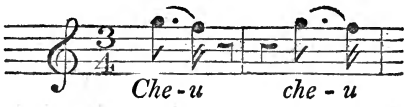
ART. VI. *On the Habits and Note of the Grey Wagtail, and on the Note of the Spring Wagtail.* By T. G., of Clitheroe, Lancashire.

WE have the grey wagtail with us the whole year; but it is rather a rare bird at all times, and in all the localities for it with which I am acquainted. I very strongly suspect that Selby is mistaken about this bird when he says, that, "previous to its departure in September, it assembles in small flocks or families, which haunt the meadows or bare pastures." This does not agree with my observations on it; although it is quite true, if applied to the spring wagtail. On the contrary, the grey wagtail, which stays with us through the winter, is a solitary bird, except in the breeding season; and the young ones, which certainly associate in broods for a month or two after leaving the nest, are dispersed before September. As to their frequenting the meadows and bare pastures, although I see them at all times of the year (and a pair or two breed, every year, near my house), and although they are birds with whose peculiar note and habits I am as well acquainted as I am with those of the house sparrow, yet I have never known them frequent the fields at any time. As far as I have observed them, they invariably seek their food on the beds of the rivers, brooks, and ditches; where their shrill note often betrays them to persons who would otherwise never see them.

This bird may be distinguished from the spring wagtail, very easily, by its note, at any time, but particularly when flying; yet, notwithstanding that the difference is very apparent to a person who hears both, it is not so easy to describe it. In attempting to do this, I hope, therefore, I shall be excused if I do not make it so obvious in the description as it is in reality. The latter part of the note of the grey wagtail is a little higher in the musical scale than the former part; and it is very *staccato*. Thus: —



it being usually altered as the bird makes a spring in the air.* While the latter part of the note of the summer bird is lower in the scale than the former part; which is more prolonged than in the note of the grey wagtail, and is slurred into the latter part something in the following manner: —



It is also softer and sweeter than the note of the grey wagtail; which bird, like the water ouzel, is fond of the letter *z*. I do not, of course, mean it to be understood that these notes are either of the same pitch, or that they bear the same relation to each other that the notes of the birds do, but intend the sketches as rude attempts at illustrating what I could not so well explain in any other way.

I have been amused with a singular habit which I have noticed in several individuals of the grey wagtail. They were fond of looking at their own images in the windows, and attacking them; uttering their peculiar cry, pecking, and fluttering against the glass, as earnestly as if the object they saw had been a real rival, instead of an imaginary one: or, perhaps, they were only admiring themselves, and testifying their satisfaction in this way. It is remarkable that two of these instances were in the autumn, when the same motives for either love or animosity, which would be likely to actuate them in the spring, would no longer exist. The first of these instances occurred when I was a boy, and was repeated daily, and almost hourly, both against the windows of my father's house, and those of that of our neighbour; who, being rather superstitious, was alarmed about it, and came to consult my mother on the subject. She said there was a bird, which, her brother had told her, was a barley-bird (*M*otacílla flàva), which was continually flying against her windows; and, as

* Persons conversant with the habits of birds will readily comprehend me: for the sake of those who are not, I will just observe that the flight of all the wagtails is very peculiar; being a succession of great leaps in the air (if I may be allowed the expression), which form a series of curves; the bird rising considerably at the commencement of each effort, and sinking again at the close. [See, in IV. 418., Mr. Main's remarks on the mode of flight of the families " of Lóxia, *P*yrrhùla, Emberìza, and *F*ringílla."]

birds were not in the habit of doing so at any other time, she thought some serious calamity was portended by it. My mother comforted her as well as she could; and I undertook to rid her of the annoyance. By setting a horse-hair noose on one of the window-ledges which it was in the habit of frequenting, I soon caught it; and, by plucking out the under tail-coverts, which I wanted to dress *yellow duns* with, I effectually cured it of the propensity, whether the stimulus had been love or hatred; whether, Narcissus-like [see VI. 513, 514.], it was in an ecstasy of self-admiration; or whether, like the cock which attacked its own image in the boot (and which Mr. Robert Warren's poet and painter have exalted to lasting fame), it would admit of no rival.

Clitheroe, Lancashire, May 29. 1834.

ART. VII. *Notes on Luminous Insects, chiefly of the West Indies; on Luminous Meteors; on Ignes Fâtui; on the Luminousness of the Sea; and on the Powers possessed by the Races of Lizards, of voluntarily changing their Colour: with other Information on the Habits of Lizards.* By the late Rev. LANSDOWN GUILDING, B.A. F.L.S. &c.

THE Luminous Matter of the Lampýridæ of the Tropics seems to afford a much stronger and more durable light than that of the glowworm of England (I. 156.; VII. 250.); which faintly sheds

> " A beam of soften'd splendour through the gloom,
> . . . . . .
> And feeds his lamp in solitude's recess."

The matter taken from the vesicles, and rubbed on the wall, long retains its brilliance, after the manner of phosphoric preparations. The occurrence, too, of luminous insects in Britain is more rare. Seldom does the same bank support a dozen of these inactive midnight sparklers: but what can equal the splendour of those fairy scenes which the inhabitant of the tropics has nightly before his eyes? The fireflies of the West Indies,

> " Stars of the earth, and diamonds of the night,"

are said to be more numerous in rainy weather: the truth, perhaps, is, that, in dark and cloudy evenings, their tiny lamps and coruscations are more visible, and attract greater notice. As twilight dies away you see, at one step, some gigantic tree peopled by these magic rovers glowing with all the green, the gold, and emerald lustre of precious stones.

——— " Around
Myriads of insect meteors, living lamps
People the glittering air; a fairy world."

At another step, some long lane in the darkness of night seems to have been consumed by fire, and to be throwing up its last expiring sparks. The insects, as they present their backs, conceal their floating lantern for a moment, and render the resemblance perfect,

" And every hedge and copse is bright,
With the quick firefly's playful light;
Like thousands of the sparkling gems,
Which blaze in Eastern diadems."

Presently, with a steady and bold sweeping course, the luminous Elater (E. noctilùcus *L.*) crosses your path,

——— " A meteor swift and bright
And the wide space around, on high,
Gleams with his emerald light."

It forms a strong contrast to the twinkling phosphoric fires of the lesser stars, and resembles a wax taper borne rapidly through the gloom, by some invisible hand: while the ear is assailed by countless tribes of sonorous insects, and frogs raising their nuptial cries.

How glorious is such a scene! From the innumerable host of insects which light up the earth, and from their proximity to the eye of the spectator, they have all the brilliance of real stars. Above our heads is the broad firmament of stationary lights; below is a second firmament of luminous points, moving with all the eccentric courses of comets and meteoric balls, and with all the glory that tracks the shooting stars. [See V. 672.]

[*Luminous Meteors.* (A note made in relation to the remarks on "*Falling Stars*," in II. 305.).]—The meteors called falling stars are very common in these islands. I lately observed one of vast magnitude traversing slowly the Bay of Kingston, a most splendid body, and at a very trifling elevation.

Ignes Fatui. (I. 156.)—The reviewer is undoubtedly right in his supposition that the far-famed ignes fatui,

" Which dance and glimmer on the marshy mead,"

may sometimes owe their origin to the phenomena attending the gaseous exhalations of the earth. They sometimes also proceed [as the reviewer has deemed probable] from the lanterns of luminous insects. When a boy in Worcestershire, I have repeatedly seen these

——— " aerial lights betray
And charm th' unwary wanderer from his way;"

and from comparison with the motions of luminous animals,

which I have since seen in other lands, I have no doubt whatever of their origin. In the generality of cases, perhaps, these lights proceed from orthopterous? or other insects attached to swampy grounds, and luminous only during the season of their nuptials.

Luminousness of the Sea. (I. 156.)—The most satisfactory information on the luminousness of the sea, and the animals producing these lovely sparks, will be found in one of the numbers of Thomson's *Zoological Researches* [see IV. 256.], a work, of course, in the hands of all naturalists. While sailing in the more shallow parts of the Caribbean Sea, and looking over the vessel's side when becalmed in these dangerous waters, in the midst of reefs, I have seen at the bottom huge molluscous or radiate animals emitting the splendour of a lamp, but could never ascertain the species.

Putrescent matter is occasionally highly luminous in the West Indies. [Mr. Guilding has a note, in another part, upon the remarks of some correspondents given in II. 209.—The gelatinous mass containing portions of the frog was probably vomited by the heron. I have known similar matter in the West Indies to become highly phosphorescent.]

It has been already observed that the larvæ of some insects emit light. The larva of an E'later? as far as I can determine, was lately sent to me, which was said, by the respectable person from whom I obtained it, to have been very luminous between every segment of the abdomen.

The Voluntary Changing of Colour in Several Genera of Lizards, and more especially in Chamæ'leon and Anòlis. (I. 157.)—There is not in nature a more singular phenomenon than this. The mode of effecting this miraculous change does not seem to have been yet fully determined. It may depend upon some small, peculiar, and supplementary system of vessels pouring a coloured fluid to the integuments, or withdrawing it from the skin; or it may proceed from the more simple action of the arterial system, from the rapidity or lethargy of the circulation: though one would suppose a temporary stagnation would deprive the creature of all activity. It is strange that the power is within the perfect control of the lizard, and is not abandoned even at the eager moment of springing on the prey.

The passions of the human mind do indeed change the colour of the face, and distort the countenance; but these changes indicative of strong feeling are transitory, if not momentary, and almost in all cases involuntary: whereas the lizards can regulate this protean power for hours, days, or months. By inflating the body, the numerous scales might be separated to certain degrees, and thus affect the general colour-

ing: but I do not observe that the outline of the Anólidæ is at all altered, however great may be the varying of the tints.

The number of a green species of Anòlis (*Lacérta bullàris L.*, from its throat being *supposed* to be inflated into a ball: the Anòlis variábilis *Guild.*, variable) is, in some of our islands perfectly incredible, and one only wonders that the race of insects is not extinct. Indeed, one never sees here moths and other objects settling on walls and trees, as in England: from the danger of such exposure, it often happens that insects whose larvæ are readily obtained for breeding are never taken in a state of liberty.

On large trees whole families of lizards are actively employed in their insect chase, while every rock, fence, or smaller tree, has one at least resting in readiness for its prey, or jumping from spray to spray with its sucker-bearing toes. Yet few will be found alike in colouring, though there are some tolerably permanent varieties. The general *unassumed* colour is a lively yellowish green: yet this is varied at will, and changed to grey, dark dirty brownish green, or is curiously varied. The aspect of each individual is adapted admirably to the spot it chooses as a cruising ground, which it commonly retains, unless disturbed, for very long periods; a fact which is easily determined by the notice of mutilated individuals.

But, whatever may be the assumed colouring of the individual, place it in confinement, and its mask is withdrawn as if by magic, and the bright green of nature is restored.

If a dark mass of volcanic trap [rock] is selected for a cruising station, the darkest colour is adopted: if the light foliage of trees and plants is preferred, a tint is acquired resembling its resting-place, and calculated for concealment and deception.

[In another place, Mr. Guilding has noted thus; in relation to the remarks, in II. 469., on "the chamæleon's antipathy to black:"—Many of our lizards reside *constantly* on the darkest rocks blackened by the air, and decayed cryptogamic plants: in which case the skin assumes a corresponding tint.]

In these cases the mute sexes separated from each other would have difficulty in meeting during the season of their loves; but nature, without enforcing the necessity of their returning to their proper colour, which would betray them to their prey and their enemies, has given to the diurnal species, which alone can need it, a retractile dewlap process, of a light and striking colour, which is never altered; of larger size in the males, which, with a vertical motion of the head, is often extended into a broad membrane to attract the notice of the other sex, as birds are known to display their plumose and other ornamental appendages for the like object.

I had once thought that at the time of developement from the egg, the colour was determined, and the animal had only to proceed in search of a spot suited to the natural varieties of its coat: but this idea is immediately contradicted by a captured specimen placed under a vase.

The Guana has in its youth much more lovely colours than its parents; and, during the periods of casting off the cutaneous exuviæ, the tints of lizards are affected: but the power of change in the chamæleons and the Anólidæ is altogether as voluntary and premeditated as it is inexplicable. In the latter tribe it is not, perhaps, so rapid as it is said to be in the former.

[In another part of Mr. Guilding's notes, there is the following remark on the guana, made in reply to the query on "edible lizards" in I. 495.

The common guana is eaten over the whole West Indies, and is reckoned equal in delicacy to a rabbit or fricasseed chicken. The eggs, also, are said to be delicious. I have a friend who shoots all he can find, and purchases every one brought to him, for his table.]

I may probably institute a course of experiments on our lizards, and communicate the results in a future Number.

[These results have not been communicated to us. As this remark was written in 1830, and the author died in 1832, he might not have instituted the experiments.]

[*Lizards like Music.*]—The assertion that spiders are attracted by music (I. 158.) is by no means incredible. Every child in the West Indies is aware how much the lizards are delighted with musical sounds, and how quickly they are drawn from distant spots to listen to the melody. I often whistle to some curious listener, and can easily discern his delight at my rude attempts: his ears are turned in mute attention, his eyes are soon closed, and he is totally absorbed and absent. In this state it is of course easily destroyed.

Our Common Green Species is a harmless, pretty, graceful, and useful animal: in houses where they are protected and caressed, I have known them tame enough to eat sugar from one's hand. As in other species, the mutilated tail soon buds, and is restored, and sometimes with monstrous appendages, or multiplication. Cats which feed on them, on my grape arbours, where they are troublesome among the ripe fruit, grow lean and sickly.

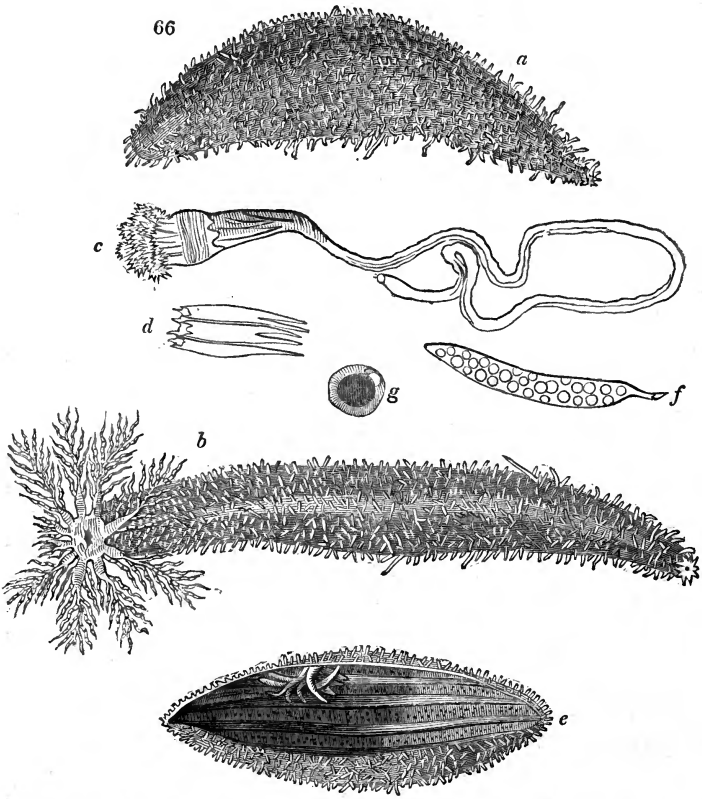
[*St. Vincent, May* 1. 1830.]

[For other facts on the habits of lizards, in Jamaica, see Mr. Sells in V. 476, 477. 653.]

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

24. MULLE'RIA PAPILLO'SA (*fig.* 66.). *Holothùria papillòsa Müller*, Turt. Lin. iv. 110.

66



a, Mullèria papillòsa, in a state of contraction: *b*, with the tentacula expanded. *c*, The tentacula and alimentary canal, as they appeared after being vomited by the animal: the ligamentous band, binding the oral apparatus together, is shown, and the ends of the salivary glands projecting underneath. *d*, The oral apparatus, detached. *e*, The eviscerated body laid open, to show the longitudinal bands, transverse fibres, and pores, and a cluster of ovaries. *f*, A single ovary, magnified. *g*, An egg, magnified.

THIS Mullèria is cylindrical or pear-shaped, according to its degree of extension; generally bellied in the middle, and tapered towards the posterior extremity; of an earthy or cinereous colour. The skin thick, coriaceous, and rough; with numerous small tubular papillæ, which clothe the whole surface, and follow no pattern in their arrangement. When contracted, nothing more is to be seen than a small circular

orifice at both ends; but, if the creature is carefully watched for some time, it may be observed to shorten and dimple the anterior by an involution of the skin, and again protrude it; and then it may, perchance, to your amazement, suddenly evolve and display its circle of tentacula (*b*). Of these there are eight large and equal, and two very small ones placed together: they originate in the circumference of the circular lip, by a thick round stalk, which sends off numerous divided branchlets, so that each assumes an arborescent form, of a brown colour, speckled with darker dots. In the centre of these beautiful organs we find the mouth, an aperture of considerable size, and armed with an apparatus of bones somewhat similar to that of those of the *E*chìnus: it consists of ten pieces, five of which seem divisible into halves by a fine scarcely visible longitudinal suture, and are prolonged below into two slender prongs; but the other five which alternate with them, are truncate below, being pointed above with a tooth; the first pieces having two similar teeth in close apposition. The margins of the pieces are minutely serrulate to favour their firmer union, which is principally effected by ligaments; and the whole are bound together by a strong broad ligamentous band, which completely encircles them; tendons passing on the inner surface of it to the roots of the tentacula, and others to and between the upper extremities of the osseous pieces, for the purpose, undoubtedly, of moving and contracting them. Between this band and the osseous apparatus, there are five oblong compressed fleshy glands, free beneath, but with a narrow pedicel at their origins, probably a canal leading to the gullet, for these are presumed to be the salivary organs, although their size and number would seem to indicate a function more important to the animal's welfare than the salivary glands are deemed to be in higher organisms.* The stomach is placed immediately under the oral apparatus: it is about half an inch in length, and very little wider than the intestine, but of a whiter colour, and with much stronger coats, the inner surface being strongly plaited and puckered in a longitudinal direction. The intestinal canal is about twice the length of the body, and must consequently have a tortuous course; it is furnished with a narrow mesentery, is of a brown colour, equal in calibre throughout, or only slightly dilated towards its termination, which is circular and plain, with a stricture immediately above it. The coats are smooth on both surfaces, but, under a mag-

* [The whole assemblage of the organs which consist in any being is an organism.]

nifier, circular fibres become very visible, and numerous minute dots are sprinkled among them.

The surface of the body was at first partially covered with fragments of shells and corallines, which were evidently retained by the suctorial property of the papillæ; and the animal, on being kept a day in sea water, threw them off. It had a slow progressive motion, slower than the shadow on the dial, which was effected by elongating the papillæ of one part, fixing them to the plate, and then drawing itself forward by again contracting these elongated parts; but the papillæ were much oftener used for the purpose of anchors than of feet, the creature being of an indolent and immovable character. When stationary, it was ever slowly changing its outward form: it was now shortened, and swollen in the centre; then it would relax itself, and become cylindrical; again, one part would be blown out and another drawn in, with a deep stricture, as if a thread had been tied round; or, again, the contraction would begin near the head, which is then made very narrow, and would spread backwards, the anterior portion recovering its original diameter as the wane of constriction passed away; and sometimes the contraction will spread in the opposite direction. It often raised the posterior extremity a little from the surface of the plate, and to one side, but I never saw any current to flow from this aperture. To effect these varied motions, we must suppose the existence of muscular bands or fibres in the coriaceous skin, both in a longitudinal and circular direction; and, on opening the body, we find such to be the case (*e*): five strong white raised bands run from one end to the other, radiating from the circular apertures; and numerous fibres pass between them transversely, among which minute pores open everywhere, which are the inner orifices of the cuticular papillæ.

The ovaries (*f*), which are of a flesh colour, lie towards the centre of the body, attached to the sides in a large cluster, or, at least, there was one cluster only left in the specimen before us, for it had ejected many ovaries before dissection. Each ovary (*f*) is half an inch long, cylindrical, with a short narrow pedicel at the end of attachment; and the ova are very visible through the thin membranous coat. They lie without any order, are somewhat globular, and enveloped in a transparent pellicle of nutritive jelly; and on one side there was a drop of an amber-coloured and apparently oily fluid.

Towards the posterior end, and reaching from the anus about one third up the body, there was a thin membrane laid

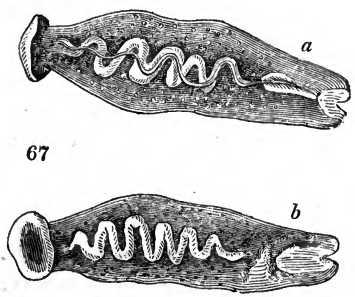
over, and, of course, internal to the muscular bands, which was spread over with a small quantity of brown grumous matter; but I saw no organs which could be supposed subservient to the office of respiration there.

The worm, having been kept in sea water unchanged for two or three days, sickened, and, by the more frequent involutions and evolutions of its oral end, evidenced its uneasiness. Being left unobserved in this state for an hour or so, I found, on my return, that it had vomited up its tentacula, its oral apparatus, its intestinal tube entire and as exhibited in our figure (*c*), and a large cluster of ovaries, which lay about the plate! The muscular convulsion must have been very great that thus so completely embowelled the creature; and yet life was not extinct, for the tentacula contracted themselves on being touched; and the empty skin appeared, by its motions, to have lost little of its irritability. It is true, as the poet has long since sung, that

> ——— "Nature's store
> Of majesty appeareth more
> In waters, than in all the rest
> Of elements."

25. PHY'LLINE GRO'SSA. (*fig.* 67.) *Hirùdo grósa Müller*, Turt. Lin. iv. 70.

Description. — Body $1\frac{6}{10}$ in. long, about six tenths of an inch in breadth where broadest; oblong, flat, soft, exannulose, roughish, with little granulations, and of a uniform flesh colour. On the upper side a small vessel is seen distinctly, running down the middle of the body, having a tortuous course, and terminating near the sucker; and it lies over a much larger intestine, following the same direction, and alone visible on the ventral aspect. The anterior extremity is rounded, somewhat raised above the mouth, which is placed in a sinus here, and opens chiefly on the under side; it is wide, edentulous; but, when opened, the inner surface appears flocculent, being clothed with longish papillæ, which are arranged in close longitudinal series, and cover the whole intestinal canal. This organ is nearly of uniform width and structure throughout; but the papillæ appear to be longer towards its termination, which is by a small aperture on the



67

Phýlline grósa: *a*, upper side; *b*, under side.

back, just above the sucker. The dorsal vessel begins in a sort of swelling above the mouth; and, after it has passed beyond the middle of the body, it becomes sensibly attenuated. It is not fibrous, and, indeed, exhibits no marked structure beyond a very fine and faint reticulation of the surface when exposed under a high magnifier. The space between the intestine and margins of the body is compactly filled with myriads of oviform bodies, which seem to lie, without any particular order, in a gelatinous fluid: they are roundish, opaque, and encircled with a rim or pellicle of transparent jelly.

I have twice found this leech in specimens of Cýpr*ina* islándica dredged up in Berwick Bay. They were lurking between the cloak and branchiæ, and doubtless had sought out the site for a less harmless purpose than shelter from foes; but, so far as I could judge from external appearances, the oyster had not suffered any material injury.

On the suggestion of Lamarck, it has been here considered a species of Phýlline; but it will not correspond with the character of the genus, for the large terminal disk or sucker is not armed with hooks, as Lamarck's definition expresses, but is quite smooth. Nor has the skin the slightest appearance of circular rings, or rugæ, even when contracted and hardened by spirits; and its whole anatomy is so unlike that of Annélides, and more especially of the true leeches, that it strengthens an opinion of Lamarck's, of there being a class of animals, yet unestablished, between the Annélides and the worms.

ART. IX. *On the Cause of Volcanic Action; a Reply to Professor Higgins's Review, in* p. 434, 435., *of Dr. Daubeny's Theory.* By Dr. DAUBENY, King's Professor of Botany and Chemistry in the University of Oxford.

Sir,

IF your correspondent, Mr. Higgins, will consult the forthcoming Part of the *Encyclopædia Metropolitana* (namely, Part xxxix.) when it appears, I flatter myself he will find, in the course of the article on Geology, which it is to contain, an answer to most of the objections brought forward, as applicable to that theory, by which I have attempted to explain the phenomena alluded to. He will at least see discussed at considerable length the question, whether the bases of the ordinary constituents of lava are likely to be so acted upon by water, as to produce the requisite degree of heat in consequence of its presence.

With regard to the supposed impossibility of water penetrating to the depths at which these inflammable substances may be imagined to exist, and likewise to the improbability of air finding admittance to the same spots, I shall be ready to discuss the reasonableness of such a conjecture, when the facts, that volumes of steam are constantly issuing from all volcanoes, and that azotic gas, either pure or combined with hydrogen, is so generally present during all the phases of volcanic action, are shown to be referable to other causes than the presence of water and air at the spots in which volcanic action occurs.

I have, however, neither time nor inclination at present to go over the details of the argument a second time, especially as the curiosity of those of your readers who may feel an interest in the discussion may be gratified very speedily, if you will only transfer to the pages of your Magazine some few paragraphs of the article on volcanoes, which will appear in the *Encyclopædia Metropolitana;* and this, probably, quite as soon as any remarks with which I might at present trouble you would find their way into print.

I am, Sir, &c.

Oxford, Sept. 17. 1834. CHARLES DAUBENY.

ART. X. *Short Communications.*

MAMMIFEROUS ANIMALS. — *Species of Animals of which Individuals with their external Covering of an anomalous Colour, permanent, have been known.*— It is not improbable that the registering instances of this anomalousness may avail, when the facts registered shall have become numerous, some lucid general inferences regarding it. As we entertain this opinion, we shall be happy to insert all notices of marked cases which may be sent to us; and shall feel additionally interested, as our readers, doubtless, will also, if any facts appertaining to what we may call the physiological conditions, parentage, &c., of the creatures noted on be supplied in connection.

A curious Variety of the Human Race was lately to be seen in my parish. The two parents, who were negroes, had several children of their own colour, but the one alluded to had a skin uniformly as fair as that of the European. The child's hair was white, but curly, as in the negro race; the nose and lips were European, and the iris of the eye blue. It was a healthy, fine child. These varieties, which depend on some disease or thinness of the rete mucosum, are some-

times only partially affected, and are then spotted and disgusting objects. — *Lansdown Guilding. St. Vincent, May* 1. 1830. [For a notice of three instances of unusual conditions of the exterior of the human person, see I. 286.]

The common Hare, White. — Instances of this are given in 504, 505.

The common Hare, Black. — Examples of this are registered in I. 84.; VII. 505.

The common Hare, Brown and White. — See in p. 505.

The common Rabbit, Black, in a wild State. — See in V. 579.; VII. 505, 506. Wild rabbits, perfectly black, I have occasionally met with in the woods about Gloucester. — *Lansdown Guilding. St. Vincent, May* 1. 1830.

The common Mole of a Cream Colour. — Instances will be found noted in the Number for December.

The common Mole of a White Colour. — See p. 143.

A Mole of a Silvery Ash-Grey Colour with an Orange Mark under the Lower Jaw, and a Line of the same Colour down the Belly.—See in p. 143.

The Porpoise, White. — On Monday forenoon, a porpoise was shot off Millport, and brought on shore. It was pure white. (*Morning Herald*, Aug. 29. 1825.)

The common Ass, White, and nearly White. — See VI. 67., for interesting particulars on one "perfectly white." We add notices of two others nearly white.

About a month ago, a common English ass, the property of Mr. Watson of Green Hammerton, foaled a colt foal, which is perfectly white, with the exception of a red tinge near its tail, and another near one of its shoulders. It is a very large one, and likely to live. What is very remarkable, it is without those stripes on its shoulders which are seen on all other asses. (*Tyne Mercury. Bury and Suffolk Post*, June 26. 1833).

A Donkey almost wholly White. — The mention (VI. 67.) of a white donkey induces me to state that, on July 6., myself and companions observed, on Hampstead Heath, a donkey milkwhite all over, with the exception of a trifling sprinkling of light brown upon its back. Did the unusual colour of these individuals originate in disease, as is stated to have been the case of the king of Siam's

White Elephant, described and figured in the *Menageries*, vol. ii.? — *James Fennell. Leytonstone, July* 11. 1833.

Crawfurd gives, in his *Embassy to Siam and Cochin-China*, an account of four of the six white elephants then kept by the king of Siam, and says of them, "they showed no sign of disease, debility, or imperfection." . . . "Two of them were

described as so vicious, that it was considered unsafe to exhibit them." These, we presume, are the two which, added to the four mentioned, constitute the six. . . . "Each of those which we saw had a separate stable, and no less than ten keepers to wait upon it," &c. . . . "In the stables of the white elephants we were shown

"*Two* [*white*] *Monkeys,* whose presence, the keepers insisted, preserved their royal charges [the white elephants] from sickness. These were of a *perfectly pure white colour*, and of the tribe of monkeys with long tails. They were in perfect health, and had been long caught; but we were advised not to play with them, as they were of a sullen and mischievous disposition. These were both taken in the forest of Pisiluk, about ten days' journey up the Menam. On enquiry, we found all the white elephants were either from the kingdom of Lao or Kamboja, and none from Siam itself, nor from the Malay countries tributary to it; which last, indeed, had never been known to afford a white elephant." In England it is believed that allowing a goat to subsist among horses promotes the health of these.

Species of Birds, of which Individuals in Plumage of a Colour anomalous to that of the Species, and permanent, have been known. — See in p. 593—598.

The Stoats seen in White Fur are Individuals of a White-furred Variety. (V. 77. 293—295. 393. 718.) — Zoophilus states, in V. 718—722., that stoats change their colour at a certain period of the year, and become white. I am convinced that this is a mistake, and that the white is a distinct variety. I have seen them of this colour in every season of the year, on what are called the mosses, on the western coast of Lancashire; and I particularly recollect that, while resident in Worcestershire, one of these white animals seldom allowed a week to pass without showing himself in front of my house, while threading the mazes of a fence, which he entered from the nearest point of a coppice from which he always sallied. This animal would not have excited so much attention, but that he invariably pursued his course over a gate-post which stood in the fence; and this constant observance of a singular practice obtained him the honour to be distinguished as "the stoat." The common stoat abounded in the same neighbourhood; and I, with a clever terrier, captured them at all seasons, and always of the same colour. It is possible that the stoat changes colour; but, if he does, I am convinced that it is purely an occasional and rare occurrence. — *Henry Berry. Bootle, near Liverpool, August* 27. 1834.

The Stoat in its White Garb not frequently seen near Stam-

ford.—I was rather surprised to see, last winter (1832), which was a remarkably mild one, a stoat (*Mustèla ermínea*) which had donned its snowy garb. I had never seen a white one here before.—*A. Clifford. Near Stamford.* [*Received Dec.* 13. 1833.]

The Otter domesticated in a Degree, and employed by Man in capturing Fish. — " We passed, to my surprise, a row of no less than nine or ten large and very beautiful otters, tethered with straw collars and long strings to bamboo stakes on the bank (of the Matta Colly). Some were swimming about at the full extent of their strings, or lying half in and half out of the water; others were rolling themselves in the sun, on the sandy bank, uttering a shrill whistling noise, as if in play. I was told that most of the fishermen in this neighbourhood kept one or more of these animals, who were almost as tame as dogs, and of great use in fishing; sometimes driving the shoals into the nets, sometimes bringing out the larger fish with their teeth. I was much pleased and interested with the sight. It has always been a fancy of mine that the poor creatures whom we waste and prosecute to death, for no cause but the gratification of our cruelty, might, by reasonable treatment, be made the sources of abundant amusement and advantage to us. The simple Hindoo shows here a better taste and judgment than half the otter-hunting and badger-baiting gentry of England." (*Bishop Heber.*)

[For information on the habits of the otter, wild in Britain, see p. 507, 508. 538. A fine otter was killed on Jan. 1. 1828, in the old river Deben, at Letheringham, after seven hours' hunt by a bull terrier and a spaniel: its weight was 29 lbs.; length, 4 ft. 2 in.; girth of neck, 1 ft. 2 in.; pads, or feet, 3 in. wide. (*Bury and Norwich Post*, Jan. 9. 1828.)]

Perforation of a Leaden Pipe by Rats (455).—E. S. has been, surely, too inattentive to proportions: there is an inconsistency in the dimensions of " a leaden pipe about $1\frac{1}{4}$ in. in external diameter, with a bore of about $\frac{3}{4}$ in. in diameter; thus leaving a solid circumference of metal varying from $\frac{1}{2}$ in. to $\frac{3}{4}$ in. in thickness." (p. 455.)—*J. R. Sept.* 1834.

[*Rats will pass under Water upon the Mud at the Bottom of the Water.*—I have seen several instances of this, not in the water rat or water campagnol only, but some in the field rat as well. The instance which I more particularly remember relates to two or three of the latter kind of rat, which had sheltered among the large roots, &c., of a couple of elm trees which were growing beside a watercourse, of, say, about 10 ft. wide. The rats, on being disturbed in the elms, crossed the stream beneath the water, and were both visible in their

course, and traceable by the track of stirred mud which they had occasioned.]

Birds.—[*Shakspeare was an exact Observer of Nature: his Notice of the Owl's Manner of Flight.*—Mr. Bree had sent us the following note for insertion in the proof of his communication, in p. 548., but want of space excluded it there.]

Though the remark may be here somewhat out of place, I cannot resist the inclination I feel to draw attention to one instance out of very many, in proof of the exquisite accuracy and exactness, with which Shakspeare observed objects of natural history. The passage I allude to occurs in Part iii. of *Henry VI.*, where Warwick is narrating to Edward the disastrous result of the battle of St. Albans, and the little effect which his troops made on those of Queen Margaret: —

> " Our soldiers' [weapons]—*like the night-owl's lazy flight,*
> Or like an idle thresher with a flail,—
> *Fell gently down,* as if they struck their friends."

None but a nice observer of nature could have made such a simile (the force of which lies, too, in a single epithet), nor can any reader fully enjoy the passage, who has not noted the owl's flight, and the slow, soft, faint strokes of her wings. — *W. T. Bree. Oct.* 8. 1834.

Species of Birds of which Individuals in Plumage anomalous to that of the Species, and permanent, have been known.

A White Coalhood (*Densiróstra atricapílla* W.).—On Sept. 5. 1834, a bird of a very unusual appearance was observed in a hedge near the house, which was at first taken for a canary finch (*Fringílla canària L.*), but on a nearer approach he proved to be a coalhood (Lóxia *P*yrrhùla of Linnæus). A gun was speedily procured and he was shot. He was pure white, without a single feather of any other colour, not even on the head, the fine glossy black of which gives rise to the expressive name " coalhood." [See p. 148., note *.] Bewick mentions a similar case, and Selby records an instance of one with white wings. There are also instances of

White Yellowbills [*Blackbirds*] (*T*úrdus *M*érula *L.*).—In our collection here, we have one with as much white as black. I have also seen

A Wren (*Anorthùra commùnis* Rennie) *Streaked with White.* —A friend of mine informs me that some time since he saw

A Wagtail (M*otacílla*) *pure Snow-White:* he joined with me in regretting that he had not his gun with him at the time.

With regard to the Scientific Name of the Coalhood, I have ventured to suggest Densiróstra atricapílla, as being more definite and expressive than either the name of Linnæus, Lóxia *P*yrrhùla, or that of Temminck, *P*yrrhùla vulgàris. The

only other British species might then be called (instead of Lóxia enucleàtor) Densiróstra enucleàtor, the pine thick-bill. The name Lóxia has been employed by different authors to denote several genera: in Shaw's *General Zoology* it is applied to the thickbills and to the grosbeaks; by Temminck it is applied to the crossbills, and by Linnæus to all three! This confusion might easily be avoided, if the thickbills (of which there are only two British species) were called Densiróstra: the grosbeaks (of which the haw grosbeak may be mentioned as an example) might be called Coccothraústes [this name Selby adopts], and to the crossbills might be applied the appellation Curciróstra, which name is adopted in Shaw's *Zoology*. Of this genus there are, I believe, only three species, the common crossbill (C. vulgàris *Shaw*), the parrot crossbill (C. pinetòrum *Meyer*), and the white-winged crossbill, (C. leucóptera *Shaw*). Selby, in the first edition of his *British Ornithology*, calls the coalhood "bullfinch grosbeak," and in the second "common bullfinch;" thus in the first instance making bullfinch the specific, and in the second the generic, name: but either way the name is improper, for the bird is not a finch at all, and has no more right to the appellation than the storm petrel (Thalassídroma pelágica) or the pied flycatcher (Muscícapa luctuòsa), both of which have been called finches! In these days of wholesale changes there may be some who look on (or rather perhaps *away from*) every alteration with suspicion or dislike; but it is but fair that they should state their reasons for discarding any new proposal, and not do so because it is new.—*S. D. W. Sept.* 1834. [*Post-mark, Burton on Trent, Sept.* 16.]

A Nest of Bullfinches [*Coalhood Thickbills, as S. D. W. above advises to name them*], *in which there were Three Snow-white young ones, and One of the Common Colour*, was once found, by a person whom I know, in his garden: I believe that he had them preserved.—*A. Clifford. Near Stamford.* [*Received, Dec.* 13. 1833.]

A Live Young Rook, almost perfectly White, was last year brought to me. It was of a dirty white colour, and, what rather surprised me, its beak and legs were also of this colour. I had wished to bring it up; but, to my great disappointment, it was killed by accident. It was quite young, and I have little doubt that, had it lived to attain its full plumage, it would have been milk-white. The person who had brought it to me said, that he had taken one or two other young ones of the natural colour out of the same nest.—*A. Clifford. Near Stamford.* [*Received, Dec.* 13. 1833.]

White, in the letter to Pennant, dated "Selborne, March

30. 1768," has remarked, " A gentleman in this neighbourhood had two milk-white rooks in one nest. I saw the birds myself, and was surprised to find that their bills, legs, feet, and claws, were milk-white." Sir William Jardine, in a note on this subject, to his edition of White's *Natural History of Selborne*, has these remarks:—" The common rook seems to be more subject to a white variation than its other British congeners. Specimens entirely white are not often seen, but individuals, with parts of the wings and tail pure white, occur in almost every rookery."

White Crows we have seen very often, says Captain Thomas Brown, in a note to his edition of White's *Selborne*.

The Raven in White and Pied Plumage.—The raven " is sometimes found quite white or pied." (*Montagu* in *Rennie's Mont. Orn. Dict.*)

" *A Pair of Magpies, entirely of a Cream Colour*, were hatched at a farm-steading in Eskdale, Dumfriesshire, and, being much thought of by the tenant, were strictly preserved, and continued near the spot for many years." (*Sir William Jardine*, in a note to his White's *Selborne*.)

A White Jackdaw has been known, as is clear from this remark by Montagu, in Rennie's edition of the *Orn. Dict.*:—" Several varieties of this species are given by different authors; some entirely black, without the grey on the head and neck: others quite white, or mixed black and white." Captain Brown has seen a white jackdaw: see his notes in his edition of White's *Selborne*. Mr. Waterton has thus noted, in our VI. 396., a jackdaw with white in one of its wings, which had occurred in the park of Walton Hall:—" A jackdaw once appeared here with a remarkable portion of white in one of the wings; it tarried with us for two years, and then disappeared for ever. Probably the singularity of its wing had attracted the fatal notice of some experienced gunner, in its peregrinations beyond this vale of safety."

Of the Starling in White Plumage, instances will be found noted in I. 494., V. 284.

Of the Grey Hen, the Female of the Tétrao Tètrix, a variety is noted in II. 90., the ground colour of whose whole plumage was " a dusky yellowish white, paler on the under parts, with the dark markings of the feathers umber brown." The individual was shot: Sir William Jardine had the specimen.

On the Pheasant in White or Varied Plumage, Mr. Waterton has, in VI. 308., noted the fact of the occurrence of some instances, and, in VI. 314., has remarked, that " a white male pheasant has taken up his abode here, for seven years, without having been once seen to wander half a mile from the house."

In the *Montrose Review* there appeared, a good while ago, a notice of a perfectly white male pheasant, that had been recently shot at the Hill of Woodstow, and was then in Mr. Malleson's museum.

A White Woodcock was seen three successive winters in Penrice Wood, Glamorganshire. (*Professor Rennie* in p. 562. of his *Mont. Orn. Dict.*) The fact is quoted from Bewick, who had derived it from Sir John Trevelyan, Bart.

A White Snipe was once met with by two gentlemen shooting in Ireland, as one of them has told me. — *J. D.*

Of a Water Rail, every Feather of which was of a pure White, an instance is registered in V. 384. "The rich coral colour of the beak formed a singular and beautiful contrast to the delicate hue of the plumage."

White Blackbirds (or Yellowbills, as S. D. W. has ingeniously called them above, to avoid a contradiction in terms) seem not of very rare occurrence. Besides the instances related by S. D. W., in p. 593., another is registered in III. 146. A correspondent has supplied the following additional one.

In 1829, a blackbird's nest, containing four or five young ones, was found at Rougham, near Bury St. Edmunds, Suffolk. One of the young ones differed in colour materially from the rest. Its eyes were red, its bill was yellow (which is not usual in very young blackbirds). The nest was not taken till the young were fully fledged. On attempting to capture them, two or three made their escape; the white one was safely caught: another was captured, after its thigh had been broken; this soon died. The red-eyed bird afterwards became nearly or wholly white, and it still retains this colour. Mr. Ely of Bury St. Edmunds, the person who reared the bird [in whose possession it was anteriorly to May 27. 1829], had received repeated offers of a guinea for it; he ultimately sold it to Mr. S. Middleditch; of whom Mr. Partridge of London purchased it for 2*l.* 10*s.* It is worth noticing that the bird, which died with a broken limb, was remarkably black; much more so than young blackbirds usually are. — *Henry Turner. Bury St. Edmunds, March* 1. 1833. [Mr. Partridge brought the bird to London: I happened to make the journey with him and it on Jan. 4. 1833. — *J. D.*

Captain Brown, in the same note, in his edition of White's *Selborne*, from which we have before quoted, relates these instances of blackbirds of unusual colour: — "In the summer of 1831, a blackbird's nest was found at Newbottle, near Edinburgh, containing four young, two of which were of the ordinary colour, and two perfectly white. The former turned

out females, and the latter were both male birds. On the grounds of Drumsheugh, the property of our friend Sir Patrick Walker, there was, some years ago, a beautifully mottled blackbird, which became so tame that it fed along with the domestic fowls. ... It is now in the museum of Sir Patrick. Another mottled blackbird was, some years ago, kept in a cage by Mr. Veitch, optician, Inchbonny." Professor Rennie in his *Mont. Orn. Dict.* mentions the fact of the occurrence of white blackbirds.]

The Barbadoes Blackbird is here now and then seen Mottled, and, rarely, quite White; while

The tropic Bird, Phàeton, varies in the markings of its plumage to a greater extent.—*Lansdown Guilding. St. Vincent, May* 1. 1830.

A Black Thrush.—A person residing in Liverpool is in possession of a living thrush, now nearly two years old, which has changed the colour of its feathers three times. This singular bird, which is of the ordinary size and form of thrushes generally, was taken along with four others from the same nest early in the spring, and before it was quite fledged. It was then of the usual colour of young thrushes; but at the end of three months its feathers became black, and remained so for about nine months, when it again resumed its original colour, namely, that of a common thrush. It has always been a very healthy bird, and is a famous musician. This singularity was not exhibited by any of the other birds of the same nest, nor have I ever before seen or heard of an instance of the kind.—*Thomas Weatherill, M.D. Liverpool, Dec.* 7. 1833.

[*For a Notice of Birds, Natural Hybrids, produced between the Throstle and the Blackbird,* see in p. 598.

A White Lark.—Notice of one, shot, is given in II. 267.

A White, or nearly White, Titlark, stuffed, is among the specimens of British birds in the British Museum. It is labelled "Titlark, variety *Alaúda* praténsis *L.*, London Market."

The Common Sparrow, White.—An instance of a female is given in I. 494.; of another female, in V. 583. note *: this last is an interesting case. Montagu has remarked of the sparrow, "accidental varieties occur, such as white, black, and yellowish." Captain Brown has seen "white birds of many British species," and a white sparrow is one of these.

A Greenfinch, extraordinary in the Colours of its Plumage, is described in II. 64.

The *Goldfinch's Colours* are known to vary with its food. (II. 64., V. 398.)

A White Swallow.—Morier mentions having seen a white

swallow at Bushire. (*J. B. Fraser*, in note * to p. 471. of his *Historical and Descriptive Account of Persia.*)

The Robin, White.—A white robin was caught, in June, 1825, in the garden of the rectory at Writhlington, near Radstock, and it is now in the possession of the Rev. G. Cookson, at Writhlington: its eyes are red, its legs and bill yellow. (*Morning Herald*, July 4. 1825.) Captain Brown has seen "a white robin, with red eyes."

All Albinos have Red Eyes.

The Colour of Plumage of the Ringdove is remarkably constant.—"I know of no British bird," says Mr. Waterton, in p. 332., "which has the colour of its plumage so constant as is that of the ringdove."

The Change in the Colours of Birds kept in Confinement is referable to the Confinement and the Nature of the Food upon which they are fed.—This seems generally agreed upon. Facts in proof of it are given in the case of a goldfinch, in II. 64.; in the case of the Senegal sparrow, goldfinch, and bullfinch, in V. 398.: hempseed is marked as the food most conducive to the change. Mr. Yarrell, the author of "Observations on the laws which appear to influence the assumption and changes of plumage in birds," treatise third, in the *Zoological Society's Transactions*, has concluded, as we have stated in VI. 502., that "feathers are influenced by constitutional power, and their colour affected as the secretions alter under constitutional changes." Those who can make access to this excellent treatise will not omit to peruse it. It may be objected that all this has rather little to do with birds produced white from the egg; but the case of these is inseparable; there must have been a cause for the whiteness, whatever may have been that cause.]

Throstles have built their Nests, when pressed by Necessity, in a surprisingly short Space of Time.—I have known throstles, which had been robbed of their nests after one or two eggs had been laid, rebuild in a surprisingly short period; and even upon the old foundation. I once took a nest, containing three eggs, but accidentally left behind the coarse external part of the nest; circumstances led me by the place on the following morning, when I observed the throstle seated on the remnant of her nest, in which she had deposited her fourth egg, having, since the day before (that of the robbery), plastered it with the *usual* coating of *rotten wood*, moist earth, and, perhaps, a little cow-dung.—*Henry Berry. Bootle, near Liverpool, Aug.* 27. 1834.

Hybrid Birds produced between the Throstle and Blackbird in a State of Nature.—With respect to the throstle, I recollect

a singular case:—In the garden of James Hankin, a nurseryman at Ormskirk, in Lancashire, a throstle and blackbird had paired: this was well known to a number of individuals, myself amongst them. During two successive years the birds reared their broods, which were permitted to fly, and evinced, in all respects, the features of strongly marked hybrids.—*Henry Berry. Bootle, near Liverpool, Aug.* 27. 1834.

The Purre Breeds at Martin Mere, an extensive Water and Swamp in Lancashire.—Bewick, in his account of the purre, remarks that at present it is not known where this bird breeds. I have shot the female with eggs fully matured, and found several nests from which I had driven the old birds, at Martin Mere, an extensive water and swamp in Lancashire.—*Id.*

Fishes.—*Facts on the Habits of Two Species of Stickleback, additional to the Facts in* III. 329.—Since the publication, in III. 329., of some observations of mine on the habits of the stickleback (Gasterósteus aculeàtus *Lin.*), I have had an opportunity, not only of confirming the remarks there recorded, but of enquiring farther into the habits of this curious fish; and have a few more facts to communicate.

The fry of this fish were, this year, in abundance in the ponds and ditches in this neighbourhood [Clapton] as early as April; but I was unable to procure any full-grown fish earlier than the first week in June, except a few of the black species, with ten dorsal spines (Gasterósteus pungítius) [see III. 332.]. These, on being placed in a tub of water, did not evince their ordinary pugnacity of character. However, I confined about eight of the common species in the early part of June; and they, as usual, took possession of different stations in the tub, and fought with their wonted fury. This disposition continued till the end of the month; when, from some cause which baffled all my efforts to discover, they became sickly, the colours of the fighters faded, and they gradually died, notwithstanding I occasionally fed them, and gave them fresh water every week. I was more than ever surprised at their rapid change of colour: simply removing them into another vessel, during the process of changing the water, caused a marked difference in the beauty of their colours. That this fighting propensity is connected with sexual desire, appears obvious from their different treatment of the female fish. On introducing a female distended with spawn into the tub, they did not attack her as they would have attacked another; but they rubbed up against her, and pushed her about with their mouths: with a view, in all probability, to make her deposit her spawn; which, I suspect, they eat;

for they are very voracious, and will seize the minute fry of their own species with the fury of a pike.

[*A'rgulus foliàceus* Jurine, fils. (VI. 94.)] They suffer, in common with some other river fish, very much from a flat-shaped parasitical insect, which adheres closely to them; and, from the tenacity of its hold, frustrates every effort of the fish to remove it. This insect is, I believe, the A'rgulus foliàceus of Jurine, fils. Several times during the period of my keeping the fish, this summer, I detached as many as six of these troublesome insects from one fish.

When the fishes are fighting, it is difficult to perceive them use their side spines (unless they are very closely observed); they strike so quickly, and often so fatally, with them. I had, this summer, one determined fellow, which, although constantly worsted, never failed to attack its neighbour whenever a fair opportunity offered. I turned it in where four others had their respective stations in the tub; and it successively, but in vain, tried to take possession of their places: at last, it fixed itself in an unoccupied part of the tub, and effectually resisted every effort of the others to depose it.

I have always failed in my attempts to keep these fish through the winter; therefore, I am uncertain how long they live: but I suspect that they do not live longer than two years. They disappeared here, from their usual haunts, by the end of June; since which, I have not seen any. — *O. Clapton, Sept.*, 1834.

[See, in III. 521—523., descriptions by Mr. Yarrell, illustrated by figures, of three British species of stickleback.]

The Pike has been seen to capture a live Rat when this was swimming on the Surface of the Water. — An informant has witnessed, at Tottenham Mills, an incident to this amount: — One day, while parties concerned were unloading a large barge of corn, two or three persons, with their dogs, were looking out for the rats, which made their appearance every now and then; and, by being driven overboard, afforded sport for the dogs. While these were in chase of one, and swimming and barking, and the men on shore shouting and urging them on, up rose a large jack, and, within a yard of the dogs, collared poor Nibble, and carried him down to the shades below, flapping its tail, in a very significant manner, in the faces of dogs and men; to their no small astonishment, for they never saw more of either the captured or captor. — *John Reynolds. 23. Chadwell Street, Middleton Square, Sept.*, 1834.

A Pike stated to have caught a Swallow on the Wing. — A young gentleman, walking in Mr. Longster's garden, Malton,

on the bank of the Derwent, saw a fine pike suddenly dart out of the river, and seize a swallow that was gliding along the surface of the water. (*Morning Herald*, July 4. 1824.) Swallows nearly touch the water sometimes; and pass slowly over the surface sometimes: and it is not difficult to suppose that the sun might be so low as to give the bird's shadow in advance of the bird itself, and thus give the pike an advantage.

Eels (V. 313. 744., VII. 283.); *the Places in which they breed.* — I taken them of all sizes (from that of a needle upwards), in ponds totally unconnected with, and far distant from, either river or brook. — *Henry Berry. Bootle, near Liverpool, Aug.* 27. 1834.

Insects. — [*The external Configuration of some Species of Insects is very extraordinary* (II. 20., V. 318. 591.): *Conjectures on some of the Purposes of this Configuration in some Species.* — The following remarks, by Mr. Guilding, he had written in relation to Mr. Kirby's figures and descriptions of the astonishing centrotuses in our II. 20—22.]: —

Among my West Indian insects are several species which have these wonderful dorsal appendages: my collection contains several new genera, which I am about to publish; and among them is a species without appendages, but having the promuscis [a form of mouth resembling a horn: see II. 20, 21.] curved backwards over the head. This peculiarity of structure would enable the insect to obtain the nectareous juices of flowers which have a bended corolla; and for this purpose it was doubtless given. Mr. Swainson has figured, in the first series of his *Zoological Illustrations*, a lovely little humming-bird, whose bill is, in a slight degree, similarly constructed. The specimens I obtained from Demerara, and one of them was sent to my valued friend Mr. Kirby. The use of the processes, Mr. Kirby notices [in our II. 20.], are given for concealment and deception; and they imitate, in a singular manner, the Clavàriæ and other *Fúngi* which spring from the bodies of dead insects in damp places.

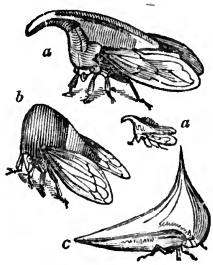
One genus here is remarkable for the curious manner in which it protects its eggs from the rapacious ants; which compel the larvæ to offer them for food, on their extensile tubiform anus, their drops of saccharine excrement. The eggs have, under the microscope, the appearance of red cherries enclosed in one of those open white china basketwork fruit-dishes so common in the last century. — *Lansdown Guilding. St. Vincent, May* 1. 1830.

[Mr. Westwood's very interesting figures and descriptions of insects remarkable in form, published in V. 318—327. 591, 592., should be cited in connection with the above.

To these we here add, from the *Encyclopædia of Gardening*, now being published,

Figures of Three Species of Membràcis. (*fig.* 68.) — *a a*, M. ensàta; *b*, M. fuscàta; *c*, M. spinòsa. The appendages, unusual to insects generally, which give these creatures so striking a form, are, according to Kirby and Spence (*Introd.*, ed. 1827, iii. 537.), processes of the prothorax. See the *Introd.* of these authors, in ii. 225., iii. 537., for notices of various species of insects remarkable for their exterior form, armature, or vesture. In the *Encyclopædia of Gardening*, § 3071., it is stated, from Mr. Swainson, that he has "never met with the A'phides in South America; but that their place in nature is there supplied by numerous species of Membràcis [see fig. 68.], Centròtus [see figures and descriptions of six species in II. 20—22.], &c., which are, in fact, the plant-lice of that continent." This last remark advises us, in a general way, of the habits of these creatures; and this may be learned more particularly by a perusal of the communications on *D*élphax saccharívora *Westwood*, by our Grenada correspondent and Mr. Westwood, in VI. 407. 409., VII. 496., as the genera *D*élphax and Centròtus are allied ones; and the genera Centròtus and Membràcis are so closely allied, that some of the species of them have been interchanged. The Centròtus cornùtus and genístæ of Curtis's *Guide* (1829), two British species, are the Membràcis cornùta and genístæ of Samouelle's *Entomologist's Compendium* (1824). It must be interesting to learn, by a comparison of the British species with the figures of American ones, in what degree their forms assimilate or differ. Centròtus genístæ is, according to Mr. Curtis's *Guide*, figured in his *British Entomology*, t. 313.

68



The Cóccidæ of the West Indies, exclusive of insects there of the affinities just remarked on, are, it seems, agents there of the same effects in the economy of nature, as the aphides are in Europe. Mr. Guilding had remarked, in a note relative to the mention, in II. 104., of aphides on the roots of plants of endive and lettuce in England, that "We have several of the Cóccidæ attached to the loose roots of plants, which soon die or droop from their attacks."

Nearly all, it may be said quite all, collections of tropical plants cultivated in Europe are attended by a species of coccus, which English gardeners have named the scale,

the scaly bug, and the turtle insect; names expressive of the insect's appearance and shape. It is, I have understood, of the species C. hespéridum; and, perhaps, has been thought to have been imported with golden apples, that is, oranges, from the Hesperides: it affects, in Europe, the whole foliage of the citron tribe. Whencesoever it may have been derived, it demands, in plant stoves, the gardener's best attention to prevent its increase; and thereby the injuries which it would effect, if allowed to live, upon the herbage of the plants. Another species of insect, called, by English gardeners, the mealy bug, is equally or even more troublesome upon tropical plants cultivated in Europe. This is the species which Dr. Gorman had met with in the Cambridge Botanic Garden, and had supposed to be identical with "the wild species of cochineal." (See II. 386.) Upon this subject, the following note had been made by Mr. Guilding: — "I doubt altogether whether the Cóccus in the Cambridge garden is the Gràna sylvéstris of South America, both from the trees to which the insects were attached, and from the tenacity with which they adhered. Many species yield the dye; though they are too small and too little productive to be worthy propagation for commercial purposes. Is it likely that any [of the] *C*ácti would answer in the open air of England?"

Some very minute Ants were exhibited, by Mr. Spence, at the Entomological Society's ninth sitting, on June 2.; which, he said, had swarmed to so great a degree at Brighton, and some parts of London, that, in several instances which had come to his knowledge, the inhabitants had found no other alternative than entirely quitting their houses. (*Ent. Mag.*, ii. 312.) [We have quoted this for the sake of identifying them with the very minute species of ant which we had previously mentioned, in p. 269., as occurring in a house at Kensington gravel-pits. For "1833," in that mention, read "1832." The house was that of Mr. Bayley, bookbinder and bookseller. — *J. D.*]

REVIEWS.

ART. I. *Catalogue of Works on Natural History, lately published, with some Notice of those considered the most interesting to British Naturalists.*

WALKER, Alexander, Author of "Physiognomy founded on Physiology:" The Nervous System, Anatomical and Physiological; in which the Functions of the various Parts of

the Brain are for the first Time assigned; and to which is prefixed some Account of the Author's earliest Discoveries; of which the more recent Doctrine of Bell, Magendie, &c., is shown to be at once a Plagiarism, an Inversion, and a Blunder associated with useless Experiments, which they have neither understood nor explained. Being the First Volume of an Original System of Physiology, adapted to the advanced State of Anatomy. 8vo, 704 pages. London, 1834. Smith, Elder, and Co., Cornhill.

"With the view of adapting the work, as far as possible, to the general reader as well as to the professional student, the author, wherever he could, has avoided mere technicalities, and those statements which suppose things to be known which are unknown; while he has sought to render minutiæ impressive, and complexities simple, by explaining the important and interesting functions in which they are associated.

"Of all the objects of knowledge, the most important and interesting are certainly those here considered; the functions of man, and especially those of his nervous or mental system. It is, indeed, only in relation to man and his mind that aught besides can possibly have [to him] even its subordinate interest: and, until this most important branch of physiology is thoroughly reformed, the very bases of moral and political science will be unfixed."

The study of zoology leads to a knowledge of comparative anatomy, and comparative anatomy necessitates a knowledge of the anatomy and physiology of man. Hence, not any zoologist can be incurious on the subject embraced in the book whose title is given above. This subject is the high and difficult one of the agency of mind; and more particularly of the mode and nature of the mind's relations, passive and active, to those corporeal organs which are the functional instruments of its operations. The views which the author has offered upon these themes are, it is advertised in the title, different from those which others have offered upon them. Which author has offered the most accurate ones, we are unable to say: we have only seen those in the work under notice. We shall content ourselves in apprising our readers of the existence of the work; and, in remarking on it, that we deem it valuable, independently of the author's conclusions, though the accuracy and merit of these may be unequalled, in the store of information on anatomy, comparative anatomy, and physiology, which is supplied in the premises from which the author has deduced his conclusions. The author has written vigorously and lucidly. He condemns utterly the performing of anatomical experiments upon living

animals; and impugns all observations as fallacious acquired by means of them. The work is dedicated to Sir Anthony Carlisle.

Macgillivray, W., A.M. F.R.S.E., &c., Author of "A Narrative of the Travels and Researches of Alexander von Humboldt:" Lives of Eminent Zoologists, from Aristotle to Linnæus; with Introductory Remarks on the Study of Natural History, and Occasional Observations on the Progress of Zoology. Small 8vo, 390 pages, with a Portrait of Linnæus. Edinburgh and London, 1834. *5s.*

Aristotle, Pliny the Elder, Gesner, Belon, Salviani, Rondelet, Aldrovandi, Jonston, Goedart, Redi, Swammerdam, Ray, Reaumur, Linnæus, and Linnæus the Younger, are the naturalists memorialised. One hundred and ninety-three pages are occupied by the memoir of Linnæus; and this memoir is one which, as we think, does justice to the character of this great man. Mr. Macgillivray seems quite free from the blind zeal of a partisan, and possessed of the candour and discrimination requisite in a judicious estimator. The work will be of real use to younger students of the science of natural history, whatever may be their age, in enabling them to blend, with their progressive acquirements in the science, associations of the men, and of events in the lives of these men, who have contributed so much to render this science what it is.

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. *1s.* "The various articles are written expressly for this work, by Authors eminent in their particular department." The Parts with the Plates coloured, *2s.* each.

Part vi. of this work is, we think, a favourable, although we know not that it is more than a fair, specimen of it. Treatises on the bats, the bears, and the beaver, and on the bearded reed-bird (titmouse), are the main of those included in it; but those treatises are such as cannot fail to gratify lovers of nature, and make them think the inconsiderable price to be paid for them as nothing. We wish the obtaining of this part may lead to the purchase of the entire work. Although this work will be a long way from what we consider the words "cyclopædia of natural history" to mean, it bids

fair to be the instrument of placing before the public such a store of information (some of it, too, addressed with force to the heart and understanding) on natural objects, as has not ever previously been generally accessible.

Cuvier, Baron, and *Latreille, P. A.:* The Animal Kingdom arranged according to its Organisation, serving as a Foundation for the Natural History of Animals, and an Introduction to Comparative Anatomy; by Baron Cuvier. With Figures designed after Nature. The Crustàcea, Arachnides, and Insects, by M. Latreille. Translated from the latest French Edition; with additional Notes, and illustrated by nearly 500 Plates on Steel. 8vo, in 36 Numbers, 1*s.* each: to form Four Volumes. Number I., published on July 1. 1833. London, 1833.

The above words are a copy of those in our VI. 432. (in the Number for September, 1833), where we have farther pointed out the work to the notice of our readers. The following communication remarks on the subsequent conducting of the undertaking: —

I will thank you to insert, in an early Number of your *Magazine of Natural History*, the following extracts from the advertisements on the cover of the Translation of Baron Cuvier's *Règne Animal*, published by G. Henderson; and a statement of facts, which proves the falsehood of the extracts quoted: —

From No. 1. — "The work will consist of 36 numbers; each will be sold at *one shilling:* it will appear," &c.

I have already received 37 *numbers:* for the first 27, I paid 1*s.* each; and for the 10 subsequent numbers, 2*s.* each.

"The plates, which constitute the most important source of expense, will amount to no fewer than 500," &c.

The third volume is not yet completed: the numbers already published contain only 164 out of the 500 plates promised.

"The advantages of the new work will at once be demonstrated, when it is stated that, for the sum of 36*s.*, the version of a celebrated standard work, richly illustrated, will be obtained; which, in the original, with its plates, costs more than 36*l.*"

The work is to consist of four volumes; it was to cost 1*l.* 16*s.*: 336 *plates, and more than one volume* of letterpress still remain unpublished; and, for what I have already received, I have paid 2*l.* 7*s.*

From No. 4. —"The work will consist of 90 numbers; each will be sold at *sixpence*," &c.

" The advantages of the new work will at once be demonstrated, when it is stated that, for a very trifling sum," &c.

From No. 5. — " The work will consist of 36 numbers; each will be sold at *one shilling*," &c.

" The plates," &c.

" The advantages of the new work will at once be demonstrated, when it is stated that, for a very trifling sum," &c.

The advertisement on the cover continued unaltered from No. 5. to No. 21. inclusive. On the cover of Nos. 22. and 23., which were published in one, appeared the following

" *Address.* —The public will immediately see, that, according to the ordinary plan of issuing the plates which illustrate 'Cuvier's Animal Kingdom,' the proprietor could never fulfil his engagement to supply the complete quantity. He begs, therefore, to apprise the public, that he will take the opportunity, during the ensuing months, of preparing numbers which shall consist wholly of plates. By this method alone will the public be able to complete the first volume; and, for that purpose, the plates illustrating that volume will be issued in uninterrupted succession. The public is also informed, that the work will be further enriched with portraits of the various eminent naturalists who are distinguished respectively in the several departments of zoology."

I have introduced the extract from the address on the cover of No. 4., as it contains the only hint that is given that the price of the work will exceed the stipulated sum: and this notice relates only to the sixpenny edition. The statement that the work would consist of 36 *one shilling* numbers, was repeated in No. 5.; and continued to be printed till No. 21. inclusive. From the commencement of the work, no notice has appeared that the price of the numbers would be doubled; or that the work could not be completed according to the first arrangement.

These facts require no comment; but, certainly, such conduct deserves exposure. — *John Reynolds Rowe. Wimborne, Dorsetshire, Sept.* 17. 1834.

I should be glad if you could inform me how many numbers will complete the edition of Cuvier's *Animal Kingdom*, now publishing by Henderson? At the commencement of the work, it was distinctly stated that it would consist of 36 numbers only, at 1*s.* each; but it has already attained to 34 numbers, and the price of 41*s.*, without being much more than half completed. — *H. E. Strickland. Aug.* 12. 1834.

ART. II. *Literary Notices.*

No. ix. of *The Entomological Magazine* is a rich one. These are the main of the subjects: — a Colloquia Entomologica. Monographia Chalciditum, by Francis Walker; twenty-nine pages. Notes on Deiléphila euphórbiæ. Description of some Coleopterous Larvæ, by Mr. Waterhouse; illustrated by figures. Attempted Division of British Insects into Natural Orders, by Edward Newman. This is the last of the longer communications, and put so by way of climax, one might imagine. In it, upwards of 150 orders are proposed, characterised, named, and their affinities indicated. In the characters, we observe, that greater cognizance is taken of the conditions of the larva and pupa than we had previously seen done. Brief general views of the habits of the insects of each order are included in the characters of it. This production of Mr. Newman's must have a comprehensive effect upon entomology, and must be welcome to all engaged in the study.

The first volume of the *Transactions of the Entomological Society of London* will be shortly published.

Of *Royle's Illustrations of the Botany and other Branches of the Natural History of the Himalayan Mountains, and of the Flora of Cashmere*, Part iv. is published. It includes generalisations upon the plants of the orders Dipterocárpeæ, Ternströmi*àceæ*, Olacíneæ, Aurantiàceæ, *Hy*pericíneæ, Guttíferæ, Hippocrate*àceæ*, Erythroxýleæ, Malpighi*àceæ*, *Ac*eríneæ, Hippocastàneæ, and Sapindàceæ; and coloured figures of nineteen species of plants. In Ternströmi*àceæ*, the author has presented nineteen pages of collected information on the question whether the teas of China are derived from plants of one or of more species, and upon the conditions which relate to the vegetation and the cultivation of these plants in China. From it all, the author has concluded that, "in the Himalayas, where so great an analogy exists in latitude, elevation, soil, climate, and the course of the seasons, as well as considerable identity of vegetation, there cannot be a doubt of success in introducing the cultivation of tea, with the strongest probability of all its properties remaining unchanged."

A work on *The Revolutions of the Globe, in a Series of Letters addressed to a Lady*, to be included in one volume, post 8vo, is to be published by Ridgway, in November. The author states his object to be, "to give the public an idea of the curious results to which the study of the terrestrial globe has, in these latter times, led our most distinguished naturalists; and to write so as to be understood by persons even the least conversant with the study of natural history."

THE MAGAZINE

OF

NATURAL HISTORY.

DECEMBER, 1834.

ORIGINAL COMMUNICATIONS.

ART. I. *On certain recent Meteoric Phenomena, Vicissitudes in the Seasons, prevalent Disorders, &c., contemporaneous, and in supposed connection, with Volcanic Emanations.* No. 4. By the Rev. W. B. CLARKE, A.M. F.G.S. &c. [Continued from p. 390.]

"Quid sit, unde sit, quare sit. . . . . quod ipsum explorare et eruere sine universitatis inquisitione non possumus, cum ita cohærentia, connexa, concatenata sint." — M. MINUTIUS FELIX, xvii.

BEFORE entering farther into the enquiry, we briefly introduce a few additional illustrations of the positions attempted to be maintained in the preceding articles; especially as, owing to the circumstances of illness under which the supplemental paper [385—390.] was contributed to the September Number of this work (No. 41.), some typographical errors * and some omissions are to be noted.

With reference to the essay No. 2. (VII. 193—202.), the following facts are highly illustrative, and must not be neglected: —

The German journals state, that, during the months of June, July, and August, 1834, immense multitudes of *mice* had appeared in the duchy of Baden; committing dreadful ravages in the cornfields, and afterwards destroying the *vines*. In a small district, 20,000 of these destructive creatures were killed. In the adjoining country, a species of

* In p. 385. [lines 8. and 9. from the bottom], for "Wolokolumsk" read "Wolokolamsk," or "Wolokolansk." For "1794" [in line 7. from the bottom] read "1799." For "Nov. 17." [in line 2. from the bottom] read "Nov. 14;" this last being the date erroneously given in p. 293. [line 8. from the top], and rightly corrected to Nov. 19., in p. 385. [line 9. from the bottom]. In p. 386. [line 16.] for "Mexico," read "Mexico;". In p. 390. [line 2.], after the word "bring," supply the words "into notice." In p. 301., also [line 8.], for "1799" read "1779."

black rat is said to have multiplied in equal proportion. * (See VII. 193—195.)

The American journals also mention, that in the month of June, 1834, many parts of the United States were troubled with an incursion of *locusts;* which did much damage, and seemed to be called up from the earth, in incredible numbers, by the very means taken to destroy them. The statement is further increased by the assertion, that a similar inroad of locusts occurs *every seventeen years.* (VII. 196., and 308, 309.)

In Hungary, during the same month, millions of *beetles* appeared; devouring the vegetation wherever they came, and increasing in proportion to the means taken to smoke them to death.

The Island of Grenada, and some other of the West India Islands, have also, during the spring of the present year, been incredibly ravaged by the *cane fly* (a species of *Cicàda Lin.*) [*Délphax saccharívora Westwood,* see VI. 407—413., VII. 496.], which has destroyed two thirds of the crops. One gentleman stated recently, at a meeting of the Entomological Society, that this pest was immediately *preceded* by a *violent hurricane.* [See VII. 496.]

M. Huber, in his *Memoirs of the Natural History of Geneva,* states that a huge column of the Vanéssa cárdui, in June, 1826, passed over the Canton de Vaud; traversing the country, with great rapidity, from N. to S. Professor Bonelli of Turin, as well as M. Huber, observed, in March of the same year, a similar swarm of the same species, also directing their flight from N. to S., in Piedmont, in such immense numbers, that, at night, the flowers were literally covered with them. They had been traced from Coni, Raconi, Susa, &c. A similar flight, at the end of the last century, is recorded by M. de Loche, in the *Memoirs of the Academy of Turin.* The fact is the more worthy of notice, because the caterpillars of this butterfly are not gregarious, but solitary from the moment they are hatched: and this instinct remains dormant while generation after generation passes away; till it suddenly displays itself in full energy, when their numbers happen to be in excess." † Mr. Bennett, also, in his *Journal of Natural*

* It would appear that the assertion of Arnobius (VII. 195.) is not without a comment in various allusions of the poets; for the ancients, who, like French cooks, dressed up their fables in such a way that they are scarcely to be recognised as originating in facts, gave to Apollo the name of *Smintheus* (*Iliad,* i. 39.); which, according to the critics, was derived from the Phrygian word for *mice* or *rats,* the god having destroyed a great number of those creatures which infested that country.

† *Mag. Nat. Hist.,* i. 387.; also Lyell's *Geology,* ii. 114. [The late Rev. Lansdown Guilding had thus remarked, in a note, lying by us, on the mention in our I. 387.:—" I have lately recorded, in the *Zoologi-*

History, relates a similar occurrence which took place at Colombo in Ceylon, when he was there; and he says the butterflies were in "incredible numbers;" and, "for the greater part of several successive days, passed down the road in a northerly direction." Mr. Lyell has also observed the periodical emigration of certain other *ungregarious* insects; an instinct only developed in rare emergencies. (*Geol.*, ii. 115.)

The country papers mention several instances of extraordinary visitations of very small black flies, so numerous as to cling by hundreds to the faces and dresses of persons, during the end of the month of September, 1834. They were noticed at Spalding (*Lincolnshire Chronicle*) on Sept. 28.; and at Colchester and Chelmsford (*Essex Standard*) on Sept. 29. and 30., and Oct. 1. At the same time, a flight was also observed at Topsham, Devon, more than three quarters of a mile in length, travelling in the direction of the wind, which was blowing gently from the S.E. (*Morning Herald.*) A similar flight was noticed at Halifax and York, on Sept. 29.; and, about the same time, at Cheltenham, and at Stroud.

Mr. Foster, in his Calendar of Nature, appended to his work *On the Atmosphere*, mentions, in p. 427., that, on July 17. 1822, he "noticed the immense quantity of *butterflies* covering whole fields for miles together, in the neighbourhood of Boulogne;" and, on July 26. 1822, at Pont-y-Pani, he saw *flies* so numerous that, "in some places, the wall was quite black with their settling on it." 1822 was, as before named, especially a hot volcanic year.

In farther illustration of No. 3. of these essays [289—308.] and its supplement (385, 390.), we may here, at once, refer to some additional particulars relating to the meteors of Nov. 13. 1833; which have appeared in the July number of the *American Journal* (xxvi. 320.), in a very interesting paper on the subject, by Alexander C. Twining, civil engineer, and late tutor in Yale College, entitled, "Investigations respecting the Meteors of Nov. 30. 1833; Remarks upon Professor Olmsted's theory respecting the cause."

Mr. Twining states that the whole space yet traced, over which the meteors were seen, extends from the Lakes to the middle of the Gulf of Mexico; and from 61° w. to Central Mexico, in long. 100°; that there was *a twilight on the morning of the 13th, between five and six o'clock, issuing from the whole south-eastern and southern quarter*, while the western and

---

cal Journal, a similar instance. A species of Còlias was observed to pass, in an extended column, across the Island of Trinidad, and the neighbouring Gulf of Paria. — *L. Guilding. St. Vincent, May* 1. 1830."]

northern quarters were as dark as usual; that four of the meteors formed their train into a cloud, and floated away to the *eastward, as if borne by winds;* that the most striking phenomenon is, "*the observed fixedness of the point of radiation in a particular part of the constellation Leo.* He confesses, however, that there are difficulties respecting this; and I confess that I am not quite satisfied with the above conclusion.

He states another fact, viz., that the "radiant" (the point whence the meteors seemed to radiate) "*had a location manifestly independent of meridians and verticals, and not confined to geodesic lines.*" He remarks, also, that there was "*not only a progressive increase of northern declination in southern latitudes, but the differences of declination, compared with the differences of latitude, were strikingly correspondent,*" amounting to about 1° 54′ of north declination for 1° of north latitude: and to account for this, when there was *no parallax in right ascension,* as the effect of parallax, he considers untenable. He adds, that there was neither parallax nor parallactic motion; that the radiant point was "everywhere stationary, or nearly so:" but the evidence certainly goes to establish the fact, that the radiant was *not* stationary till about 3 or 4 A.M., it having a motion from W. to E. (or a little south of east); and that this motion, at first rapid, gradually decreased. He says, also, there was, *with the exception of particular accidental coincidences,* no tendency to follow the magnetic dip.

The conclusions come to by Mr. Twining are similar to those of Professor Olmsted. [385—390.] Other particulars are given, which are very interesting. One meteor is described as "if a column of glowing melted metal had been poured down from the spot whence the meteor issued; another had a brilliancy "above the brightness of the sun;" and several traversed arcs of 20° and 30°, vanishing in clouds as big as, and even five times as big as, the moon. The result as to the height of these meteors is, that "*they entered the atmosphere with a velocity not less, but perhaps greater, than fourteen miles in a second; that they became luminous above eighty* [*miles*] *from the earth; and became extinct nearly thirty miles from it.*" Mr. Twining is obliged, however, to confess, from an examination of the facts, "*that the atmosphere itself must have its limit much higher than is generally supposed;*" and suggests, whether it cannot be ascertained by the means of the upper extremity of "shooting stars," which certainly seem to bear a close affinity to the meteors of Nov. 13., what is the height of the atmosphere. (This tallies with my remark in p. 387.)

The above gives, pretty accurately, the principal features of Mr. Twining's "investigation;" although compelled, by

want of space, to be compressed and abbreviated. The great question of the origin of these meteors is considered, I must say, fairly; but the solution is totally at variance with a *volcanic* hypothesis. The first argument is, that, if the meteors were "*atmospheric*, *electrical*, *magnetic*, or even unknown and merely *imaginable*," they ought to have conformed, in arrangement or motion, to *geodesic* lines. But, with all deference to the reasonings of Mr. Twining and Professor Olmsted (who has considered *gravity* "an adequate cause" of the motions, in which I agree with him; though Mr. Twining disputes it), it does not at all follow that meteors occasioned by volcanic emanation should pursue any "geodesic" line. If their composing matter had been pumped upwards into great heights, in or above what is called "our atmosphere," they might, after having been, either by attraction or electrical forces, formed into a mass, be whirled along by the action of wind; or might partake of the earth's proper motion, through restraint of gravity, and appear to have an eastward motion; till, becoming stationary, they should be discharged as described, the stationary position being determined by the excess of gravity. I cannot but infer that this position of the radiant is a powerful argument in *favour* of a *terrestrial* origin. It may also be added, that a want of coincidence with the magnetic dip and variation is not a reason why these meteors had nothing in common with the "north lights" or the auroral arch; for, though the aurora has frequently (p. 291.) corresponded in these respects, it has not *always* corresponded; and the absence of agitation on the part of the needle, during the display (as noticed by Mr. Twining in his "investigation;" Silliman's *Journ.*, July, p. 347.), is not a necessary absence; for the needle is not always affected by the aurora, though there are cases where such has been the effect.* Mr. Twining contradicts himself when he says, "the reverse of such a coincidence do we find;" for he has allowed some "particular accidental coincidences," which, perchance, were not accidental. Moreover, it has been before stated, in the *American Journal* (xxv. 356.: see *M. N. H.*, vii. 291.), that the *radiant* agreed exactly with the point of magnetic direction; and the whole evidence goes to prove that the cessation of progressive motion corresponds with this point. The change of declination of the meteors (Mr. Twining allows) *may* turn the argument against him: it certainly does so, and by no means encourages the supposition that "*any* terrestrial origin seems to be cut off." (*Sil. J.* p. 347.) The next argument is,

* Arago noticed it on Feb. 7. 1831; and Faraday and Christie, on April 19. 1831. (*Report of the British Association.*)

that the meteors having an "independence of the earth's rotation," and the "stationary condition" not being "an instantaneous cause," but rather "an ultimate state of motions gradually becoming quiescent, the conclusion seems inevitable, that our planet owed the brilliant decorations of its atmosphere, on the morning of Nov. 13., to the presence of foreign and celestial visitants." The independence of the earth's rotation, and yet the coincidence of the motion of the radiant with that of the earth, in direction from W. to E., may, however, together with "the stationary condition" of the meteoric cloud, be reconciled upon the hypothesis before advanced [385—390.] of a volcanic origin; which influence, we have already proved almost indubitably, has been known to affect the atmosphere as it was affected after the display in question; and to coincide with the occurrence of the aurora, and the exhibition of meteors scarcely less brilliant or less striking than those of Nov. 13.

With Mr. Twining's next argument, that these meteors had no *secondary* dependence upon our planet (farther than as alluded to above, and in his denial of any analogy with meteorites *), I have no controversy; but, with the last of his arguments, respecting an "orbit of revolution round the sun" (for the reasons already stated, in my remarks [385—390.] on Professor Olmsted's paper, and on Mr. Twining's), I can hold no sympathy. They follow the preceding arguments naturally and properly; but, doubting the premises, I cannot approve the deductions. With the truly philosophical and religious tone of Mr. Twining's "final observations," I do, however, most warmly sympathise, as they express the feelings which subjects of this kind must awaken in the bosom of every reflecting person: nor is the just and beautiful argument for the "*protecting*" care of the Almighty lessened, in my opinion, by the result of our speculations; whether the meteors were "foreign and celestial," or "of the earth, earthy." In either case, mercy is mingled with *power:* and, perhaps, after all, the argument would be strengthened by the reference to the "volcano" rather than to the "comet." For, if the latter be restrained by the invisible hand that launched it into space, so, also, is the latter made the *safety-valve* of a planet which, we must conclude from observation, has all the wonderful energies of combustion and explosion that might have

* In contradiction of the asserted distinctive character of these meteors, it is expressly stated by Mr. Jenkins, Principal of Middletown Academy (Silliman's *Journal*, xxvi. 397.), that "the meteoric shower of Nov. 13. last presented appearances similar to those which have been often described; except that no particular point of radiation was observed." Middletown is in lat. 40° 26′ N., long. 73° 59′ W.

been supposed incompatible with a residence for man. It is, after all, a matter of little *practical* importance what is the secondary origin of a meteor; but thus much do speculation and theorising avail for good, that no man, with a correct view of his own insignificance, and with a simple-minded aim, can explore any of the bountiful fields of science which are spread out so magnificently above him and around him, and not find himself a *better man*, even if he have to acknowledge himself a *worse philosopher* than he imagined.

To return, however, to facts in illustration of that with which I set out: the earthquake at Chichester, on August 27. 1834, was coincident with the most tremendous earthquake of Vesuvius on record, and was followed by a brilliant aurora soon after. The shock of Sept. 21., at the same place, was followed by the aurora on Sept. 30., and by meteors on Sept. 29., and on Oct. 1. and 3., as seen from Hensbury, near Bristol; Bologna being shaken by an earthquake on Oct. 4.

I may observe, also, that, on Dec. 20. 1799, there fell, in the province of Benares, many meteoritic stones, coming from the westward; the relations of which are given in Lord Valentia's *Travels* (i. 468. appendix). These stones were attended with great light; and, in other respects, the meteor was of similar character to those of Nov. 12. 1799, in Cumana (*Mag. Nat. Hist.*, vii. 291.), with which it may have been connected. The meteors seen by Humboldt were calculated to have fallen into the sea between America and Africa: which was probably an optical deception; for it is altogether impossible to ascertain that. The latitudes of Cumana and Benares, and the eastward motion of the meteor in India, might rather lead us to infer, that there was as much connection between it and those of Cumana, as between the meteors seen at Mocha, on Nov. 14., and in England, on Nov. 19. 1832; the space travelled by the latter, and the time of the journey, being taken into account.

In addition to former examples, it may be added, that, in the year 1832, the volcanoes of the Pacific Ocean were in unusual action.

On Oct. 31., Etna was violently affected; while, during March (8. to 14.), violent earthquakes occurred in Calabria, Modena, and Reggio; and, on May 26., in the Apennines, Gulf of Genoa, &c. (*Journal de la Belgique*, Juin 8—11. 1832.) So that there were ample materials, on my supposition, to produce the meteors in question. The heat was so great in some parts of Europe, during the autumn of 1832, that the ground spontaneously took fire. Such was the case in Swit-

zerland; as at Geneva and Lausanne, where fire appeared. The same phenomenon occurred at Maglanz in Savoy, where the trees were consumed below the ground. (*A. R.*) A recent number of the *Journal of Courland and Livonia* (Sept., 1834) gives an account of a fire in a great moor, caused by the long drought. Thousands of people were employed in digging ditches to arrest its progress; but the moor frequently began to burn behind them, the fire rising from the earth having probably spread at a lower depth than the bottom of the ditches.* Similar events have occurred in Russia, Carinthia, &c.

As general additional illustrations of foregoing statements, we might refer to Mrs. Graham's [Calcott's] letter to Mr. Warburton; in which she says, that, during the evening of Nov. 19. 1822, when the earthquakes commenced in Chile, and previously to them, the *aurora australis*, and *lightning* over the Andes, had been seen; that, on Nov. 21., there was a *thick fog* while the earth was being shaken; and, on the 26th, she says, "we had a violent northerly wind, with rain, which *was considered very unusual at the season.*" (*Geol. Trans.*, i. 415. 2d series.)

The last remark leads naturally to the main subject of the present essay, namely,

Violent Winds and Hurricanes; which, as we have seen, have attended the incursions of ravaging insects in the West Indies (p. 610.), the meteors in America [296, 297.], the aurora (298.), and earthquakes and volcanic eruptions generally. But it is impossible to enter on this topic without connecting it with another, *the temporary changes of climate*, the rains, inundations, and tempests, &c., of the last few years.

During the last year, "tremendous gales" and hurricanes were most frequent; and the almost constant position of the wind in the w. and s.w., during the autumn and winter of 1833, produced distress and destruction amongst mercantile and nautical interests scarcely ever paralleled. Ships were detained more than three months in the Channel, whilst vessels from the westward and southward made incredibly short passages.

On Jan. 26. 1834, the master of the Scilly packet-boat returned to Penzance for the *thirtieth* time, having been unable to get across with the mails. (*Shipping List.*) The Nimrod

* I am inclined to think that this phenomenon will explain the dubious statement of Tacitus (*Ann.* xii.); on which Dr. Daubeny has commented (*Description of Volcanos*, p. 62.), as well as Dr. Hibbert (*On the Extinct Volcanos of Neuwied*, p. 254.). The fire in the country of the Juhones is just as likely to have arisen from the extreme heat of the weather setting fire to the soil in the first instance, as from an accidental ignition of gas; though in both cases, probably, an evolution of inflammable gas occurred.

frigate, on the contrary, ran from Santander to Plymouth in 50 hours, four days before.

Three solutions have been given of the cause of these *westerly* winds, which, in the south of England have, assumed a somewhat constant character. Some say we are receding from the sun; others, that the clearing of the wilds of Canada has so changed the climate, that the N.W. winds will prevail over to England, causing no winter in the southern counties, and producing cold at New Orleans; causing a British westerly trade wind, and driving the real trades to the south of the Mexican Gulf; others, again, attempt (as the *Quarterly Review*, xviii. 447.) to account for them by the melting of the ice in the Atlantic. Let us examine these theories in order. 1. As for the recession of the earth from the sun, of which certain German philosophers have spoken, we may safely refer our readers to the calculations of astronomers themselves, to show how unfounded are any fears connected with a known, but in this respect unimportant, fact in science.* 2. As to the clearing of the woods in Canada producing a change in the climate of England, observation tends to prove that such a supposition is perfectly erroneous.

Dr. Kelly has shown, in the *Transactions of the Literary and Historical Society of Quebec* (iii. part i. 46.), from a comparison of recent observations, and an examination of ancient documents, that *the climate of Canada has not altered during the last two hundred years*, and that, consequently, no change can have been wrought in Europe, within the last few years, on that account. The winds which prevail in that colony are, he says, chiefly from the W. and S.W.; and Mr. C. R. Redfield (Silliman's *Amer. Jour.*, xxv. 114.) considers these winds as part of the circuit of the trades to the N.E. from the Mexican mountains, drifting through the valley of the St. Lawrence †, and, when not high, causing the heat at Montreal sometimes to equal 93°. That the climate of Europe, within the course of centuries, has changed, there is no doubt; the vineyard countries of England, France ‡, and Germany have most assuredly decreased in temperature; and, to account for a recent partial amelioration, certain writers have attributed it to the clearing of woods nearly 4000 miles from the British

* The earth's annual recession is about a thousandth part of its distance from the sun. To this the German writers attribute our *wet summers* and *decreasing vegetation!*

† Sir John Herschel accounts for the westerly winds of the Atlantic, by a compound resultant motion of the earth and the air. (Lardner's *Cyclopædia, Astronomy*, p. 132.)

‡ In 1552-3 the Huguenots drank Muscat wine made at Macon: it is not now made there. (*Arago.*) Other examples are given in the *Quarterly Review*, xviii. 207.

shores; not considering that, if such could be the cause of warmth in modern Europe, the clearing of the great forests of ancient Europe must have heightened the temperature also.* It has been proved that the climates of Palestine and Rome, and the adjacent countries, have not changed during the last 3000 years; and, therefore, as the west and the east have maintained their equilibrium, the recent changes of climate in Europe must be attributed to another cause. That cause I consider to be simply the occasional increase or revival of the volcanic action, which hundreds of extinct craters in France and Germany prove to have been infinitely more active than at present. Be it as it may, Canada can have nothing to do with our prevalent winds, nor with alternations of climate in England.

3. The third class of writers attribute the cause to the melting of ice in the Atlantic.† As this hypothesis has been received almost generally, and been made the agent of results which I think not referable to it, we must examine it somewhat in detail.

I have made allusion to this as the cause of cold in certain years (p. 300.); but it is impossible to allow some of the arguments drawn from occurrences of the kind, as stated by a popular writer in the *Quarterly Review*, to hold good, without refusing the assent of our *senses* to a contrary conclusion as far as affects the year 1833.

"During the winter of 1348, the whole coast of Iceland was frozen, so that a horseman might have ridden from cape to cape round the island. Such a circumstance had never occurred before since the country was discovered; and it seems probable that in this winter the accumulation of ice began, which has blocked up the coast of East Greenland. (*Quarterly Review*, vii. 52.)... Having resisted the summer, it took root, as it were, along the coast, and has continued to increase, producing effects upon the climate of the north, *which we* ‡

* A Mr. Williams published, in 1806, a work on the climate of Great Britain, in which he attributed our wet summers to the practice of making fences of hawthorn (*Cratæ`gus Oxyacántha, L.*), instead of holly (*I`lex Aquifòlium L.*). He states that, during the 60 or 70 years preceding the date of his book, the quantity of hawthorn hedges had produced a material effect on the atmosphere.

† Amongst these is *M. Arago*, who published this theory in the *Annuaire* for 1834, and is, it is said, engaged in writing a work on "climate."

‡ To show the inconsistencies of reviews, we take the following contradiction of the statement in the text:—"It is a common, but we believe an *erroneous opinion*, that the temperature of our climate has regularly been *diminishing*, and that *it is owing to the ice having permanently fixed itself to the shores of East Greenland*, which, in consequence, from being once a flourishing colony of Denmark, is now become uninhabitable and unapproachable. *We doubt both the fact* and the *inference!*" (*Quarterly Review*,

ourselves in some degree experience." (p. 53.) "There is good reason for supposing, that even *our own climate* has undergone some changes since his time" (Horrebow, about 1735). "Iceland will probably become colder, *unless some earthquake should break up the belt of ice which forms a rampart round East Greenland.*" (p. 71.)

That, about the time here spoken of, the phenomenon alluded to took place, there is, I believe, no question. Arago says, Greenland was free from ice in the tenth century; flourished as a colony in 1120; and that in 1408 Bishop Andrews found the coast so blocked up that he could not land. (*Annuaire*, 1834.)

"Towering icebergs formed at the same time (1347–8) on the coast of East Greenland, in consequence of the general concussion of the earth's organism; and no mortal, from that time forward, has ever seen that shore or its inhabitants." (Hecker, *Black Death*, p. 75.)

There is an indirect evidence upon the subject, which deserves notice. It appears that formerly the Priory of Chamonix, in the valley of that name, was in the jurisdiction of Courmayeur. The Priory was founded in 1099. Chamonix is on the north side of Mont Blanc, in Savoy; Courmayeur on the south side, in Piedmont. The records of the Priory attest, that there was formerly a direct path between those places through the valley now filled with the ice and snow of the glaciers, which form the Mer de Glace, and that it took eight hours to traverse. (*Ebel*, ii. 262.) The horizontal distance between Chamonix and Courmayeur is about two leagues, the breadth of the base of Mont Blanc. The present route extends full 18 leagues. In 1787, M. Bourrit and his son made a hazardous journey over the glacier, by way of the Col de Géant, occupying 17½ hours. Saussure, in 1788, was *two days* going from Chamonix to the Col de Géant, 5½ hours from Courmayeur. But the dangers of this pass are now so great, that *only one Englishman*, and that in 1786, has been known to attempt it. The height of 10,500 ft. on Mont Blanc corresponds in the isothermal scale with the level of the sea under 83° of N. latitude, and above that height there is nothing but ice and snow.* Now, it certainly appears from this, that, previously to 1348, the Alps were as free from ice as the coast of Greenland; and there are other facts which point out that there is a coincidence between the highlands of

xvi. 170.) In a subsequent volume the same review goes into a series of proofs to establish *both fact* and *inference!* (see xviii. 205.)

* See *M. N. H.*, vii. 84. There is an unintentional error in the wording of the note in that page, which the present allusion will correct.

Europe and the polar basin.* The coincidence may, however, and probably does, only belong to the *accumulation* of ice and snow. Observation almost establishes this fact: for the diminution of ice in the Greenland seas, however produced, by causing an influx of ice into lower latitudes, *might temporarily* chill, to a limited extent, the European, as it certainly does the American, continent. If the "*earthquake*" alluded to by the reviewer in the *Quarterly Review* (vii. 71.) should break up the belt of ice round Greenland, or if *volcanic heat* should melt away the foundations of the rampart, the lower latitudes would become cooler *within the sphere* of the ice's influence. The popular writer to whom I before alluded actually asserts that this was the case all over Europe and America in the year 1818, in consequence of the breaking up of the ice previous to 1817.† He states, that for two years America, and the whole of Europe as far as Malta, were chilled, and that "in *New Orleans* the ice was 2 in. thick, the ground covered with snow, and the thermometer down to 27°; that Etna was unusually loaded with snow, and the whole Continent was visited with unusual *storms of wind* and *torrents of rain;*" and adds, that, "as these phenomena have occurred with wind from the *westward*, they are everywhere ascribed to the approach and melting of ice in the Atlantic." (*Quart. Rev.*, xviii. 147.) It is a certain fact that the year 1816 was a miserably cold and stormy year, and that Etna was not alone in the enjoyment of an unusual mantle; for Ritter, in his "*Beschreibung des Mont Blanc*" (p. 103.), says, that, on Mont St. Bernard, "*Im Jahre* 1816 *verging keine Woche ohne Schnee im ganzen Jahre*" (not a single week passed without snow, throughout the year). (See *M. N. H.*, vii. 440., note ‡.) But will this warrant the conclusion of the reviewer. "that the floating and thawing of such vast bodies of ice in a low latitude have been the causes of those extraordinary gales of wind from the *west* and *south-west*, *accompanied with sleet and snow;* and produced those storms and inundations which have visited not only these islands, but a great part of Europe, during the first three months of the year 1818; and that, unfortunately for us, *so long as* such fields and islands of

* Mr. Bakewell (*Travels*, ii. 30.) has remarked a coincidence in the *red snow* annually found in the Alps, and on the shores of Baffin's Bay. The same intelligent writer has alluded to *evaporation*, in both cases, as the main agent of nature in preventing unusual augmentation of snow. (p. 33.) It may be also added, that there is a correspondence in the periodical advancement and retreat of the glaciers, and the increase and diminution of the polar ice. On the effects of the increase of the glaciers, see *Quarterly Review*, xviii. 205. See also Mr. Brown on Red Snow, *M. N. H.*, VI. 557.

† M. Arago says the disruption took place in 1813–14.

ice continue to be carried away from the polar seas, and melted in the Atlantic, *we have nothing to expect* but a *raw, moist, chilly* atmosphere, with *westerly winds* both *summer and winter?*" (*Quarterly Review*, xviii. 447.)

If these assertions be correct, the test may be safely applied to the years 1832, 1833, 1834, during which years "such fields and islands of ice" *have been* "carried away from the polar seas, and melted in the Atlantic," as I shall proceed to show: yet what becomes of the parallel afforded by these years to 1816, 1817, 1818, when our atmosphere has *not* been "raw and chilly?" To make the parallel as strong as possible, let us take two or three preliminary facts. In 1818, there was ice at *New Orleans* 2 in. thick." (*Quart. Review.*) So, in November, 1833, very early frosts set in, and the crops were ruined. The ice in the ponds was $1\frac{1}{2}$ in. thick. Full 1000 acres of land were in consequence abandoned; and, instead of 120,000 hogsheads of sugar, only 50,000 were expected to be produced. (*New Orleans Paper.*)

It appears, also, that, in 1831, the ice was not removed from the shores of Newfoundland late in the month of June (Redfield, in Silliman's *Amer. Journ.*, xxv. 134.); and that it blocked up the Strait of Belle Isle in the month of August. (Baddeley, in the *Quebec Transactions*, iii. 144.) In 1833, the inhabitants of Newfoundland enjoyed no summer. In May, the thermometer was 21° below the freezing point; on May 11., it stood at 19°. In June, it was seven times at or below 32°. In July, it was only eight times above 50°, three times below 40°, only ten days above 70°, and it was three days below temperate. In August, there were only eight nights above 50°; three were below 40°; and only three days above 70°. *

Accounts, also, up to Nov. 15. 1833, mention, that great cold had been felt in Canada, in the autumn and summer, which had prevented the crops from ripening; and that early frosts had set in, doing great damage. Capt. Back's despatches state, that the winter of 1833-4, in the northern parts of America, was more tremendously cold than ever before known.

On Mont St. Bernard, unusual accumulations of snow took place in Dec. 1833, and *avalanches were frequent*, causing great damage.† On the *Pyrenees*, however, *no snow* had fallen through the winter of 1833, up to Jan. 12. 1834; but there were there dreadful rains, attended with *thunder and lightning*, which, on that day, struck the tower of the church

* These particulars are contained in a letter from a Newfoundland merchant to a friend in Poole, published in the *Dorset County Chronicle*.

† *Journal de Lausanne*. The falling of the avalanches would imply a degree of *warmth*, as well as the accumulation of snow a degree of cold.

at Orthez. (*French Papers.*) On March 25. 1834, snow fell on the mountains of Abruzzo, near Rome: there had been no snow there at that period since 250 years.* In the *Archives of the Academy of Incoronati*, it is said that snow fell, and remained a whole day on the ground and houses, on March 25. 1595. The winter of 1833 was particularly mild at Rome. These cases are mentioned in order to show that, as in 1816—1818, there have been instances of *unusual cold* in these last three years.† We will now try how far there has been a disengagement of ice, and a melting thereof in the Atlantic. On reference to the *Quarterly Review* (xviii. 447.), the state of the ice in 1817 and 1818 will be found. The following examples not only parallel, but continue, the statements there made.‡

On Dec. 1. 1832, the Sir E. Codrington and the Jonah were lost in the ice at the entrance to the St. Lawrence. On Feb. 26. 1833, the Emulous packet met with *field ice* off Nova Scotia, in long. 30° w.; and, in lat. 43° N., long. 49° w., she fell in with *packed ice:* on March 4., she passed three *icebergs* in ninety-five miles' run. It is most *unusual* to meet with ice in this part of the Atlantic during winter. The Harvest Home and Mary Ritchie struck on ice, on May 9., in lat. 46°, long 45° w. The Martha was sunk by ice, on May 18., 290 miles from Newfoundland, after being eight days beset. The Lima was beset, on May 11., 400 miles off, in lat. N. 46° 20′, long. w. 45° 50′. The Waterloo was lost, on June 14., off the Banks; and the Mary White, on June 21. On June 29., the British Tar and Alloa left the Gulf of St. Lawrence: on July 3., they found Belle Isle blocked up with ice; they put back: on July 6., they passed through seventy miles of ice, some of the pieces a mile in length. They found nine brigs, two ships, and a bark standing off and on at the eastern edge of the ice, waiting for a passage; and, as far as the eye could reach, to 48° long. w., icebergs were numerous and immensely large. The General Wolf was lost, on July 6., in 46° N. 48° w.; and the Francis and Mary, off the Banks, on July 11. On March 7., the Maria Elizabeth left Cork for Newfoundland: she fell in with

* *Notizie del Giorno di Roma.* The whole of Upper Lombardy was covered with snow, as far as Milan, March 6., at which time snow fell on the Welsh hills.

† For other cases, see *M. N. H.*, vii. 299.

‡ Surely there must be a mistake in one of them: the reviewer says, the Funchal left St. John's, Newfoundland, Jan. 17. 1818, and, about fifteen miles "*westward*" of that port, fell in with ice; again, she fell in with ice in 42° lat., 250 miles "*more westerly.*" This is as bad as the *offence* which Mr. Waddington committed, when he made the Nile run the wrong way. See the *Quarterly Review*, xviii. 447., and xxvii. 215.

ice, and was dragged * by it to the coast of Greenland (in attempting a passage through it), where she was detained three months and a half. She reached St. John's, Sept. 15. In the spring of 1833, the Banks of Newfoundland were more crowded with ice than had been ever known; and I have memoranda of more than thirty other vessels lost off the coast of America, or in crossing the Atlantic, by falling in with ice. We have the authority of Captain Ross, that the ice broke up in Lancaster Sound on August 14. On October 3., the ship Lancaster was fallen in with abandoned among ice, in 45° N. 45° W. The Helen Mearns, from Quebec to Belfast, passed large icebergs, on October 30., in lat. 55° N. 38° W.; and, in 55° N. 11° W., quantities of wreck, with gales from W. N. W. On Feb. 13. 1834, a vessel reached the West Indies, which had been detained many weeks off Newfoundland. The President frigate, which took out Sir Colin Campbell to Halifax, and arrived there in the beginning of July, fell in with icebergs 100 ft. high, in lat. 44°—46° N., and long. 44°—64° W. The thermometer fell from 60° to 45°. The whole passage was attended with *cold*, *rain*, and *westerly winds*.

Newfoundland, also, during the spring and summer of the present year, has been suffering most severely from the immense accumulation of ice and snow.

The southern hemisphere has, also, during the same period, been encumbered with ice to a low latitude. The following particulars are from the log of the Arethusa, Capt. Boulton †, which sailed from Van Diemen's Land round Cape Horn, in Dec. 1832: — From Jan. 4. 1833, till Jan. 20., she was beset with ice. She fell in with it in lat. 54° 48′ s., long. 148° 57′ W. On the latter day, the ice was almost impassable in lat. 56° 59′ s., long. 93° 46′ W. This was just 5° N. of the spot where ice was seen in 1832. She left the ice, Jan. 24., in lat. 56° 51′ s., long 78° 6′ W. The Tula, in 1832, saw ice 7° nearer the south pole than the above. In 45° and 44° s., long. 42° and 44° W. the Arethusa

* This word is used in the account (Lloyd's *Shipping List*) whence I derived my information. It cannot, however, mean more than is expressed in the parenthesis.

† *Naut. Mag.*, ii. 450. A few notes may be added. On Jan. 20. the barometer stood at 29°, the thermometer at 51°

Jan. 2. he had a whirlwind, nearing the ice.
Jan. 5., whirlwind, snow, and hail; wind s. w.
Jan. 6., whirlwind, snow, and hail; wind W.
Jan. 7., no ice.
Jan. 8., whirlwind; body of ice nearly forty miles in extent.

All the time he was in the ice he had heavy seas, *variable winds*, and hard gales.

saw sea birds, whales, and storm petrels, the usual attendants on ice.

Mr. Scoresby (*Arctic Regions*) is the principal authority respecting the season when the "barrier of ice" first broke away, and afforded materials for the encumbering of the Atlantic with the masses which, we see from the above account, have, since 1816, been met with by vessels sailing to the westward. He particularises the following seasons: — 1803, *open*, weather tempestuous, wind N. E.; 1804, *close;* 1805, as usual; 1806 and 1807, close, wind N. E.; 1808, nearly open; 1809, close; 1810, as 1804; 1811, uncommonly close; 1812, *more singularly close, most formidable season* [the year of Bonaparte's retreat from Moscow]; 1813, open, uncommonly tempestuous, wind E.; 1814, open, wind S. and W.; 1815, open; 1816, *partially* open; 1817, especially open; the coast east of Greenland seen for the first time since 1607; 1818, less open, but more so than usual. (*Scoresby*, i. 276., and § vii. 284.) "In these two seasons of 1817 and 1818, the sea was more open than on any former occasion remembered by the oldest fishermen; an extent of sea amounting to about 2000 square leagues of surface, included between the parallels of 74° and 80° N., being quite void of ice, which is usually covered by it." (Scoresby, *Arctic Regions*, i. 284. See also *Quarterly Review*, viii. 203.) The map of the ice appended to Mr. Scoresby's narrative shows distinctly the extent of the change thus produced, and is very instructive.

Since the years above named, the Atlantic has never been entirely free from ice; but there have been periods, when the cold has been particularly severe, and the ice in both hemispheres has been especially disturbed.* From 1826 to 1828, ice was found floating off the Cape of Good Hope as low as 39° to 36° S. lat.; and, on April 20. 1828, the Eliza, from Antwerp to Batavia, met with five icebergs in 37° 31′ S., and 18° 17′ E., against which the sea broke violently. (Horsburg, *P. T.* 1828.) From 1827 to 1829, the coasts of Labrador and Greenland were more encumbered with ice and snow than before known.† In April, 1825, also, immense icebergs were met with, three days' sail from Newfoundland.

The cause of the disruption of the ice from the polar seas is, by the Quarterly Reviewer, said to be "*its own weight;*" and he states, as a singular *coincidence*, that the *needle became*

* Capt. Parry saw the first iceberg, in 1824, on June 16., in 60·75° lat., 55° long.

† The winter of 1828 commenced at Fahlun, in Sweden, by so great a fall of snow, in the end of September, that commerce was interrupted. (*Hamburgh Journal*, Oct. 6. 1828.)

stationary at *the time* he alludes to, 1817. (xviii. 203.) Now, there are reasons, why this is a most unsatisfactory explanation. That the *magnetic needle* might be contemporaneously affected, and that, at the period when its variation altered, a great change might take place in the earth's organism, is more than conjectural; and that fact might have pointed out a cause for the "breaking loose" of the ice less unphilosophical than has been assigned. The years 1816, 1817, and 1818 were celebrated for earthquakes; and Mr. Scoresby has actually mentioned that, on April 29. 1818, Bird (or Egg) Island, a dependence of Jan Mayen's Island, was smoking; and it is probable that there were eruptions before; for the space whence the ice was removed is volcanic.* In accordance with the state of things a few years later, we find that, in 1828, the glacier of Skideraa Jokul, in Iceland, was in eruption (*Gruithuisen*, p. 42.); and Capt. Ross states that the winter of 1829 was the mildest on record; that the season of 1831–2 was tremendously cold, and that of 1832–3 very mild. Capt. Parry states, also, that 1818 and 1825 were unusually mild. (*Third Voyage*, p. 151.) Dr. Besser† has furnished us with some particulars respecting the seasons at Kreminiec in Volhynia (in lat. 50° 5′ N., long. 23° 21′ E. from Paris), four miles from the Austrian and Russian frontiers of Brody, from 1815 to 1830, by which it appears that 1818 was an early year, and 1829 a most extraordinary season for mildness; and that, from 1820 to 1830, no frost occurred there, only snow, in winter; and that the summers were free from rain, producing famine of usual food. I can only refer, as a confirmation of my views, to the statements respecting the numerous earthquakes of 1829, given by me in VI. 301., which correspond exactly with the state of the ice at that period in both hemispheres.‡ It is easy to show, by the records of the years 1816, 1817, 1818, that the earth was generally heated at that time by volcanic agency; and the

* *Arctic Regions*, i. 166. There was, it would seem, an eruption or earthquake in Jan Mayen, on Sept. 8. 1633–4.

† *Responsum ad Quæstiones Consilii Medici Imperii d. Oct.* 15. 1830 *datas, et a Consilio Medico Volhynico d. Nov.* 18. 1830 *communicatas, cum W. Besser, M. D.* The doctor says,—"Rarissima hyems fuit A. 1829, ubi via pro trahis *per quatuor menses* non interrupta duravit, *alias vix per duo menses* sine interruptione observatur." "Cerasi avium plerumque Aprilis 25. incipiunt florere. *Rarus casus fuit* A. 1818, ubi jam Aprilis 8. effloruere." He says, also, that, in 1812, the cold commenced in October; that, in 1813, melons were destroyed by frost, on May 12. (24.); and that, in 1829, snow fell in November, but melted at sunrise.

‡ One of the Andes was also in eruption in 1829. (*Boussingault.*)

state of the earth in 1827, 1829 *, 1833, 1834, tallies also with the recent descent of the ice from the poles. To what, then, can we attribute the "breaking up" and "floating away" of the ice since 1816, but to the one universal agent, the influence of an increased terrestrial heat? The year 1833 parallels, as we have seen, in all respects, that of 1818; and both periods are parallels of that of 1348, when a greater disruption of ice took place, and, in consequence, the coast, now partially free, was encumbered. The cause which has operated recently, doubtless operated in 1348; and the *blocking up* was, there is every reason to believe, occasioned by the same agency as the *breaking up*. It was accident, perhaps, which first grounded the foundation ice of the "rampart;" and the same accident may occur again. There is no reason to believe that either cold or mildness are of any fixed duration in the polar seas; and there is every reason to believe that the changes of climate there depend, in great measure, on the developement or inactivity of subaqueous and subterranean heat.

I will allow that, in 1348, the blocking up of lower latitudes might have chilled Europe to an immense extent; but there is no ground for supposing that the more recent alterations in the ice in the Greenland seas, or its frequent melting in the Atlantic, can produce such an influence on the climate of England as has been asserted. If the position of the Quarterly Reviewer be a just one, it could have stood the test I have put it to in the foregoing remarks; and, therefore, since the year 1833 has been distinguished by an intensity and duration of southerly and westerly winds, not paralleled for twenty-four years: and since those gales have been accompanied with a warmth not paralleled for twice that length of time; since, also, the present year has been hotter than perhaps ever known, and the seasons at least a month earlier than remembered; and since, during both years, ice *has been* floating into low latitudes, we ought not to attribute the gales in question to the ice, which ought to produce "a raw, moist, *chilly* atmosphere," but to a cause which, *despite the ice*, has set the air in extraordinary motion, and heated the earth throughout. What that cause is, I have already surmised.

* In 1829, Kirauea, in the South Sea, was in eruption. (*Stewart.*) In 1831, there was an earthquake in Owhyhee: the sea is said to have risen in a pyramid, four or five miles from shore, "higher than the bread-fruit trees, which are 60 ft. or 70 ft. high. (Goodrich, in Silliman's *Amer. Journ.*, xxv. 199.) In 1832, Jan. 12., Mouna Kea, in Oahu, erupted with violent earthquakes; and on June 20., Mouna Loa broke out for three weeks: the crater was filled up 50 ft. higher than the black ledge in Lord Byron's account. (*Id.*)

That the American continent, to a certain extent, may be affected by the ice, when this has received a lodgement on her shores, no one can dispute; and that a momentary passing chill may be produced, in the direction of the prevalent wind, by ice crossing that line, even in England, I would not deny; but this is the extent of the influence to which I would limit it. The inundations, hurricanes, and tempests of 1816, and even the accumulation of snow partially, in all probability, owed their origin to *electrical* agents, set in motion by the cause which filled the Atlantic with icebergs. Westerly and southerly gales, it seems, have blown on the other side of the floating ice; and, therefore, unless the American continent has been *much colder* than the ice, these winds cannot be caused by it. But it so happens, that the heat and drought experienced in Europe have been felt also in America, even in Canada, although the *coasts* of Canada and Newfoundland have been dreadfully chilled by a transported winter. It is said, that "in Virginia scarcely a night" occurred, in 1816, without frost, even in summer *; in New Orleans, the ice was 2 in. thick, &c. &c. (*Quarterly Review*, xviii. 447.) Now, can any man believe that frost in New Orleans is caused by ice melting in the latitude of 40°?† We have seen that the south of

* In Virginia, the south-west wind prevails in the summer. (*Jefferson.*)

† The latitude of New Orleans is 30° N., and its longitude is 90° 10′ W., and it is situated in the Gulf of Mexico, from which a *warm* current sets northwards, between the Bahamas and Florida, at the rate of four miles per hour, "which is not reduced to two miles till the stream has proceeded a distance of 1800 miles in the direction of Newfoundland, when it meets with a current setting to the southward from Baffin's Bay, and is thereby deflected to the east." (Lyell's *Geol.*, i. 258.) "It retains, in the parallel of 38°, nearly 1000 miles from the above straits, a temperature of 10° Fahr. warmer than the air." (*Id.*, p. 108.) Now, it is not pretended that the ice has come lower than 40°; and, even calculating the distance between 40° and 30°, in the same meridian, at about half distance between England and the spot where it was seen on October 30. 1833, still the difference of climate and the breadth of difference in longitude must upset the calculation; for we are told by a recent writer, that, even at Christmas, the heat at New Orleans is so great, that oranges, peas, and red pepper grow there in the open air. (Mrs. Trollope's *Domestic Manners of the Americans*, i. 9.) "The extreme limits of the icebergs in the northern hemisphere appears to be the Azores," or 42° E. (Lyell, *Geol.*, i. 111.) Moreover, Mr. Lyell says, on undoubted authority, that the Gulf stream "maintains an open sea free from ice in the meridian of East Greenland and Spitzbergen." (i. 108.) The lowest latitude registered by the Quarterly Reviewer (xviii. 446.) is 41° 51′, in long. 50° 53′ W., which is more than 1800 miles from the meridian of New Orleans, and consequently the iceberg in question was more than 2000 miles from New Orleans; the Gulf stream, the atmosphere above, and the Carib Sea intervening. The spot is scarcely more than 120 miles from that where the Emulous met with packed ice on Feb. 26. 1833; so that this memorandum will serve for both cases. Major Rennel estimates the distance between the Gulf of

Europe was chilled, in 1832, by some extraordinary cause (*M. N. H.*, vi. 292.): and could that cause which produced ice at Smyrna, so that skating was practised *, have been the melting of a few icebergs off the Azores? Was the cold, which was felt after the meteors of Nov. 1833, produced by the ice? At that time, the coast of America was beset by ice; yet we have the evidence of an eyewitness that America was unusually warm. (VII. 388.) † Was, also, the cold which followed the meteors in Germany (VII. 299.) occasioned by ice? Yet surely so, if the positions in the *Quarterly Review*, respecting 1816, hold good. How is it to be accounted for on that theory, that, while great accumulations of snow took place on the Alps during the last winter, the Pyrenees, so much nearer the melting ice of the Atlantic, remained free? And how do the statements respecting the ice in May and June, 1834, agree with the weather in England during those months? ‡ *Less rain and warmer weather than since* 1829 marked them; and not "*a raw, moist, chilly atmosphere.*" As to the frost at New Orleans, it may be observed that, in New Grenada, from Dec. 11. 1808, to the end of Jan. 1809, the cold was greater

---

Mexico and the Azores at 3000 miles; and considers the stream to run that distance in about eleven or twelve weeks. Now, it is for these reasons that I conclude, that though the ice, to a certain extent, brought cold, and tempered the climate it passed through, the effects did not extend to New Orleans; but that the cold there, as in Mexico, New Grenada, &c., at certain seasons, had a different origin, though contemporaneous with effects actually produced by ice elsewhere. Ice at New Orleans is far more likely to be produced by a N. W. wind than a N. E. In the West Indies, I believe, ice is never naturally formed; but occasionally, when the winter in America is very severe, and the wind from the N. W., Nevis, Antigua, St. Kitt's, &c., experience sufficient cold to cause the closing of shutters and doors: but this is all the effect produced.

* The thermometer, at Tefis, in Georgia, during the winter of 1832–3, stood at 35° Fahr.; at Alexandria, in Feb. 1833, there fell snow and hail; while it rained in Egypt for six months. (VI. 292.)

† Maple sugar was made by the Indians on Dec. 31. Mr. Hildreth (Silliman's *Amer. Journ.*, xxvi. 84.) states that, at Marietta in Ohio, lat. 30° 25′ N., 4° 28′ W. of Washington, the year 1833 was even milder than 1832; and that the spring was earlier by a week. After September, *westerly winds were prevalent;* i. e. winds that blew *to*, not *from*, the ice then melting off the coast of America. Such was the case, also, in the year 1831, when the United States were affected with unusual cold during the prevalence of *westerly* winds.

‡ May, 1834, was warmer than any May since twelve years, except that of 1833: *less rain fell than since* 1829, though more than in 1833. The barometer stood higher than in any May since 1829. In June, 1834, the thermometer was higher than since 1822; and the barometer higher than in any May since 1827. *The rain was less than the average*, much less than in 1832 and 1833. The mean of the barometer only once exceeded in twelve years, viz. in 1829. From Register kept at High Wycombe. (*Literary Gazette.*)

than ever known, and *was attended by frosts.* The sky was always hazy, calm, and dry; the wind always from the *south.* This extended over the first twelve degrees of south latitude. But the climate of New Grenada is subject to severe frosts at night, even during the season of most scorching heat. The inhabitants of the country desolated by the earthquakes at Pasto, &c., in January, 1834, suffered from this most dreadfully.

Towards the end of August, 1804, the maize in New Mexico was so completely destroyed by intense frosts, that famine, and its attendant pestilence, carried off no less than 300,000 persons. Now, 1804 was a *close* season, when little ice was melted in the Atlantic; and the same may be said of 1809.

Were these frosts caused by ice in the Atlantic? Yet, why not? Again, are the horrid frosts in Persia and China, and in Africa (12° N.), caused by this melted polar ice? As has been well observed by M. Parrot, the cooling of the sea, by the melting of the ice, would be like cooling Geneva Lake with a cubic fathom of water of the temperature of melting ice: and to cool Europe this way would be still more preposterous.* M. Parrot is contending against Fourrier's theory of a central fire; and says, in continuation, that, if such a fire exists, it would be proved by the increased temperature of the sea at great depths. He proves that the temperature at sea *decreases* with the depth; and alludes to Mr. Scoresby's experiments in the deep sea between Greenland and Spitzbergen, where the heat increased even amidst ice; and justly observes, that this heat was owing to the volcanic mass below.†

M. Parrot rejects *in toto* the idea of a central heat; and considers that all the phenomena connected with terrestrial heat arise from *volcanic action*, which has existed from the earliest times; and still operates, though with much less intensity than at ancient eras. In this case I am completely borne out in my speculations by M. Parrot.

Notwithstanding, in the above remarks, I am far from wishing to deny any indubitable influence that the ice may have in producing sudden paroxysms of cold in the direction of the wind blowing across it. The chill, in the spring of 1833 and 1834, and, perhaps, an occasional coldness since, were, as I believe, occasioned by the wind bringing to our shores a stratum of "*raw moist air:*" but I dispute that the

* Considérations sur la Température du Globe, &c. (*Mémoires de l'Académie de St. Petersbourg.*) There is a paper on the same subject, by the same author, in the *Bulletin de Férussac.*

† Vide *Quarterly Review*, xviii. 452–3, where are some sensible remarks on this subject. See, also, De la Beche, *Manual of Geology*, p. 22.

ice was the *cause of the wind's direction;* the point I am endeavouring to explain. Navigators all state, that, in approaching the ice, the temperature falls; and that *variable and gusty whirlwinds* attend it: they give no idea of a *constant* breeze from the *west.* So far, then, I allow, and no farther, the melting of ice in the Atlantic to be a means of cooling our atmosphere: and this melting of the ice is, it is almost certain, the effect of terrestrial heat; so that even our "raw, moist, chilly" weather is attributable to the same cause as the dry hot atmosphere which has so recently prevailed. Paradoxically, this is to maintain that *heat* may produce cold; but *cold* can *never* produce *heat.* I will, in my next paper, consider the question more fully.

Clifton, Oct. 13. 1834.

ART. II. *Observations on some of the Diseases in Poultry.* By J. M. COBY, Esq., Member of the Royal College of Surgeons in London, of the Provincial Medical and Surgical Association, of the Medical and Philosophical Society of London, &c.

As the diseases of the feathered tribe have not hitherto attracted much scientific attention in this country, it may not be uninteresting to the readers of the *Magazine of Natural History* to be presented with a few facts and investigations deduced from the study of comparative morbid anatomy. The pathology of birds had been slightly entered upon by Mr. Youatt, the highly talented professor of veterinary medicine at the London University; and it is to be regretted that his researches, which appear to have been confined to more valuable animals, have not been extended in this department. The naturalist may possibly be able to refer to a nosological system in some of the numerous works on zoology, British or foreign; but I am not aware of the existence of any such system. Girard's *Anatomie des Animaux Domestiques*, 2 vols. Paris, 1820, which is one of the latest foreign works on the structure of domestic animals, does not, I believe, enter upon the subject of pathology.

1. *Cerebral Apoplexy or Stroke.*—The animal, when attacked with this disease, suddenly falls, appears senseless, and is found with the head bent under the neck or thorax. Every time an attempt is made to place it in a sitting or standing position, the head is constantly forced downwards below the breast, the cranium resting on the ground. There is no inclination to take food; and, when it is artificially introduced into the pharynx, it passes onward to the crop. In some instances, death rapidly supervenes; in others, some days

elapse, when convulsions in the voluntary muscles appear, and continue till life is exhausted.

This disease is, I believe, always considered to be fatal; but its nature and remote cause are, I apprehend, little known. I believe, in most, if not all, cases, it is occasioned by some vegetable poison, received into the stomach, which has the effect of exciting an engorgement of the vessels of the brain, and a consequent rupture of one of the veins or sinuses of that organ.

On the 31st of August, a fine young hen dropped from her roost almost immediately after she had placed herself upon it. The apoplectic symptoms, above described, were immediately observed; and, at the end of a week, convulsions of the extremities, and of one or both of the larynges (or vocal organs), took place; and, on the eighth day, she died. She was artificially fed and kept warm during the whole illness, and deglutition was completely effected; but the crop had not discharged any of its contents, which had been thus accumulated within it.

On examining the head, I found a rupture of the longitudinal vein or sinus near that part where in the human subject the torcular Herophili is situated; and a considerable quantity of coagulated blood was lying in contact with the cerebellum and medulla oblongata, and forced into the mastoid cells. The gizzard was distended with *Irish ivy*, which had been picked from a wall covered with it, and bounding the poultry yard. On enquiry, I find that ivy is well known to be poisonous to poultry. Its secondary operation on the vascular system of the brain or cerebellum has probably never been suspected.

2. *Emphysema.* — Chickens, when about two weeks or three weeks old, are subject to an emphysematous swelling, a collection of air, under the integuments about the neck, generally preceded by a slight morbid sound in the larynx; and accompanied with vertigo, closing of the eyelids, drooping or convulsive motion of the wings, and coldness of the whole body, which ends in death. This is a different disease from the *roup*, which is designated by a mucous or mucopurulent discharge from the eyelids, mouth, and nasal passages.

Dissection presents no morbid appearance in the lungs, or injury in the ribs; and the pharynx, œsophagus, gizzard, and the rest of the alimentary canal, are free from disease; except the ileum, the mucous coat of which I have, in some instances, found in a state of softening (or what the French call *ramollissement*), readily admitting of abrasion, occasionally attended with perforations; and, in one case, with black

marks on the peritoneal coat, opposite the disease in the internal surface. These black marks, of which the annexed is a representation, arise from a species of disorganisation, which is, I believe, peculiar to serous membranes, as I have never observed them in other structures; and, on that part of the intestinal tube being immersed in water a few hours, they disappear, and leave corresponding semiperforations. I have remarked the same appearance in the human intestines, accompanied with a softening and abrasion of the mucous tunic, and a general disease of a specific character affecting the whole serous covering of the abdominal viscera. The other morbid phenomena consist of a softening, erosion, and partial destruction of the spinal marrow, immediately adjoining the medulla oblongata, accompanied with a considerable effusion of bloody serum, and preternatural vascularity of the adjacent parts.

The extravasation of air is probably produced by the rupture of one of the axillary or thoracic air cells into which the animal has the power of inflating air from the lungs by means of numerous large tubes resembling the respiratory organs of insects. I am disposed to believe that there exists in these cases a direct communication between the cellular membrane infiltrated with air and the lungs; because, whenever I have punctured the integuments, and produced perfect collapse, the swelling and crackling have been speedily and repeatedly restored. I have not been able to trace the exact source from which the air proceeds, as the cells, even in large birds, are of delicate structure, and, in some, extend from the axilla under the skin along the neck; and, in young poultry, they are still more delicate. I hope to be able to ascertain this point, and to direct my enquiries more particularly to the state of the trachea and inferior larynx.

The morbid condition of the spinal medulla and the adjoining medullary structure is sufficient to account for the paralytic and convulsive affections of the upper extremities; but whether this state may be primary or secondary, appears to me at present uncertain. As I am engaged in the investigation of some diseases of the nervous system, which has led me to take advantage of comparative physiology and pathology, I decline at present entering any farther into this important subject.

Bridgnorth, Oct. 15. 1834.

[In V. 207, 208. are figures and particulars of a species of intestinal worm, of which numerous individuals had been found

attached to the inner surface of the trachea (windpipe) of a number of pheasants that had died. In II. 300, 301., are particulars on the conditions of the death of a hen, which had died of strangulation from a lump of cellular substance which had been formed around the trachea immediately above its entrance under the breastbone. In I. 300., and II. 288., are remarks relative to the rearing of young pheasants; and, in the remarks in I. 300., it is noticed that certain young pheasants had died "very suddenly, as they" were "throwing out their crop and tail feathers." The late Rev. L. Guilding had made this note on that fact: — "The destruction of the young pheasants may have proceeded from parasitic lice and acari. In the West Indies, these creatures are fatal; and a single acarus will sometimes kill a full-grown fowl. An account of these pests was sent [by me], with a drawing, to the conductors of the *Zoological Journal*, several years ago, who have not yet been able to insert it. — *L. Guilding. St. Vincent, May* 1. 1830."

ART. III. *Information on the Habits of a Species of Caprimúlgus (or of some closely allied Genus) which inhabits the Neighbourhood of Lima.* By Mr. ANDREW MATHEWS, A.L.S., Travelling Collector of Natural Productions in South America.

THE specimen sent is one of the male of a species which is common in the vicinity of Lima. It visits this neighbourhood in about the end of October or beginning of November. The female lays her egg (I have not seen more than one) upon the bare ground, without the least sign or preparation of a nest, and at a distance from any vegetation. One which I had watched daily, this last summer, until the young bird had become hatched from it, was laid on a "huaca" (a large heap of stones) planted around the base with grape vines; so that, had the bird preferred privacy, she might have placed her egg where it would have been more secret. The egg is of about the size of a blackbird's egg, of a dirty white or stone colour, mottled with olive and brownish green of different shades. The young is, at first, covered with a greyish down: as its feathers appear, it assumes the colour and markings of the parent. The female parent, during the period of incubation, is remarkably fearless, and will even suffer the hand to be brought within 2 ft. of her before she will quit her charge. Her colour is so much that of the ground and stones, that she, when sitting, is not readily observed. When she does quit her charge, it is only for the distance of a few yards;

and if she observes you touch or examine the egg, becomes restless, keeping her wings in motion, and uttering a low twitter of uneasiness. The male sits upon the ground during the day, beneath the branches of the vines, and usually commences his evening flight about five or six o'clock. Whilst the bird has been on the wing, I have frequently observed a sudden twist or bend of the head; but, from the quickness of its flight, and from its usually flying high, I cannot confirm or contradict what is advanced in III. 32, 33. [By Mr. Dillon, on the use of the pectinated claw of the nightjar. See also III. 188. 296. 449; IV. 275. 425.] That the South American species have the serrated claw may be seen by the specimen I send. In its stomach I found, on dissection, a quantity of mosquitoes and some coleopterous insects [this is the instance referred to in p. 560.], which were taken, probably, while it was on the wing. I do not think the bill suited to taking beetles upon the ground. These birds leave the neighbourhood of Lima in April or May. The specimen I send was shot at Lurin, about twenty miles from Lima, in the end of July: the species is called "durmidero" by the natives. As I am not well supplied with ornithological books, I shall feel obliged for information whether it be a described species, and, if it be, what it is called. I wish the specimen to be presented to the Linnæan Society for their collection.

Lima, August 22. 1832.

We are sorry that we have so long withheld Mr. Mathews's communication, and present to him our apology for doing so. Our motive for the delay has been the wish to get the species identified with some one already described, or get it clearly distinguished as an undescribed one. We have not, even now, succeeded in attaining either object. One ornithologist, to whom we had submitted the specimen and account of it, has replied, — "I have searched the different ornithological works to which I have access, but without finding Mr. Mathews's goatsucker. It is probably undescribed." Another naturalist, versed in ornithology, to whom we had sent the specimen and account, has remarked in reply: — "I have here no means of ascertaining its systematic name; but can nevertheless assure you that it is a species very well known, so that a technical description of it would be unnecessary. It is one of those curious species with pectinated claws, but without any vibrissæ on the rictus, the absence of which has occasioned many naturalists to doubt that the former

structure is ever used to clear from the mouth the hooked claws of coleoptera, &c.; but, I think, without sufficient reason, for the beetles might hitch to the rictus as easily as to the vibrissæ, and more so. Mr. Mathews's account of its habits is interesting, and in these it resembles very closely the common species of this country; but one curious circumstance is mentioned, that of its laying but one egg, which, should it prove to be invariably the case, would be a remarkable anomaly in the genus. I wish that its note had been described."

To complete our account of the specimen of *Caprimúlgus* sent by Mr. Mathews, we add a technical description of it, which the ornithologist first alluded to above has supplied.

Length, from the point of the beak to the end of the tail, $8\frac{1}{4}$ in.; from the point of the beak to the gape (rictus), seven eighths of an inch; width of mouth across, 1 in. The whole of the upper surface of the back, a speckled ash grey, marked on the top of the head with dashes of black and streaks of the same colour on the back. The general colour of the upper surface of the wings rather lighter than that of the back, beautifully mottled, and various feathers distinctly marked with black at their bases, and yellow at their points. The primaries black, dusky towards the tips, with a minute edging of white. The bird was a male; and the first four primaries are marked with an oval spot of white which pervades both webs. The wing, from the point of the shoulder to the end of the second primary, which is the longest, measures $6\frac{3}{8}$ in. The two centre tail feathers are of the same speckled ash-grey colour as the back, but are barred obliquely with black; and, when the tail was closed, these two feathers hid all the others: the outer, four on each side, are mottled over their proximal half [the half nearer the body] with black and white; the distal half [the half farther from the body], black, with the sexual white spot in the centre of the black, extending over both webs. The chin freckled with reddish brown and black. The throat white; this colour extending on both sides to the space behind the opening of the ear. The whole of the under surface of the body and the wings pale rufous brown, transversely barred with dusky black. The under surface of the tail primaries alternately barred with black and white. The bird, in smallness of size, as well as in the want of vibrissæ on each side of the beak, resembles the swallows; but in every other respect is a perfect *Caprimúlgus*, and has the middle toes nearly as long again as the outer ones, with the claw broad and strongly pectinated.

To keep our clew of the notices in this Magazine on certain *C*aprimúlgidæ, mostly the *C*aprimúlgus europæ`us, wound up, we now add V. 726.; VII. 156. 347. and note *, 511. 559, 560. 633., to the references given in V. 674.

In IV. 424., V. 241., VII. 511. 559., objections are expressed to the application of the names goatsucker, *C*aprimúlgus, and Nyctichelìdon, to the species of birds to which they are applied, as not any species of them either sucks a goat; milks a goat, which deed the word *C*aprimúlgus imputes; or is a night-swallow, strictly speaking, which the word Nyctichelìdon, taken literally, implies it to be. O. has remarked, in VII. 511., that a species which visits Lower Canada is called by the inhabitants "the mosquito hawk;" and he has added, that this is "a more appropriate name, as relates to the habits of the bird, than goatsucker." Mr. Mathews has informed us above, that the species which is the subject of his notice had fed on mosquitoes and coleopterous insects. In relation to the name of the species which visits Britain, a correspondent has recently asked as follows:— "Would not the name Nyctivociferàtor europæ`us be preferable to *C*aprimúlgus europæ`us *L.*, or to Nyctichelìdon europæ`us *Rennie?* All the kinds of the genus '*C*aprimúlgus' are addicted to screeching: some in the night. — *W. H. Y. Sept.* 10. 1834." As we suspect that our correspondent's proposed generic name of seven syllables, the first two Greek, the rest Latin, will scarcely be well received, we may state that he had previously proposed, in a communication, dated July 5., "Vociferàtor europæ`us," as the name of the nightjar which visits Britain. "Vociferàtor," as a generic name, is free from the literary objections to which "Nyctivociferàtor" is subject. All these words about names, which we have for once indulged in, may serve to instance reasons, however humble ones, for the opinion on generic names which Dr. Lindley has expressed, and other naturalists have concurred in. (See VI. 232.) His opinion is this:— "So impossible is it to construct generic names that will express the peculiarities of the species they represent, that I quite agree with those who think a good *unmeaning* name by far the best that can be contrived."

Previous contributions by Mr. Mathews will be found in II. 67. and III. 431. In VI. 314—319. are figures and descriptions of some marine animals which Mr. Mathews had discovered, and a notice of the fact of his having collected many species of plants in South America, some of them not previously discovered ones, and of Dr. Hooker's having named a South American plant, Mathéws*ia* foliòsa, in honour of him. Besides Mr. Mathews's attention to, and acquisition of, objects

of these classes, he collects, he has informed us, " nests, eggs, and skins of every kind :" and it is a pleasant duty to remark, that the state of the specimens sent to us fully testifies his skill; the colour and plumage being well preserved, and the skin entire, soft, and flexible. Mr. Mathews, at the date of his communication, stated, that any orders sent to him, might be directed for him, to the care of John MacLean, Esq., Lima; " as my letters will be taken care of, whatever part of Peru I should happen to be in." We received the skin of the *C*aprimúlgus through Mr. Hunneman, 9. Queen Street, Soho, who, we believe, is in professional communication with Mr. Mathews.

ART. IV. *Reasons in support of an Opinion advanced, that the Mackerel is not a Migratory Species of Fish.* By O.

THE frequent appearance of the mackerel (*Scómber Scómber L.*) in the shops, at periods of the year when it is not expected, has long induced me to doubt the fact of its being, as Pennant calls it, " a summer fish of passage." By reference to my journal, I find this fish has been common in the shops of the London fishmongers, the last winter, during the months of December (1833), January (1834), and February (1834). Now, if the species be migratory, as is generally supposed, these individuals could not, surely, have come from distant seas to our coasts at an unlooked-for period of the year, because the season may have been mild, to go back again on the return of severe weather; for then, it is to be observed, they again disappear. The conjecture I have to offer is, that the mackerel do not, as is the conceived opinion, migrate into distant seas when the spawning season is over; but that they then retire into the vast depths of the ocean, near their spawning quarters, beyond the reach of the lines and nets of the fishermen. I have, for many years, observed, during the winter season, after mild or turbulent weather, that mackerel are invariably to be seen in the shops; and the reason for this appears to me to be, that the instinct implanted in them to visit the shallower water for the important business of spawning, is either matured by an unusually mild and unseasonable state of the weather, or that the violence of the winds has driven them from their deep retreats in the ocean; showing, in either case, that their migrations are not into remote seas. Reasoning from analogy, in natural history, is said [V. 499.] not always to be a safe guide; but the habits of the char (*Sálmo alpìnus L.*) bear no small analogy to the

habits I impute to the mackerel; though I am aware I am comparing a freshwater fish to a saltwater one. When the char spawn, they are seen in the shallow parts of the rocky lakes (in which only they are found), and some of the streams that run into them; they are then taken in abundance: but so soon as the spawning is over, they retire into the deepest parts of the lake, and are but rarely caught. Such, I venture to suppose, may be the habits of the mackerel. This opinion is offered with deference; and it would be a gratification to have it confirmed by some who may have more opportunities for pursuing the enquiry than I have.

Clapton, Sept. 1834.

[Our correspondent's opinion is quite in accordance with that of a naturalist distinguished in his knowledge of fishes; who, farther, sees in the law of nature which impels fishes to visit the shores periodically, a beneficent provision for the welfare of man, who, without the action of this law, would be deprived of many of those most valuable to him as food.

Our correspondent, the Rev. W. B. Clarke, has mentioned unusual dates of the appearance of mackerel, and other species of fishes, in VI. 291, 292., VII. 197., in his collection of facts relative to his arguments in proof of his proposition of the connection of meteoric phenomena with volcanic emanations.]

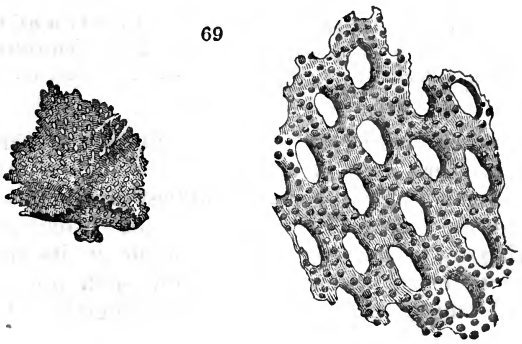
Art. V. *Illustrations in British Zoology.* By George Johnston, M.D., Fellow of the Royal College of Surgeons of Edinburgh.

26. Rete'pora cellulo'sa. (*fig.* 69.)

Synonymes.—Retépora éschara marìna *Ellis*, Corall., p. 72. pl. 25. fig. d. D. F.; Millépora Retépora *Pall.*, Elench., p. 243. (exclus. Syn. *Raii* syn.); Millépora cellulòsa *Lin.*, Syst., p. 1284.; *Turt.*, Lin., iv. p. 637. (exclus. syn. Borl. Cornw.); *Turt.*, Brit. Faun., p. 205.; *Stew.*, Elem., ii. p. 427. M. foraminòsa *Soland.*, Zooph., p. 138. pl. 26. fig. 2. Retépora cellulòsa *Lam.*, Anim. s. Vert., ii. p. 182.; *Risso*, l'Europ. Mérid., v. p. 343.

Rete'pora cellulòsa has been long known as a production of the Mediterranean, where, says Ellis, it is "found growing to shells and rocks, on the Italian shore, in irregular leafy figures, but very often in the form of a cup or drinking-glass, irregularly expanded at the brim." The British specimen here delineated has something of the latter form, and is about an inch in height with a breadth of nearly three quarters: it is affixed by a hollow, thick, and very short stalk, which expands into a shallow cup, with unequal, waved,

69



and sinuous margins. It is pure white, calcareous and beautifully reticulated; the meshes about a line in length, oval, subequal, regular, and divided by celluliferous spaces rather wider than their own shortest diameter; the cells immersed, quincuncial, leaning, with the apertures looking upwards, a little prominent, round with a small tooth on the distal edge: they open only on the superior or inner aspect; for the under surface of the polypidom is imperforate and almost smooth. Of the polype architects very little is known; but they are said to be "very vivacious," and so industrious in their vocation, that their building rises with a rapidity which has extorted an expression of wonder from several observers.

To Mr. Bean of Scarborough I again tender my thanks, for the liberality and kindness which induced him to entrust his valuable specimen of this our prettiest zoophyte to my examination. It may be regarded as a new addition to our native list; for although, in the *History of Zoophytes* by Ellis and Solander, it is said that "this elegant little coral is found now and then on our coast," and we find it introduced into the works of Turton and Stewart, yet the evidence appeared so slight and unsatisfactory that the Rev. Dr. Fleming has rejected it; influenced, perhaps, by the fact that the latter naturalists, at least, had confounded it with the Retépora reticulàta, figured in Borlase's *History of Cornwall.* Mr. Bean's detection of it in very deep water at Scarborough, where it is very rare, renders its claim to denizenship indisputable; and I heartily congratulate him on his good fortune; for it is just one of those little discoveries over which the simple naturalist rejoices with feelings which amply repay him for the toil of much patient research.

Berwick upon Tweed, Oct. 10. 1834.

ART. VI. *Some Account of the Salt of the Mountain of Gern, at Cardona, in Catalonia, Spain; with some Facts indicative of the little Esteem entertained by Spaniards for Naturalists.* By W. PERCEVAL HUNTER, Esq.

As no description of that curious production of nature the mountain of Gern salt, at Cardona, in Catalonia, has ever appeared in any English work, to the best of my knowledge; and as, too, the place will not, probably, be visited again for years, owing to the bloody civil war raging in its environs; the following notes, taken down on the spot, however imperfect and faulty, may not, perhaps, be altogether devoid of interest.

This hill, or mountain as it is generally called, is situated near the foot of the Pyrenees, about sixty miles from Barcelona; and is, according to the measurement of Bowles (*Introduccion á la Historia Natural de España*, p. 249.), from 400 ft. to 500 ft. in height, and one Spanish league, or nearly four English miles, in circumference. The depth is unknown, as well as the nature of the rocks on which it rests, but the formation of the surrounding country is red sandstone and red marl. The whole hill is of the purest solid salt, with the exception of a few mounds of earth scattered about the base and sides, on which I collected from twenty to thirty species of plants; but, from my utter ignorance of botany, I could not write down their names, and as I was unable to procure any thing to dry them with, in the wretched dirty little town of Cardona, they withered up, and I threw them away as useless, the next day, on my road to Cervera. The prevailing colour of the salt, from the foot to the summit of the hill, is of an icy-coloured white; in some places, however, is seen a variety of snowy white, as well as patches of red, green, black, and blue, which, decked out, as they appear to be, in all the colours of the rainbow, fluted at the sides, and ending in peaks, present, when the sun shines, one of the most beautiful sights imaginable.

All these varieties, when broken with a hammer, and ground down into powder, become of the same colour, and have the same delicious flavour as the white; next to which the red or rose-coloured is the most common: it is cut up into slabs and used as a most efficacious remedy against rheumatism, cramps, and other pains in the body and limbs. When I visited these saltworks last November, the workmen were busily employed in cutting these slabs (*ladrillos*, as they call them; 1 ft. long, 4 in. wide, and $\frac{3}{4}$ in. thick), of which 60,000 had already been sent to Seville as a remedy against the cholera morbus. They

are well soaked in brandy, the *administrador* of the *Salinas* informed me, heated as hot as the patient can bear them, and then applied to the feet. The red variety also is chiefly employed in the various ornaments, crosses, rosaries, candlesticks, &c., &c., which are manufactured by hand, in the most elegant manner, by a carpenter of Cardona. Some of these ornaments I sent to England from Tarragona, and am happy in having it in my power to contradict the prevalent notion, that, though in Spain they are as hard and durable as the vases, &c., made of Derbyshire spar in England, on arriving in this country they immediately melt, owing to the humidity of the climate. A temple, and a pair of candlesticks, have been in England since January; and, on my opening the case containing them, last week, I found that, though they had rather a moist feel, they exhibited no signs of decay, and I hope and trust they will long remain in a sound and perfect state among the other curiosities of my collection.

A river, or what, like most Spanish rivers, would be termed in England a trout stream, flows along about a stone's throw from the salt hill, into which trickles a small streamlet, whether produced by the dissolving of the salt, or originating in some spring near, I could not discover. I tasted the water near its entrance into, and at several places lower down, the river, but could not discover any thing brackish or unpleasant in it. During the heavy rains, however, which occasionally fall in Catalonia, rendering the high roads, which, as in most parts of Spain, are at other times excellent, more like ploughed fields than thoroughfares, an immense quantity of salt is, the *administrador* informed me, washed down into the Cardonero, and the fish are destroyed for leagues. The salt, however, must afterwards evaporate [?], as no deposit can be made of it in the bed of the river, judging from, as I have before observed, the perfectly fresh taste of the water.

Bowles, according to Patrin (*Histoire Naturelle des Minéraux*, v. 370.), states that the sal-gemma of Cardona has the property of decomposing nitre: a kind of *aquafortis* is made out of it, and the jewellers of Madrid, who commonly make use of it, assert that it does not attack gold; "une observation," remarks Patrin, "qui seroit fort singulière si elle seroit confirmée. Il seroit à désirer qu'un chimiste voulût bien vérifier ce fait." In order, therefore, that this fact may be verified by experiment, I enclose a specimen of the rose-coloured variety, and also one of the salt in its purest, or rather, I should say (for it is all pure), its most powerful state, which, as you will observe, is transparent, and in many re-

spects closely resembles ice, in order that it may be analysed by some competent chemist.

[We purpose to send the specimens, as soon as we have a printed copy of our correspondent's communication ready to be sent with them, to some friend versed in chemical analysis, whose report upon the salts we hope to give in a future Number.]

Notwithstanding the immense quantity of salt which might be drawn from these works, sufficient for the supply, not only of all Spain, but, I might perhaps say, the whole of Europe, such are the absurd regulations prevailing in every branch of industry in that lovely but unfortunate country, that the sale of it is confined to a circle of about seven leagues, including the large manufacturing town of Manresa: beyond which it is contraband. The surrounding country, though patches of the most beautiful woodland occasionally occur, has, for the most part, a sad, dreary, desolate look: for miles and miles, with the exception of here and there a train of asses or mules laden with sacks containing salt, and the whirr of a covey of red-legged partridges started up from their heathy roost, not a sound is heard, not a living creature is seen. The rugged barren nature of the country, indeed, joined to the fierce vindictive character of its inhabitants, had the effect of scaring the French off during the Peninsular war; and the castle of Cardona, which, though situated on an eminence, and strongly fortified, is by no means impregnable, was one of the very few fortresses which never, during that six years' bloody warfare, received a French garrison within its walls. It was also the only fortress never taken during the war of succession, but was delivered up in 1715, after the glorious but fruitless defence of Barcelona by the Catalans, against the united forces of France and Spain: a defence unparalleled in the annals of history, save by those of Gerona and Saragossa in later times.

There are thirty-five labourers employed on these salt-works, who receive five rials, about 13*d.* a day; and twenty guards keep watch night and day in order to prevent any of the salt being stolen: such is the wretched character for robbery and murder borne by the surrounding inhabitants; a character, indeed, which seems vindictive in the extreme. Nowhere, in any of my rides in Spain, did I meet with crosses, those Spanish signs of blood and vengeance, in such numbers as on the by bridle-road from Cardona to Cervera.

The salt mountain formerly belonged to the Duke of Medina-Celi, and the manner by which it fell into royal hands

is rather amusing, and was told me with great glee by my host at Cardona. Charles III., the only wise man in his family, as the Spaniards call him, hearing of the great value of the mountain, determined to get it into his own clutches; and for that purpose observed carelessly one day to the Duke of Medina-Celi, that he understood his salt possessions brought him in a large annual rent. "A mere trifle," replied the duke, who, like all Spaniards, wished to conceal his wealth, naming about one third of the actual amount. "If that is the case," rejoined the king, "I will give you double, and make as much more out of them as I can." To hear, in those despotic times, was to obey; and thus the Duke of Medina-Celi lost one of the fairest possessions of his powerful house: for, as may easily be imagined, from the proverbial good faith of a Bourbon, after the death of that king, the promised tribute was never paid, and they now belong entirely to the queen regent, who farms them out to a merchant at Barcelona.

"Spain," said Bowles (an Englishman by birth, but a Spaniard by adoption, who was employed by Charles III. to inspect and report on the then state of the mines), sixty or seventy years ago, "is, to the naturalist, a virgin land" (*una tierra virgen*); and such — in spite of her beautiful marbles, unrivalled by those of any country upon earth; her noble forests; her numerous mines; and splendidly plumaged-birds (among them the roller; the bee-eater, which I met with in May last, as common as swallows, along the banks of the Tagus, between Toledo and Aranjuez; the azure-winged jay, &c.), vying with the most magnificent species of the torrid zone, in brilliancy and variety of colouring — she has since continued, and appears still destined to remain. No one, indeed, in their senses, would *naturalise* in a country, where, in addition to the chance of being stripped naked, soundly bastinadoed, and left tied to a tree all night (for such is the mode of punishment inflicted by those worthies, Spanish robbers, on any person who has the misfortune to fall into their clutches, and whose purse does not appear to them sufficiently well lined with dollars), a naturalist is subject to such barbarous treatment as I received, though my passport was perfectly regular, in January last, in the Catalonian Pyrenees. For four nights I slept in dungeons on straw; one of these nights with irons of the most barbarous description on my feet; for two days and a half I was marched through the country bound, like a robber or a cut-throat, hand and foot to my horse with cords; in company with my guide, who was treated in a similar manner; under a guard of twelve armed men, to Talarn, the capital of

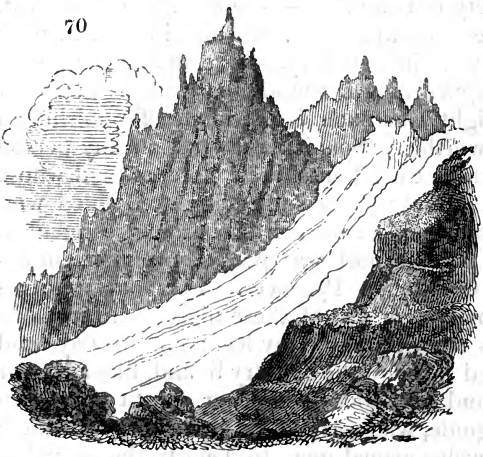
the district, and the residence of the governor. All this was owing to a hot-headed captain of volunteers taking it into his mind that I must needs be one of the two foreigners he had shortly before (such at least was the excuse made for him by the authorities, when called to account for such extraordinary conduct by the British ambassador at Madrid) received orders to search for, arrest, and send under a strong escort to Talarn to be shot! The governor, after examining my passport, and asking me a great many questions, of course set me at liberty; but, on my expressing my indignation at the brutal treatment to which I had been subjected, he had the audacity to tell me that I had no right to complain, for Spaniards were every bit as free as Englishmen, and the same thing might have happened to himself, had he been travelling in England; and that, as I had stated my chief object, in wandering about the mountains, to be, to collect *pieles* and *piedras* (*skins* and *stones*), he really did not feel very much surprised at what had happened! Such an unknown species of biped is a naturalist in Spain.

Sept. 27. 1834.

ART. VII. *Facts and Considerations on the Strata of Mont Blanc; and on some Instances of Twisted Strata observable in Switzerland;* by J. R.: *with Remarks thereon,* by the Rev. W. B. CLARKE, A.M. F.G.S. &c.

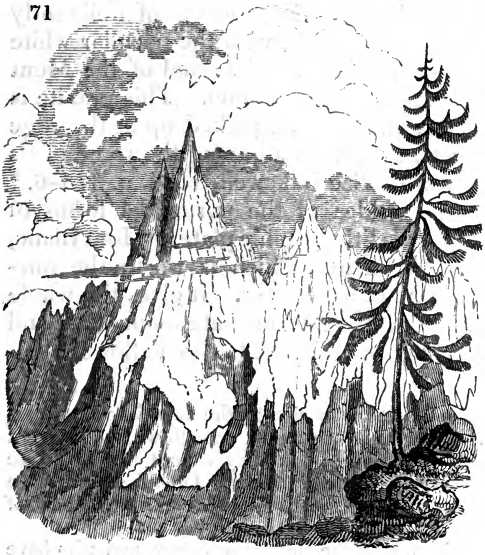
THE granite ranges of Mont Blanc are as interesting to the geologist as they are to the painter. The granite is dark red, often enclosing veins of quartz, crystallised and compact, and likewise well-formed crystals of schorl. The average elevation of its range of peaks, which extends from Mont Blanc to the Tête Noire, is about 12,000 English feet above the level of the sea. [Its highest culminating point is 15,744 feet.] The Aiguille de Servoz (*fig.*70.), and that of Dru

70



(*fig.* 71.), are excellent examples of the pyramidal and splintery formation which these granite ranges in general assume. They rise out of immense fields of snow; but, being themselves too steep for snow to rest upon, form red, bare, and inaccessible peaks, which even the chamois scarcely dares to climb. Their bases appear sometimes abutted against (if I may so speak) by mica slate, which forms the south-east side of the Valley of Chamonix; whose flanks, if intersected, might appear as in *fig.* 72. *a*, Granite, forming on the one side (B) the Mont Blanc, on the other (C) the Mont Breven; *b*, mica slate resting on the base of Mont Blanc, and which contains amianthus and quartz, in which capillary crystals of titanium occur; *c*, calcareous rock; *d*, alluvium, forming the Valley of Chamonix. I should have mentioned that the granite appears to contain a small quantity of gold, as that metal is found among the granite debris and siliceous sand of the river Arve [*Bakewell*, i. 375.]; and I have two or three specimens in which chlorite (both compact and in minute crystals) occupies the place of mica. — *J. R. March*, 1834.

71



72

[*Remarks, obligingly added by the Rev. W. B. Clarke, to whom we had submitted J. R.'s Notes.*]

The granites of the Mont Blanc have already been ably described by various geologists; as Saussure, De Luc, the writer in Ebel, Mr. Bakewell, &c. The latter author has given a coloured view of the Aiguille de Dru as a frontispiece to

vol. ii. of his *Travels in the Tarentaise;* and a description of the rocks, ii. 12. The granite is not always a "dark red," for the glaciers are strewed with blocks and fragments of differently coloured granites; and, among others, with the peculiar white granite from the summits of the Aiguilles and of the Mont Blanc, which are, perhaps, the most common. This granite is traceable by its character, and may be picked up at the edge of the ice on Montanvert, as well as all along the route of its transport, as far as the Jura. See Bakewell, vol. i. p. 375–6.* J. R.'s sketches give a good idea of the pyramidal forms of the aiguilles. There is a large lithographic plate of Mont Blanc, taken from Servoz, by Villeneuve, which is worth the purchasing, if it fall in the way of a collector. It gives the whole range from Chamonix, with the intermediate mountains, and the vale between it and Servoz.† Mr. Charles Fellows, a fel-

* [This state of alpine strata has given rise to the two following comprehensive speculations. They scarcely consort enough with the present subject to be very fitly attached here; but they cannot fail to excite welcomely the imagination of the general reader. On this account we hope that neither Mr. Clarke nor J. R. will disapprove our attachment of them.

"Those naturalists who have seen the glaciers of Savoy, and who have beheld the prodigious magnitude of some fragments conveyed by them from the higher regions of Mont Blanc to the valleys below, to a distance of many leagues, will be prepared to appreciate the effects which a series of earthquakes might produce in this region, if the peaks, or 'needles' as they are called, of Mont Blanc were shaken as rudely as many parts of the Andes have been in our times."—Lyell's *Principles of Geology*, vol. iii.

"The rapid change which is now going on in the greatest altitudes of Switzerland, points out to us the mode in which nature is operating by decomposition, and the attraction of gravitation. When standing on the borders of the Mer de Glace, and while crossing its frozen bosom, this operation was brought most forcibly to my mind. Every moment my ears were saluted with the sound, more or less distant, of rocks precipitated from some height into the abysses below, and which reverberated over this frozen sea. The time may come when the pinnacles of Mont Blanc and other mountains which surround the beautiful valley of Chamouni, will have been precipitated to their bases, and the debris be so completely carried off as to leave, perhaps, that beautiful and fertile spot itself, the highest pinnacle of the country, a naked rock to be gazed at from a distance."—Lea's *Contributions to Geology* (Philadelphia, 1833), Introd. p. 16, 17.]

† The allusion to the Valley of Chamonix recalls to my mind that splendid and beautiful poem, upon which alone the lately deceased Mr. Coleridge might have rested his fame as one of the greatest of our modern bards. There is nothing, if we except Milton, in the whole range of English blank verse, at all comparable with the Hymn whence the following extract is made:—

> "Ye Ice falls! ye that from the mountain's brow
> Adown enormous ravines slope amain—
> Torrents, methinks, that heard a mighty Voice,

low-traveller of mine (who, in 1827, ascended Mont Blanc), has given, in his *Narrative of the Ascent*, a good view of it, with the glaciers and aiguilles, as taken from the Breven with a camera obscura; and also another from the Col de Balme; both of these convey a perfect idea of the perpendicularity of the stratification, though the former is out of proportion. Mr. De la Beche has the best view from the Breven, in his *Sections and Views*. Mr. Hawes, who ascended with Mr. Fellows, thinks Mr. Fellows's drawings rather too imaginative; and I think so too. The same remarks apply to Mr. Auldjo's views. J. R.'s sketches (*figs.* 70, 71.) are illustrative; and are, therefore, though not novel, worth preserving.

The granite of Mont Blanc is said to contain gold. Gold is very common in all soils and in most river beds; though in quantity too minute to be observable. It is universally distributed, and may be procured from decayed vegetable matter. It is obtained in small quantities near Simplon, on the route of that name: most alluvial deposits have traces of it. See the localities and river beds named by Leonhard and Phillips and Jameson. The washing of the sand of the Rhine at Baden produced, in 1827, 2317 kr. $53\frac{1}{2}$ gr. of gold; from 1828 to 1829, 2999 kr. $44\frac{17}{18}$ gr. (*Allgemeine Handlung Zeitung*, Oct. 1829.) Gold is also found in the rivers of the north of Moldavia; in the Goldbach near Audel, in Trèves; near Endkirch on the Moselle; and in the Guldenbach near Stromberg, in the neighbourhood of Coblentz. (Gruithuisen, *Analekten für Erd und Himmels-kunde*, part iii. p. 36.)

The chloritic granite, of which J. R. has spoken, comes from the Col de Géant: the red granite from the Aiguille de Blaittière. A far more striking discovery would be that of sulphur in the granite, which has been, in some cases, found. —*W. B. Clarke.*

And stopp'd at once amidst their maddest plunge —
Motionless torrents! silent cataracts!
Who made you glorious as the gates of Heaven
Beneath the keen full Moon? Who bade the Sun
Clothe you with rainbows? Who, with living flowers
Of loveliest blue*, spread garlands at your feet? —
God! let the torrents like a shout of nations
Answer! and let the ice plains echo, God!
God! sing ye meadow streams with gladsome voice!
Ye pine groves, with your soft and soul-like sounds!
And they, too, have a voice, yon piles of snow,
And in their perilous fall shall thunder — God!
Hymn before Sunrise in the Vale of Chamonix.

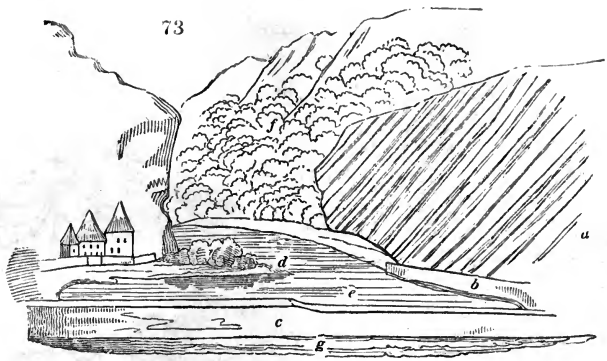
* *Gentiàna* màjor [? acaúlis], which grows on the very edge of the ice. [See p. 249.]

Twisted Strata. — The contortions of the limestone at the fall of the Nant d'Arpenaz, on the road from Geneva to Chamonix, are somewhat remarkable. [See *fig.* 75. in p. 651.] The rock is a hard dark brown limestone, forming part of a range of secondary cliffs, which rise from 500 ft. to 1000 ft. above the defile which they border. The fall itself is about 800 ft. high. The strata bend very regularly; except [at *e* and *f*], where they appear to have been fractured. — *J. R. March*, 1834. [J. R. sent with this communication a small neat copy of a sketch carefully taken on the spot; but as this did not exhibit the stratification so distinctly as one which the Rev. W. B. Clarke has since supplied (*fig.* 75.), we have only engraved the latter; into which we have endeavoured to introduce the letters *e* and *f*, in the points in which J. R. had, in his own sketch, exhibited them. The following remarks are by Mr. Clarke.]

Nant * *d'Arpenaz.* — J. R.'s drawing is too indistinct to give an idea of the stratification. The curvature of the strata is a disputed point. Saussure first stated the circumstance; subsequently, Mr. Bakewell has considered the appearances an illusion produced by the cleavage. I am compelled to differ from him, and to adhere to Saussure; who mentions that the strata, being originally horizontal, are bent upwards, and then curved backwards. (See Bakewell's *Travels*, vol. i. p. 339.) In the year 1825, I spent two days, in July, in examining the whole of the strata on both sides of the Nant d'Arpenaz, and, in fact, all that side of the Valley of Maglanz from Cluse to St. Martin; and I confess that there are so many instances of contorted and perpendicular strata in the limestone, that I came to the conclusion that the rocks at Arpenaz, as well as at Nant d'Orli, are merely portions of a great range of strata, which, owing to vast pressure and elevation of the subjacent beds, have been forced out of their horizontal position.† The falls, in both instances, rush over the face of the rock; where there is, evidently, a fissure, apparently caused by a crack upwards through the cliffs. The real curves in the beds are explained in the appended diagrams, which were made in 1825.

* *Nant*, in the language of the country, means a waterfall.

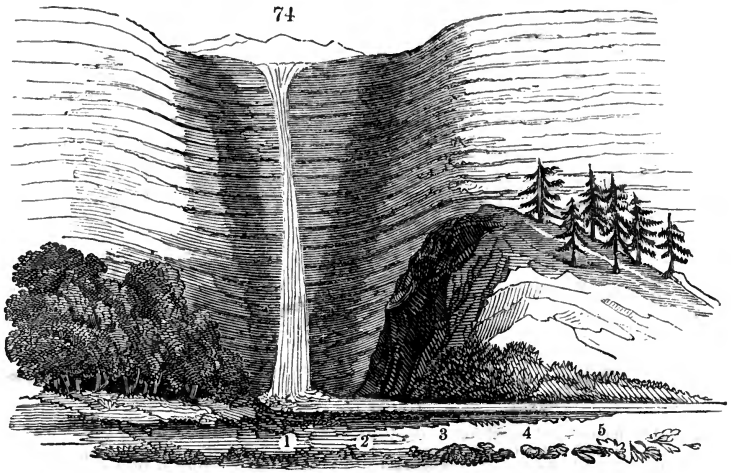
† The following passage is also corroborative of Saussure's opinion upon the subject: — "Ein schönes vielfaches Echo empfängt hier den Reisenden; weiterhin stürzt ihm zur Seite von einer Höhe von 800 Fuss der Gebirgstrom Arpenas (*Nant d'Arpenaz*) als Wasserfall herab, der auch bei geringerer Wasserfülle eins der sonderbarsten Schauspiele giebt, weil die gewaltige Felsenmasse, über die er hinabstürzt, eine *concentrische Schichtenbildung* hat, die auf das deutlichste in die Augen springt, wie Schaalen, die sich um einen gemeinsamen Kern aufsetzen, und zu bedeutender Höhe in *S-förmiger Gestalt sich emporwinden*." (Ritter's *Beschreibung zu* Kummer's *Stereorama des Montblanc-Gebirges*, Berlin, 1824, p. 31.)



Strata of the Rocks at Cluse.

a, Highly inclined rock overhanging the river, under which there is a narrow walk and wall at *b*. *c*, The parapet of the bridge. *d*, A tongue of land jutting into the river. *e*, The river Arve, which comes from behind the rock; at the foot of which is the tongue of land and the town of Cluse; the latter represented by three gable roofs of houses, and a wall round. *f*, Trees feathering the whole surface of the rocks on the right-hand side. *g*, Roadway from Cluse to Bonneville. — N.B. The Valley of Maglanz is at right angles to the valley in which the country between it and Bonneville is situated.

At Cluse (*fig.* 73.), the rocks are so curved that they overhang the river and road; and, near Cluse, the mountains are split from top to bottom, forming the Vale of Reposoir; and the same singularities are remarked at various places throughout the Valley of Maglanz. It had been my intention to draw up a paper on this valley, as offering some peculiarly interesting geological features; but the design was abandoned, from a pressure of more serious matters. The remarks of J. R. have reminded me, however, of it, and I shall add a few observations from my note book. As confirmatory of the views I have taken on the point, I may quote, at once, the words of MM. Barbe and Robert; who travelled through Lorraine and Switzerland in 1830, and published their observations in the *Bulletin de la Société Géologique de France*, 16mo, tom. i. p. 89.: — "La montagne schisteuse est singulièrement repliée, d'où se précipite la cascade d'Arpenaz, la suivante, formée d'ardoise, enfin une troisième située entre elles, au fond d'une petite gorge, forment par les directions de leurs couches, représentées par des lignes droites, un véritable triangle placé obliquement sur une de ses pointes." Nant d'Orli is the fall alluded to in the latter part of this observation; and the first grand variation from the horizontal position of the strata which occurs, is at Nant d'Orli. This is a beautiful cascade, which tumbles down the face of the rocks immediately behind the little village of Maglanz, from which it sometimes is called the Cascade of Maglanz. (*fig.* 74.) The height of the fall may be about 500 ft.: it is not of any great breadth, but the water



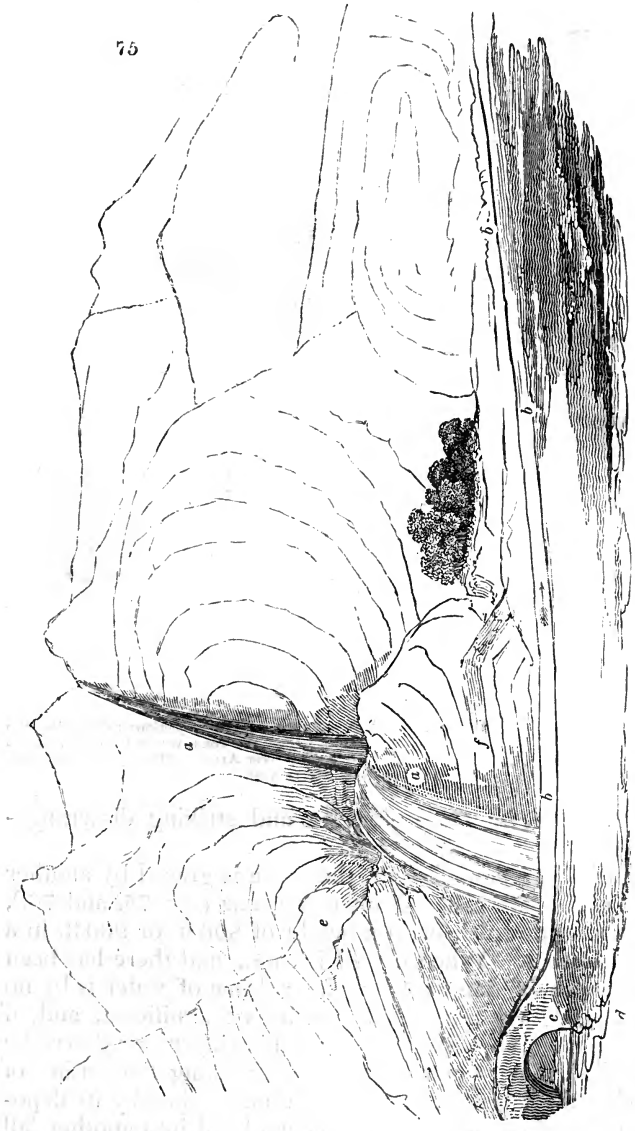
Nant d'Orli.
1 2 3 4 5, The road to Nant d'Arpenaz

falls with sufficient volume and force to work a saw-mill, built across the rivulet which carries it to the Arve.

A vast mass of ruin is accumulated at the foot of the fall, the debris of the higher rocks, and on the summit of it there are growing pines of a great age.* We might almost suppose that these fragments were hurled down by the catastrophe which caused the *fault* by which the cascade was formed, and the size of the fragments affords an additional proof; so vast are many of them, that some children who were climbing them in search of wild strawberries, cherries, &c., whose voices were long heard, and directed us to their situation, were some time invisible to us, being hidden under the shadow of these mighty "*screes*," as they would be called in Cumberland.

The strata here are bent downwards on either side of the fall, so as to form a crevice in the front of the rocks which presents the more backward strata in the regular order, over which the water is projected. *Fig.* 74. will explain this. On a first inspection, it seems as if the strata had been bent downwards, continued horizontally in a lower position, and then bent upwards again to their former level. The continued

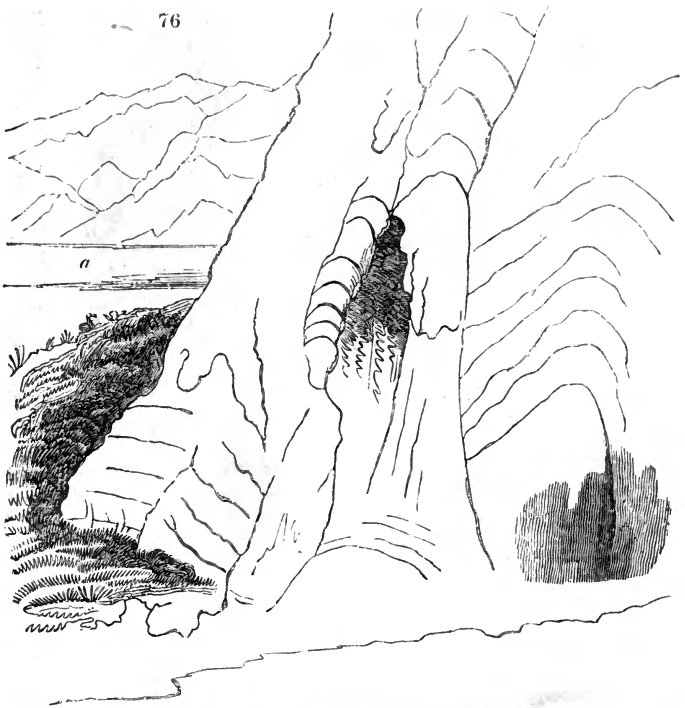
* ["What a noble tree is a mighty pine! when growing in the situation it is intended for, on the mountain side; based on the solid rock, which its huge roots enfold, and, stretching deep, bind to the parent earth; its enormous trunk, unbent by storm or time, reaches towards heaven, 'lythe by degrees and beautifully less;' its dependent limbs, laden with persistent verdure, shake icy winter proudly from their crest. Truly the pine is the mountain forest king, as the oak is that of the plain."—*Robert Mallet, Esq.* in *Gard. Mag.*, ix. 275.]



a a, The Nant d'Arpenaz [rather too much water is shown at the lower *a* in our engraving]. *b*, The road to St. Martin. *c*, The bridge over the rivulet: the latter crosses the road, and flows into the Arve. *d*, The Arve. *e* and *f*, Fractures, apparently, in the bent strata.

inclination of these strata would form a considerable angle. The thickness of the strata varies from 1 ft. to 20 ft., and in some places the thicker strata are uppermost.

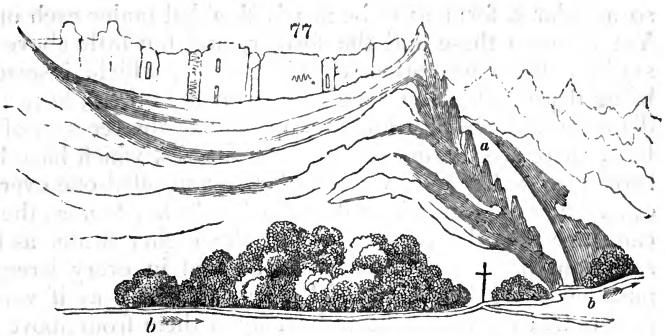
This curious appearance in the strata is however only an



Bottom of the rocks at Nant d'Arpenaz, to show the buttress-like projections that enclose the lower part of the fall. The falls go down lower than the road, which is crossed by the rivulet flowing from the falls into the Arve. *a*, The river Arve. Rise of strata to south. Dip of strata to north. Inclination of strata east to west.

indication of a far more singular and striking disarrangement.

About half a league farther, the scene is graced by another most splendid fall, called Nant d'Arpenaz (*fig.* 75. and 76.), which comes down through a height of 800 ft. or 900 ft. in a brilliant descent. When the air is calm, and there has been a continuance of fine weather, the volume of water is by no means considerable; but after rain it is magnificent, and, if by chance a brisk wind should be blowing up or down the valley, the falling water is borne away along the surface of the rocks, till it becomes an invisible mist, when by its deposition it is again condensed and accumulated into another fall of equal beauty, so continuing its descent into its rocky basin below, whence it is carried, as the waters of Nant d'Orli are, to the river Arve. The beauty of this fall is not its only charm: for the extraordinary position of the strata near it demands equal observation. Approaching it from Nant d'Orli,



a, Nant d'Arpenaz in perspective distance [represented too wide in our engraving]. *b b*, Road from St. Martin, passing in the direction of the arrows.

upon the summit of the cliffs, which here appear sunk and shattered, the traveller is greeted with a view of what he at first believes to be an ancient castle, citadeled in the mountains. Seen, as the writer and his companion saw it, lit up by the bright rays of a setting sun, while the neighbouring rocks were in shade, it had a most beautiful and magical appearance: but it afterwards was found to be produced by a portion of the rock, which, by some cause, has been tossed over from its horizontal position, and piled up perpendicularly into the fanciful forms of turrets, towers, and bastions: there are even openings in these fragments in the exact position and shape of windows. (See *fig.* 77.)

Immediately in conjunction with these, the subjacent and adjacent strata are bent upwards in their centre, at an angle of about 30°, and then continued regularly to the edge of the waterfall, which comes from a deep fissure through the mountain, and probably communicates with the feeders of Nant d'Orli, of which it may be only another branch: but of this it is almost impossible to be convinced by actual observation, on account of the steepness and distance of the mountains. On the right of the fall, instead of a horizontal position, the strata are deposited in concentric arches upon a diameter which forms the right cheek of the fissure. (See *fig.* 75.) By what extraordinary convulsion this can have been produced, there is no means of determining: for, although there are in this neighbourhood unequivocal marks of most extraordinary derangement, the extreme variety of forms which the strata assume baffles investigation. The concentric arches, above mentioned, are at first perfectly circular, but, as the middles of the strata are thicker than the extremities, they gradually become more and more eccentric, until, as they appear a few hundred paces farther up the river, they assume

so angular a form as to be nearly doubled under each other. Yet between these and the former, and but little above the surface, there are other circular arches, which, instead of being deposited in the same manner as the others, have their diameter *horizontal.* Farther up, among the recesses of the hills, there are fragments of exotic masses, which have been brought together from various places, and piled one over the other in "most admired disorder." As far, too, as the eye can trace and the rocks are bare, the higher strata, as they recede in perspective, appear to be laid in every irregular position, some depressed, and others elevated, as if various powers had been brought to bear upon them from above and below.

The most natural conclusion is, that there are, probably, large reservoirs of water on the mountains above, which, at some early period, whether by an extraordinary accumulation, or by the recession of the subjacent rocks, were precipitated in a flood to the valley, bearing with them the huge masses which lie about in so many rude fragments. But this could not have caused the contortions in the strata which are so remarkable.

The natural colour of the limestone is a deep indigo, but from meteoric causes the surface has assumed a yellowish and brownish tint, while fragments are strewed about, which have passed through the fire of a kiln at the foot of the fall, of a light gravelly red. At this spot, there is a surprising echo, which is "shown off" by the discharge of a small cannon; for the employment of which, the traveller is charged a fee which would not be unworthy of the guides who minister in the Devil's Cave, at Castleton, in the Peak.

The diagrams here given in illustration are not drawn with a view to proportion; my only object has been illustration. —*W. B. Clarke.*

[*A Postscript to Mr. Clarke's Communication, ending in* p. 630. — *The appearing of Meteors in November, in different Years.* (p. 386, 387.) *An Instance for* 1834.]— On the return [in 1834] of the period when the meteors, of which I have said so much, were seen in 1799, 1832, and 1833, I felt naturally anxious to watch the atmosphere. My health, however, did not allow me to remain up all night; but on rising, at three o'clock in the morning of Nov. 13., I saw from my window, in fifteen minutes' time by the watch, fifteen falling stars, in the direction of a line from Leo to the star Miza in Ursa major. The night was cloudless, and the moon so

bright, that the constellations could be scarcely seen; but the meteors were very red and brilliant. The wind blew briskly from E.N.E., and *freshened* after every meteor. The coincidence between these and those before seen in America and Europe (p. 289. 385. 611.) on this day of the month is curious; but those which I now mention were decidedly electrical, and of no uncommon character. One meteor fell to the south of Ursa major, and appeared to pass between Cor Caroli and Arcturus. There were no trains. Should any correspondent of the Magazine have made any farther observations, I shall be obliged for the statement of them. — *W. B. Clarke.*

REVIEWS.

ART. I. *Titles of Works on Subjects of Natural History, published recently.*

Lord, Perceval B., M.B., M.R.C.S. of the Bombay Medical Establishment: Popular Physiology; being a Familiar Explanation of the most interesting Facts connected with the Nature and Functions of Animals, and particularly of Man. Adapted for general readers. Small 8vo, 500 pages, and several woodcuts. 1834. 7*s.* 6*d.*

Lea, Isaac, Member of the American Philosophical Society, &c.: Observations on the Genus Unio, together with Descriptions of New Genera and Species in the Families Naiades, Conchæ, Colimacea, Lymnæana, Melaniana, and Peristomiana; consisting of Four Memoirs read before the American Philosophical Society, from 1827 to 1834, and originally published in their Transactions. 4to, 232 pages, with [numerous] coloured plates. Philadelphia, 1834.

Various Contributors: The Transactions of the Entomological Society of London. Vol. I. Part I. 8vo, 100 pages; 7 copperplates filled with engravings of insects, some of them coloured. London, 1834. 7*s.* 6*d.*

Bagster, Samuel, Jun.: The Management of Bees; with a Description of the "Ladies' Safety Hive." With Forty illustrative Wood Engravings, and a Frontispiece exhibiting the Queen Bee, Worker Bee, and Drone Bee, of the natural size and colour, and magnified. Small 8vo, 244 pages. London, 1834. 6*s.* 6*d.*

Purchas, Samuel, A.M., and *Bagster, Samuel*, Jun.: Spiritual Honey from Natural Hives; or, Meditations and Observ-

ations on the Natural History and Habits of Bees. First introduced to public notice in 1657, by Samuel Purchas, A.M.; now modified and republished by Samuel Bagster, junior. Small 8vo, 176 pages. London, 1834. *3s.*

Phillips, Professor: A Guide to Geology. *5s.*

Higgins, W. M., F.G.S., Lecturer on Natural Philosophy at Guy's Hospital, Author of "The Mineral and Mosaical Geologies," &c.: Alphabet of Electricity, for the Use of Beginners. 12mo, 116 pages, and 47 engravings on wood. London, 1834. *2s. 6d.*

ART. II. *Literary Notices.*

THE Report of the British Association for the Advancement of Science, on the contributions to science made at the late meeting at Edinburgh, is to be put to press immediately.

A Volume on Comparative Anatomy, by Dr. Grant, is to be published early in 1835, by M. Baillière: in 8vo, with numerous wood engravings.

Swainson's Zoological Illustrations, Second Series. We are requested to state that not any single numbers of this work can be had after January 1. 1835.

Of the *Zoological Journal*, part xx. (the 4th of vol. v.) is very nearly ready. This part will contain several plates; and there will be published, at the same time, a part consisting of supplementary plates.

Of Gould's *Birds of Europe*, part x. is published, and it is a most interesting one: the figures of the penduline tit, the marsh sandpiper, the kite, and the little bittern, are especially commendable.

The Natural History of Dogs is the subject of the next volume of the Naturalist's Library, by Sir William Jardine: the volume is nearly ready. *The Deer and Antelopes* are to be the subjects of the successive volume.

Of *Thompson's Zoological Researches* a fifth Memoir has been just published; its subject is:— "Developement of Artemis salinus, or brine shrimp, demonstrative of its relationship to Branchipus and the other Crustaceous Phyllopoda, and to those enigmatical fossils the eyeless Trilobites; with a new species of Artemis and of Apus. With six plates."

In No. iv. of the *Analyst*, November, is an entertaining article on the nidification of the wren, and another on the plumage, nest, and eggs of the long-tailed titmouse.

INDEX TO BOOKS NOTICED AND REVIEWED.

GENERAL INDEX.

END OF THE SEVENTH VOLUME.

BRITISH MUSEUM ZOOLOGICAL NATURAL HISTORY

LONDON:
Printed by A. SPOTTISWOODE,
New-Street-Square.